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Full Length Research Paper

The value of environmental management and green product design within sustainable development and competitive strategies of the companies: An examination of the energy industry

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In this study, the conceptual background of environmental management and green product design was examined and based on this, the relative importance of these aspects within the competitiveness and sustainable development of the companies in the energy industry was investigated. The analysis of the value and competitive advantages of the green product design and environmental management issues were provided. Finally, based on the examination of the role of environmental management and sustainable development, a strategic development for the relevant green product design and recommendations were provided. With this respect, the study intended to identify the key success factors in the environmental management and green product design for achieving sustainable development and competitiveness within the energy industry.

Key words: Environmental management, green product, sustainability, competitive strategy, competitiveness, energy industry, renewable resources.

INTRODUCTION

This study was aimed to examine recent knowledge about conceptual framework of sustainable development and competitive advantage from research implications based on Porter (1999) approach and it tried to provide a knowledge and discussion of the core elements of creating competitive advantage and sustainable development framework. In this respect, the subject of this study was to examine the sustainable development strategies and environmental management for competitive advantage within the energy industry.

In this study, the conceptual background of sustainable development and competitive advantage was examined and based on this, it was tried to investigate the competitive advantages of the renewable and conventional energy resources with the framework of green product design within the energy industry. Moreover, with the analysis of the value of environmental management and green product design for achieving competitive advantage, both renewable and conventional energy resources were compared. Finally, based on the examination of the competitive advantages of these resources, it was tried to develop a strategic sustainable development for the relevant energy resources and green product design.

In this respect, the leading industrial nations in the renewable energy sources industry and the leading firms that have research and development facilities for the creation of green products and environmental safety products were also examined in this study. Moreover, it was tried to evaluate the strategic contributions of designing green products by giving value to the environmental management for the firms' and nation's competitiveness and how the shifting towards green product development can contribute to their overall achievement of competitive advantage was discussed. In this context, finally to propose a strategic development for the relevant subject was tried.

The reason of selecting this study was the sense of

shifting from fossil-atomic energy supplies to renewable energy sources and the establishment of the subject on the agenda of the international community and the firms. It is implied that conventional energy supplies can hardly satisfy the global hunger for energy and according to a statement made by the International Energy Agency in July 2007, by 2012 oil production would have reached its peak and will no longer be able to meet demand (EEG-The Renewable Energy Sources Act, 2007: 4).

In this respect, it can be claimed that to make changes in global system, it is required to shift towards green product design and green energy sources such as the sun, wind, water, biomass and geothermals. Therefore, this study was aimed to examine the value of developing renewable energy resources, to compare the competitive powers of the renewable energy resources as been green products and to make an inquiry of how the competitive advantage can be enhanced through the development of the green product resources and valuing the environmental management.

THE RESEARCH DESIGN

The research approach

In this research, according to Saunders et al. (2003) suggestion, the research was conducted on the literature evidences. At this point, deductive approach was adopted for this study as deductive approach is a research approach which requires the testing of a theoretical proposition with a specific research design (Saunders et al., 2003).

In this study, valid and case-based approach was tried to be used. The study also presented information and findings obtained through the secondary sources as qualitative research approach was adopted in this study. In this way, the study differed from the experimental approaches as it was It was associated with scientific or quantitative data gathering process (Saunders, 2007). Furthermore, in this study, the research design was constituted within the light of the cases and samples that were mentioned in the literature part of the study. It can be stated that, the research strategy was a generalized plan that was structured to find answers for the research questions. The research was done through cases strategy which enabled the collection of data from a variety of cases. Therefore, according to the information gathered from the cases of companies and implications about countries, general evaluations were tried to be made for the analysis of the relationship for valuing environmental management and green energy resources with the achievement of competitive advantage and sustainable development.

Data collection

A research is a systematic process that requires the collection of data. In this study, the data was collected from secondary sources about different companies and countries as presented in the study. Later, the general evaluations and implication were tried on the basis of the aims of the study.

