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## Eco-Innovation as Modern Era Strategy of Companies in Developing Countries: Comparison Between Turkey And European Union

Nimet Eryigit<sup>a</sup>, Gürol Özcüre<sup>a\*</sup><sup>a</sup>Ordu University, Unye Economics and Administrative Sciences, Ordu, Turkey

### Abstract

Eco-innovation is developing new ideas, promoting new operations, products and processes to protect the environment, so obtaining environmental sustainability. Eco-innovation supports the survival of the companies as proposing an acceptable image for these companies to stakeholders. The innovation which decreases the environmental damages and hereby develops the sustainability of the firms, including eco-products, eco-processes and eco-organizational factors is called eco-innovation. Eco-innovation is one of the aims of European Union (EU), and establishes a part of the development and economic policies. Technological progress makes the companies benefit from eco-innovation. Besides the environmental benefits; there are also cost related gains for the companies which apply eco-innovation. Organizations take eco-innovative actions because of the governmental pressures, consumers' pleasures and the great risk of changing climate in all over the world. Climate change, ozone layer depletion, acidification, eutrophication, decreasing biodiversity and land degradation are some of the environmental threats that face the humanity and also the companies' survival. Hence multiple stakeholders of the societies expect the companies to be sensitive about eco-innovation to protect the environment in order to save the nature and human lives. Eco-innovation is one of the leading strategies to promote resource and energy efficiency and create a low a carbon society in EU; because this strategy has other advantages like decreasing the costs of material purchasing. So it leads EU to be more competitive in global world. Eco-innovation is simply contributing to the sustainable company survival by challenging the environmental issues in the eyes of multiple stakeholders in the society. In this study we have comparisons between Turkey and EU in the framework of eco-innovative behaviours of the firms.

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\* Nimet Eryigit. Tel.: +90-452-3238255; fax: +90-452-3238256.

*E-mail address:* [neryigit@odu.edu.tr](mailto:neryigit@odu.edu.tr)

## 1. Introduction

Today as a favourite concept eco-innovation briefly explains the intentions of the companies to save the environment during their innovation processes. Within a EU funded research project called “Measuring Eco-Innovation” (MEI) eco-innovation is described as; “*the introduction of any new or significantly improved product (good or service), process, organisational change or marketing solution that reduces the use of natural resources (including materials, energy, water and land) and decreases the release of harmful substances across the whole life-cycle*” (European Commission, 2011: 4).

The global crisis since 2008 seems to have hit the eco-innovation strategies less heavily than others due to high public pressures and urgent policy requirements. The most affected sectors are solar, wind, biofuels and agriculture. Also, some green technologies have experienced significant increases, including electric and hybrid cars, battery technologies, energy efficiency and smart grids (Rodinella, 2015:101).

Eco-innovation demand increased due to the pressures based on the environmental challenges (Panapanaan, V. et al., 2014: 1213). In developed countries, some of the examples of eco-innovative firm behaviours are Apple’s reduction in over-all carbon foot print, Toyota’s recovery and reuse of end of life vehicle components and HP’s environmental protective inks at company level. Some firms as above mentioned take voluntary actions; but most firms are obliged to eco-innovate because of the pressures of the governments, standards, customers and competitors (Ganapathy, S.P. et al., 2014: 198).

Ecological economics is about technologies; but eco-innovation has organizational, cultural and social dimensions. Eco-innovation is the basis for green environment and resource efficiency both providing sustainability and improving technology (Tarnawska, 2013: 741).

Industry is the foundation of Europe’s competitiveness and deindustrialisation is not a solution for Europe to meet climate targets due high price related to employment and human resources without industrial competences. The solutions are related to eco-innovation, higher resource and energy efficiency on the part of an industrial base maintained and continuously upgraded in the EU (Galgoczi, 2015: 21-22).