Research quest ns

In this study, the following research quest ns were asked.

i) What are the benefits of valuing environmental management?
ii) What are the benefits and advantages of green product design?
iii) What is the importance of creating green products such as renewable energy resources?
iv) What are the competitive advantages that are gained by the design of green products and development of renewable energy resources?
v) How can the companies and the countries gain competitive advantage and sustainable development through investing for the design of green products and renewable energy resources?

CRITICAL LITERATURE REVIEW

Sustainable development and competitive advantage

The term competitiveness stems from the analysis of firms and is usually thought to be defined at the firm level. However, recently the notion competitiveness has become a prominent concept in the assessment of countries, regions and locations. The competitive advantage of nations and the competitiveness of locations have become important topics in economic policy (Aiginger, 2006). Interest in this field has been stimulated and increased by the work of Porter (1990).

Porter (1990) outlined his conceptual framework of competitiveness first in “The Competitive Advantage of Nations”. Porter defined “the competitiveness of a location as the productivity that companies located there could achieve and he used this definition of competitiveness to understand the drivers of sustainable economic prosperity at a given location (Ketels, 2006).

Furthermore, Porter developed the Porter diamond, ranging from factor conditions, demand conditions, and related and supporting industries to rivalry and government policy. These tools were applied in the context of specific countries such as Russia, United Kingdom and Singapore (Aiginger, 2006).

When the concept of competitive advantage is examined, it is seen that competitive advantage is the basis for superior performance and understanding the anatomy of competitive advantage has crucial importance for general managers who bear the ultimate responsibility for a firm's long term survival and success (Ma, 1999). It is suggested that a firm needs a rationale to justify its existence, and that rationale is mentioned as to create value better than rivals can; to contribute to the society in ways that are unique and indispensable. These are all important questions concerning the multiple dimensions of the anatomy of competitive advantage (Ma, 1999).

The term “sustainable” considers the protection such attributes and resources have to offer over some usually undefined period of time into the future for the organization to maintain its competitiveness. Within this context, “sustainable” can assume a number of meanings depending on the frame of reference through which it is viewed. It can be interpreted to mean endurable, defensible,

bearable, and tolerable, live able, supportable, passable, acceptable, justifiable, negotiable and penetrable (Chaharbaghi and Lynch, 1999).

According to Chaharbaghi and Lynch (1999), sustainable competitive advantage is the product of enjoying both competitive advantage and strategic advantage. Viewed in this way, sustainable competitive advantage represents a process that meets the competitive needs of the present without compromising the ability of the organization to meet future competitive needs. Such a process develops organizations as a dynamic concept, encompassing the following fundamentals (Chaharbaghi and Lynch, 1999):

• Sustainable competitive advantage is conservation-oriented as no organization has unlimited resources. Given such a limitation, conscious management of existing resources is necessary.
• Sustainable competitive advantage is needs-based whereby the economic activity of the organization must be concerned with the need of the market for the goods and services produced from such an economic activity.
• Sustainable competitive advantage is future-oriented, placing itself beyond day-to-day management for the long-term development of resources to bring about strategic advantage.

In this perspective, while considering the importance of understanding sustainable development and competitive advantage, a research was conducted on the proposed topic. It can be claimed that the sustainable development and competitive advantage are important for the growth and success of the firms and the nations as if they have been achieved by valuing environmental management and green product design. Furthermore, it can be claimed that the firms or nations that work on the creation of the renewable energy resources and make innovative changes for the environmental management and sustainable energy resources will have competitive superiority and thus gain competitive advantage within the business environment or amongst the nations.

RESULTS: THE VALUE OF ENVIRONMENTAL MANAGEMENT AND GREEN PRODUCT DESIGN

In a highly competitive environment within the global context, the business firms and the countries' governments are faced with completely new environmental factors to deal with and, as a result, try to develop new ways of doing business and to develop new products to create competitive advantage and sustainable development. In this situation, the governments and the business environments consider the ways to change the features and impact of the traditional energy resources by implementing either incremental or radical changes through the development of renewable energy resources. It is seen that the business environments and the governments have been focusing on the environmental management issues and discussing the ways of developing renewable energy resources for the benefit of people, environment, earth itself, and the future of the humans. Therefore, as the natural resources of the earth are scarce, as there is a global need for energy and as the energy resources are the mainstreams of human life, in today's world, the subject of environmental management, energy protection and creating sustainable energy resources have become important topics. Further, this subject has been added to many of the countries' government policies such as U.S.A., U.K., Germany, India, Turkey, etc.

As it was noted before, the competitive advantage is important for the growth and success of the firms and the nations. It can be also claimed that the firms or nations that work on the creation of the renewable energy resources and make innovative changes for the environmental management and sustainable energy resources will have competitive superiority and thus gain competitive advantage within the business environment or amongst the nations.

In this respect, it can be claimed that to make changes in global system is required, to shift from fossil and atomic energy supplies towards a decentralized supply generated from renewable energy sources such as the sun, wind, water, biomass and geothermals. Therefore, this study, tried to examine the value of developing renewable energy resources, to compare the competitive powers of the conventional and renewable energy resources and to make an inquiry of how the competitive advantage can be enhanced through the development of the renewable energy resources and products.

In the literature, there is a body of research and study that have indicated the importance of gaining competitive superiority within the energy industry by focusing on the green products and renewable energy resources and recognizing their potentials.

In a research study by Seyboth et al. (2008), various potential renewable resources for the energy industry were examined and especially it was emphasized that heating and cooling in the industrial, commercial, and domestic sectors constituted around 40 to 50% of total global final energy demand. It was also noted that there was a wide range of renewable energy heating and cooling (REHC) technologies but they were presently only used to meet around 2 to 3% of total world demand. Several of these technologies are mature, their markets are growing, and their costs relative to conventional heating and cooling systems continue to decline. However, in most countries, policies developed to encourage the wider deployment of renewable electricity generation, transport biofuels and energy efficiency have over-shadowed policies aimed at REHC technology deployment (Seyboth et al., 2008).

Within the research studies done on the energy industry and energy resources, there are studies that examine the renewables for heating and cooling-untapped potential, that investigate the present and future markets and that compare the costs of providing heating and cooling services from solar, geothermal and biomass resources. It was claimed that the market deployment of REHC technologies should be supported and a greater energy supply security and climate change mitigation should be enhanced.

Moreover, as Fairbank and Barley (2008) have implied, the stimulating investment in the renewable energy industry is critical not only to the earth's well-being, and to reduce the earth's and the people's dependency on foreign energy sources, but also to the national, state, and local economies. For this reason, many of the countries and firms have reviewed their agendas for developing solutions with wind projects, solar installations, bio- fuels production and distribution, biomass projects, R&D, technology advancement and business support services, all of which are stimulating investment and job creation in the commonwealth (Fairbank and Barley, 2008).

According to Fairbank and Barley (2008) statements, the countries and companies should act for the creation and development of renewable energy resources and work for the sustainable energy resource management. For this aim, it is suggested that the countries and the companies should enact legislation supporting investment in renewable green energy developments, more specifically for the renewable energy and job creation Act of 2008 (Fairbank and Barley, 2008).

For instance, it is stated that U.S.A. currently does not have national energy strategy such as Germany and Japan. For example, Germany has a 20 year solar incentive program, Japan 12 years, even China is trying to use its own efforts to invest in renewable. In 2007, China invested 10 billion U.S. dollars in the Chinese renewable energy industry and Germany has also made considerable investments in the relevant industry. The two main instruments to stimulate investment in the United States' renewable cluster are the Investment Tax Credit (ITC) and the Production Tax Credit (PTC), and both of them are expected to be expired at the end of 2008 (Fairbank and Barley, 2008).

It is also claimed that failure to renew the ITC and PTC would make U.S. renewable energy industry weaker and this situation is socially unconscionable and economically damaging. Therefore, it is suggested that U.S.A. should give importance to making investments for the clean energy resources and should develop knowledge-intensive, high technology industry which are the areas that the U.S. should be focusing its efforts and setting goals. By this way, such as other countries U.S.A. can maintain a competitive advantage in the global economy (Fairbank and Barley, 2008).

In this respect, it can be suggested that the countries or firms that successfully implement the relevant policies and procedures to benefit from these renewable heating and cooling resources would gain competitive advantage within the energy industry as well as the overall global competition. Therefore, it can be claimed that countries and the firms should try to recognize the potentials of green energy resources and try to increase the share of renewable energy in providing energy.

At this point, it is indicated that "the use of renewable energy in Europe offers the possibility of reducing greenhouse gas emissions, and contributes to energy security and independence" (Anonymous, Resource Week, 2008: 17). Besides, it is implied that, there are reforms of the Common Agricultural Policy (CAP) and a variety of recently introduced national directives which are supporting renewable energy sources in the European Union, and therefore, the economic attractiveness of bioenergy production has been increasing. For this reason, it is suggested that new EU policies should be modified in order to avoid developing conflicts between small-scale changes in landscape ecosystems caused by large-scale transformations in energy policy. (Anonymous, Resource Week, 2008: 17).

On the other side, Scheer (2002) proposed that there are several problems caused by the current fossil-based energy and economic system and showed how current technological changes and economic growth threaten the global economy. Therefore, Scheer (2002) suggested that an alternative program would be sketched on how the global economy could and must substitute its dependence on fossil fuels with renewable energy and materials. He also added that as a result of these renewable energy programs the enormous and multiple benefits would emerge.

Scheer (2002) also deals with the exploitation of solar resources and describes the solar supply chains. According to his descriptions, they are much shorter compared to the fossil chains and have lower environmental, social and industrial influences. He also implied that if the supply chain is shorter, the scope for reducing the costs of energy generation would be greater. Additionally, it is suggested that decentralized small units should be created in order to finish the pressure to globalize that comes from the fossil resource base. However, as it is mentioned by Scheer (2002), shorter renewable energy supply chains make it impossible to dominate the entire economics and renewable energy would take off the community from fossil fuel dependency and from the oligopoly structure of the fossil economy.

When the modern technologies for electricity generation were examined, it was seen that the wind power, photovoltaics (PV), hydroelectric power, geothermals, and biomass were some of the major renewable energy resources for the electricity generation (EEG-The Renewable Energy Sources Act, 2007). It was described that wind power is the kinetic energy of the wind converted into electricity using wind turbines and the plants were built in coastal regions, in windy inland areas, as

well as in the sea itself (offshore). Photovoltaics (PV) are both direct and diffused solar radiation which was converted into electricity using solar cells. PV plants are built on roofs, on building facades, as well as in open spaces and its capacity shows that from a few Watts several MW were generated. Hydroelectric power is the kinetic energy and height of fall of water which are used for electricity generation or energy storage. The installations are built in the mountains, highlands and along rivers and streams. Geothermals is the heat which is stored in the earth's crust for electricity generation with the capacity of 1 to 50 MW and such kind of a method could be used worldwide. Biomass is the energy in which electricity is generated from wood, woody plants, organic raw materials and biological waste through burning or gasification. Various technologies could be used for this method such as turbines, stirling engines, gas turbines and gas Otto engines. It should be noted that biomass is storable and can be converted into electricity when it is needed (EEG-The Renewable Energy Sources Act, 2007).

Moreover, another renewable green energy resource is named as "biodiesel" and it is defined as a clean burning alternative fuel produced from domestic, renewable resources such as vegetable oil and animal fat. Biodiesel can be mixed with petroleum diesel to create a blended fuel that can be used in diesel vehicles with no significant engine or fuel-system modifications required (Anonymous, U.S. Newswire, 2008a).

It is stated that biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the 1990 Clean Air Act Amendments (Anonymous, U.S. Newswire, 2008a). The use of biodiesel in a conventional diesel engine results in a substantial reduction of unburned hydrocarbons, carbon monoxide and particulate matter compared to emissions from diesel fuel. In addition, the exhaust emissions of sulfur oxides and sulfates (major components of acid rain) from biodiesel are essentially eliminated compared to diesel. As it can be understood, biodiesel is better for the environment because it is made from renewable resources and has lower emissions compared to petroleum diesel. Besides, it is implied that biodiesel can be used as a pure fuel or blended with petroleum in any percentage and B20 (a blend of 20% biodiesel with 80% petroleum diesel) has demonstrated significant environmental benefits.

According to the U.S. Department of Energy, a 20% blend of biodiesel fuel reduces carbon dioxide emissions by 15% compared to petroleum diesel fuel. The carbon dioxide released into the atmosphere when biodiesel is burned is recycled by growing plants, which are later processed into fuel. At the same time, scientific research confirmed that biodiesel exhaust has a less harmful impact on human health than petroleum diesel fuel. Moreover, biodiesel also reduces particulate matter-an emission linked to asthma and other diseases and carbon monoxide, when compared to conventional diesel fuel (Anonymous, U.S. Newswire, 2008a).

Biodiesel is registered as a fuel and fuel additive with the Environmental Protection Agency and meets clean diesel standards established by the California Air Resources Board. Neat (100%) biodiesel has been designated as an alternative fuel by the Department of Energy and the U.S. Department of Transportation. Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the 1990 Clean Air Act Amendments. The use of biodiesel in a conventional diesel engine results in a substantial reduction of unburned hydrocarbons, carbon monoxide and particulate matter compared to emissions from diesel fuel. In addition, the exhaust emissions of sulfur oxides and sulfates (major components of acid rain) from biodiesel are essentially eliminated compared to diesel (Anonymous, U.S. Newswire, 2008a).

For instance, it is indicated that a firm called DTE Energy has begun using biodiesel in its vehicles in 2008, blending 5% of the renewable fuel with 95% conventional diesel. The firm has increased the blend to 20% biodiesel; the industry standard and expects to complete that conversion at the end of 2008.

Therefore, it can be suggested that biodiesel has been an effective renewable green resource that has added a value to the firms' overall success and competitive superiority within the energy industry. As it was stated, DTE Energy has expected to save almost $600,000 annually along with the environmental benefits of the biodiesel. This shows that biodiesel has contribution to the environmental management of the firms as well as their profits, growth and industrial competitiveness (Anonymous, U.S. Newswire, 2008a).

Furthermore, it is implied that the wind power, the geothermal and the hydroelectric power are the main renewable energy resources that have effective cost saving for the economy. For instance, wind power has an important role to play in the electricity mix and 5% of Germany's entire electricity consumption was provided by wind power in 2006 (EEG- The Renewable Energy Sources Act, 2007) . Besides, the production costs for electricity produced in wind plants were in consistency with the new, conventional power plants. At the same time, the wind-generated electricity has been traded cheaper than electricity generated by conventional means. In comparison with other renewable energy sources, electricity production from geothermal power is also minimal (2006: <0.1%). Furthermore, in Germany, after the commitment to produce renewable energy resources, the fees paid were considerably increased in the 2004 in order to support the expansion of geothermal power and in that country the hydroelectric power plants met 3.5% of electricity demand in 2006.

In the energy industry, it is recognized that the countries that had environmental management policies and renewable energy resource management programs

have been gaining competitive power within the industry and the world. For instance, Greece has a liberalized energy market and is evolving into an energy management after 2000s. Today, Greece represents a significant and dynamic sector of the economy and has formed alliances with major European, American and Japanese companies. Hence, the oil and gas agreements have made Greece to do business in energy and invest for renewable energy resources (http://www.investingreece.gov.gr/default.asp?V_DOC_ID=2708&V_LANG_ID=0).

Because of its important investments in the renewable energy resources, Greece has become one of Europe's fast developing countries and it is predicted that it will continue to grow in the near future. It is indicated that Greek demand for renewables has produced 750 MW installed power and it is expected that the country will make it 1500 MW in 2010. Since 2002, annual growth rate of RES was 30-50% and it is stated that the growth wild will continue in the following years (http://www.investingreece.gov.gr/default.asp?V_DOC_ID=2708&V_LANG_ID=0).

Moreover, it is mentioned that a number of international energy companies have invested successfully in Greece and have expanded their operations to meet the potential demand. This means that investment in renewable brings the companies profit and growth and helps them to achieve their long term strategic objectives and increase their competitive superiority in the market. Therefore, it can be suggested that the companies and the countries that do research and development facilities for the renewable energy resources gain competitive advantage in the market and hence, this makes them to gain competitive superiority and sustainable development within the industry.

In this respect, it is indicated that there are competitive advantages of investing in renewable energy resources for the companies and the countries. The government should support future energy investment, development of regulatory framework for energy investment, increase of generous investment incentives, renewable energy project development at competitive costs, expansion and diversification of the energy market and in manufacturing energy technologies and increase the innovation in R&D (http://www.investingreece.gov.gr/default.asp?V_DOC_ID=2708&V_LANG_ID=0).

Moreover, according to the publishment of Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) of Germany, it is indicated that "the international community needs the global change of system, away from fossil and atomic energy supplies towards a decentralised supply generated from renewable energy sources – from the sun, wind, water, biomass and geothermals" (EEG-The Renewable Energy Sources Act, 2007). Federal Ministry for the Environment, Nature Conservation and Nuclear Safety has stated that Germany made its decision at the end of 1990s to work on the renewable resources and today in 2000s it is one of the leading industrial nations in the renewable energy sources sector. For this aim, Germany has accepted the Renewable Energy Sources Act (Erneuerbare-Energien-Gesetz, EEG), which came into effect on 1 April, 2000. The EEG caused a fundamental change in energy supply and emphasized that every citizen could become an energy producer (EEG-The Renewable Energy Sources Act, 2007).

In this respect, when the outcomes of The Renewable Energy Sources Act of Germany were examined, it indicated that after the implementation of the policies of the act, an independent, successful and thriving industry which is carried by the vision of a few business entrepreneurs, the know- how of numerous small and medium-sized enterprises and the enthusiasm of solar energy initiatives, environmental groups and agenda groups had been created. Moreover, there were economic outcomes of the EEG. For instance, in 2006, 12.0% of total German electricity consumption was supplied from renewable energy sources and this resulted to the reduction of over 100 million tones in CO_2 emissions. In this sector more than 230,000 people were employed and had an overall turnover of around 23 billion Euros. On the other side, the electricity production reduced the wholesale price for electricity by 5.0 billion Euros, and also reduced by 3.4 billion euros the subsequent costs for the climate which arise from fossil energy sources as a result of the EEG (EEG-The Renewable Energy Sources Act, 2007).

Furthermore, the EEG also achieved other goals such as a minimum of 27% of total electricity consumption produced from renewable energy sources. As a result of this, it was noted that it would be possible to make a key contribution to the European Union's expansion targets of 2007 about the renewable energy resource use (EEG-The Renewable Energy Sources Act, 2007). Therefore, it can be suggested that there are advantages of EEG for a country's economy and overall energy costs as it was seen that in accordance with the EEG, Germany reduced its dependence on energy imports and it was expected that the country would continue to make energy affordable for the society.

Moreover, when other countries' actions towards the renewable green energy resources were examined, it was seen that on August 1, 2008, the Florida Public Service Commission was authorized to require a mandatory charge per kilowatt-hour on all electricity consumers of the state to support the development and promotion of the renewable energy projects in the U.S.A. (Clean Energy States Alliance, 2008: 1). For the aim of developing and promoting renewable energy resources, Florida Renewable Energy Trust Fund was constituted and it indicated that the public purpose of the fund was to generate the maximum economic and environmental benefits over time from renewable energy to the ratepayers of the State. Such benefits of supporting the

renewable energy resource could be achieved through the policies and programs that support and promote increased availability, use, and affordability of renewable energy resources and initiating the formation, growth, expansion and retention of renewable energy and related enterprises, institutions, and projects (Clean Energy States Alliance, 2008).

At this point, the fund would be administrated by the department of environmental protection or other governmental body or independent non-profit organization to facilitate the development and implementation of renewable energy programs, projects, and enterprises. Moreover, the aims of the fund included the development and increased use and affordability of renewable energy resources in the U.S.A.; protection of the environment and health of the citizens through prevention and reduction of adverse pollution effects of electricity generation, including greenhouse gas emissions; provision of the benefits created by increased fuel and electricity supply diversity to the consumers; stimulation of increased public and private sector investment in, and competitive advantage for renewable energy and related enterprises, institutions, and projects in the U.S.A. and increase of entrepreneurial activities in related enterprises, institutions, and projects (Clean Energy States Alliance, 2008).

Moreover, on 19th of September, 2008, The National Policy on Biofuels in U.S.A. also emphasized the importance of indigenous, non-polluting and virtually inexhaustible renewable energy resources (Anonymous, Businessline, 2008). It was indicated that while fossil fuels would continue to have a dominant role in meeting the country's energy needs well into the future, attention to biofuels would reflect the policymakers' desire not to overlook the environmental challenges posed by conventional fuels (Anonymous, Businessline, 2008). Therefore, it is shown that the relevant policy lacks a coherent strategy to stimulate or promote the production and consumption of biofuels within the renewable energy resources.

On the other side, according to the U.S. Newswire of 12th of June, Martifer Renewables Solar Company and its development partners designed a creative renewable energy system that is cost-competitive with conventional generation technologies. The goals of the company's action towards the production and use of renewable energy resource are to develop projects to increase the level of clean, affordable, renewable energy in California while at the same time alleviating the pressure on agricultural producers and municipalities to reduce their greenhouse gas emissions in the near future (Anonymous, U.S.Newswire, 2008b, June 12).

According to the statements of the company, the hybrid technology would combine two renewable resources: solar energy and biofuel and it would be continued to add these types of innovative renewable energy sources to the power mix as they work to provide the customers with some of the cleanest energy in the nation and meet the U.S.A.'s climate change goals (Anonymous, U.S.Newswire, 2008b, June 12). It was also indicated that the company's renewable hybrid projects combined solar thermal through technology and steam turbines powered by biomass fuel to produce hybrid solar-biofuel renewable electricity. The incorporation of biofuel increases the overall production of renewable power by allowing for around-the-clock production of clean energy, even at night or when sunlight is not at its strongest (Anonymous, U.S.Newswire, 2008b, June 12).

When Turkey was examined in terms of the subject of developing green products and renewable energy resources, it was recognized that there are two important aspects of energy policies of Turkey as one is to put emphasis on domestic sources and to deal with inevitable dependency (Kepenek, 2009). Another main problem is that it consumes less energy than the other countries but, it cannot use it on a productive or efficient and clean way. The share of unofficial use of electricity and losses is 20% of total consumption. Moreover, almost 30% of her population lives in rural areas. The socio- economic gap between the regions is so high. About 0.02% of villages do not have electricity services at all (DIE, 2004). There are so many villages that use traditional ways for cooking and heating like wood, plant and animal residues. Due to her geographical advantage, renewable energy looks likely to have a great potential; especially solar, wind, hydro and geothermal energy, however only 35% of total hydro power, wind energy and only 5% of geothermal energy is in use (Kepenek, 2009).

It is also indicated that the renewable energy resources are the second biggest domestic energy sources in Turkey (after coal). The share of renewable energy sources in TPES was 18.2% in 1990. Unfortunately, the share fell to 12.3% in 2001 (TUB TAK, 2003).

In the national programme which was prepared within the scope of *acquis communautaire* for the membership to EU, energy had a special topic and the promotion of renewable energy is set as a short- term target. The main aim was specified as making the necessary legal regulations in order to promote the use of renewable energy and to increase its use in the energy market without damaging the existing free market mechanisms. To achieve this target, the use of renewable energy sources in the production of electricity has been established for social participation (nongovernmental organizations and universities. etc) (Kepenek, 2009).

The main target of the law is to provide the necessary conditions to promote the use of renewable energy in the electricity market. The other aims are to determine the resources properly, to support investments while providing R&D incentives and carrying out sustainable developments. The local applications are also given special emphasis in the law. The prior aims are generally the same as the other renewable energy efforts like keeping for energy security in the future, decreasing the

dependency on external energy sources and also reaching the international Kyoto targets (TBMM, 2004).

In order to support RE investments, some regulations were established. There are two important regulations in the electricity market law (EPDK-Energy Market Regulatory Authority, 2004):

1) The legal entities applying for licenses for construction of renewable energy facilities are required to pay only 1% of the total license fee. The license fee is not taken for the following years.
2) Also, renewable based generation facilities are exempt from paying the annual license fees for the first eight years following the facility completion date as specified in the license.

In this respect, it is mentioned that the EU membership process will be very beneficial especially in terms of establishing an energy vision. Turkey has to increase its international co- operation with the EU and neighboring countries in terms of energy (Kepenek, 2009).

Hence, it can be claimed that supplies of conventional fossil fuels have not been advantageous and competition for those supplies are becoming more inadequate and it can be proposed that other forms of energy should be tried for improvement. It is indicated that many countries are reliant on external sources for their energy needs; however they have problems because of the high prices and the negative impacts of the conventional resources to the ecological and social environment (Anonymous, 2008; The Banker, October).

Therefore, many of the countries and companies have been diversifying their energy resources and allocating their sources for developing alternative technologies and energy resources. In this respect, it can be suggested that through diversifying the energy resources and investing for developing alternative renewable energy resources and technologies, the companies in the energy sector and the countries could achieve their energy management goals and could gain competitive advantage in long term.

At this point, it is indicated that the energy problem has been causing pressure on the free market approach to energy supply. Some of the countries argue that market-based structures emerged through deregulation have failed to deliver in terms of increased capacity, greater efficiency, security of supply or consumer choice (Anonymous, 2008; The Banker, October). Therefore, in many of the countries and developed economies such as U.S.A., Germany and U.K., the re- regulating energy resources are the most preferred ones within the market. Moreover, the developing countries and the European Union countries' governments have begun to involve in developing technologies for renewable energy resources and have commitments to use cleaner alternatives.

C NCLUS N AND RECOMMENDATIONS

In this study, recent learning about conceptual framework of competitive advantage from research implications were examined based on Porter (1999) approach and it was tried to provide a knowledge and discussion of the core elements of creating competitive advantage and strategic development framework. In this respect, the sustainable development strategies for competitive advantage within the energy industry were examined.

Moreover, in this study, the conceptual background of sustaining competitive advantage was examined and based on this the competitive advantages of the renewable and conventional energy resources of the energy industry were investigated. Moreover, with the analysis of the value and competitive advantages of the renewable and conventional energy resources, a comparison of both types of resources was provided. Further, based on the examination of the competitive advantages of these resources, various strategic development actions of the countries and the companies for the relevant energy resources were discussed.

In this context, as it is known, in an increasing global competition, business firms and the countries' governments are faced with completely new environmental factors to deal with and, as a result, try to develop new ways of doing business and to develop new products to create competitive advantage and sustainable development. In this situation, the governments and the business environments have been considering the ways to change the features and impact of the traditional energy resources by implementing either incremental or radical changes through the development of renewable energy resources. It is seen that the business environments and the governments have been focusing on the environmental management issues and discussing the ways of developing renewable energy resources for the benefit of people, environment, earth itself, and the future of the humans. Therefore, as the natural resources of the earth are scarce, as there is a global need for energy and as the energy resources are the mainstreams of human life, in today's world, the subject of environmental management, energy protection and creating sustainable energy resources have became important topics.

In this respect, it is suggested that the leading industrial nations in the renewable energy sources industry and the leading firms that have research and development facilities for the creation of renewable energy products and environmental safety products would gain competitive superiority within the industry. Moreover, it can be suggested that there are strategic contributions of creating green energy resources for the companies' and nation's competitiveness and shifting towards renewable energy resources can contribute to their overall achievement of competitive advantage.

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