Research and development (R&D) and innovation are key policy components of the Europe 2020 strategy. The Europe 2020 strategy sets the target of ‘improving the conditions for innovation and (R&D)’ with the aim of ‘increasing combined public and private investment in R&D to 3 % of GDP’ by 2020. The ‘Innovation Union’ flagship initiative is the EU strategy that aims to create an innovation-friendly environment for EU researchers and entrepreneurs. It also contribute to a well-functioning knowledge-based economy (Eurostat, 2015: 50).

## 2. Eco-Innovation

Eco-innovation is developing new ideas, promoting new operations, products and processes to protect the environment; so obtaining environmental sustainability. Eco-innovation provides a qualified life for everybody by using the natural resources economically and releasing toxic substances minimum. Eco-innovation is not only about the end-of-pipe technologies; but also includes the innovations about life styles and behaviours of the individuals. Eco-innovation results in reducing emissions and wastes. Examples of eco-innovation are: renewable energy sources, energy recovery from solid waste, waste usage for materials recovery, fertilizer production from wastewater, eco-products and several types of management systems (Panapanaan, V. et al., 2014: 1212-1219).

Eco-innovation supports the survival of the companies as proposing an acceptable image for these companies to stakeholders. The innovation which decreases the environmental damages and hereby develops the sustainability of the firms, including eco-products, eco-processes and eco-organizational factors is called eco-innovation (Ganapathy, S.P. et al., 2014: 198). Eco-innovation is based on eco-efficiency which is the ratio of the economic value of a product or service to the environment caused by this product or service. Third factor of this paradigm is the social value of eco-innovation (Scarpellini, S. et al., 2012: 1048). Eco-innovation is the innovation which reduces the environmental impact. By means it is a new product, process, organizational and marketing method which creates

benefits for the environment relative to the alternatives (Rozkrut, 2014: 137-139).

Not only manufacturing firms but also services firms may innovate ecologically concerned. In Spain, according to a survey made at 5509 firms; even there are not much differentiation between the eco-innovative behaviours of these different sector firms, manufacturing firms are more tending to be eco-innovative (Segarra-Oña, M. et al., 2014: 134). According to the survey made in India, the managerial aspects of the manufacturing firms are more effective in eco-innovative behaviours of these firms than their innovation practices (Ganapathy, S.P. et al., 2014: 198). The purpose of the study (Panapanaan, V. et al., 2014) is to understand the emphasis of eco-innovation in regional scale at Lahti (Päijät-Häme Region) in Finland. SAMPO is the new eco-innovation model generated by the ideas gathered from multiple stakeholders in the region, enhancing the strategies about the environment, design and innovation. The categorization in the model is triad; which are practice-based innovation, eco-design and sustainable innovation. In regional innovation strategy principles of the model SAMPO is derived and the learning points are created. SAMPO is accepted by Päijät-Häme Regional Council, varied business clusters, the research institutes and academics, so it establishes the framework for structuring the eco-innovation policy in the region.

### 2.1. Types of Eco-Innovation

Eco-innovation can be characterized as technological, organizational, social and institutional (Panapanaan, V. et al., 2014: 1218-1219):

- **Technological Eco-Innovation:** These technologies are both corrective and also preventive. They consist of measures to reduce the energy and material input and emissions.
- **Organizational Eco-Innovation:** Eco-audits are the examples for this type of eco-innovation. In services sector some material products are substituted with less-material services.
- **Social Eco-Innovation:** This is the patternal changes in consumer behaviour. People's life style changes result in social eco-innovation.
- **Institutional Eco-Innovation:** Scientific and public institutions cooperate to make policies about eco-innovation. The policies are arranged with the focus of world research and development tendencies accordingly.

### 2.2. Classes of Eco-Innovation

The six main classes of eco-innovation enablers are investors, research laboratories, testing facilities, universities, training provision, public procurement, legislators, lobbyists, non-governmental organizations, advisors, grants, taxation holidays and government (Panapanaan, V. et al., 2014: 1219-1220):

- **Eco-construction:** Housing design, urban design, rehabilitation of sites.
- **Spatial planning and wellness:** Medicine development, food product quality improvement and increasing the quantity of green territories.
- **Energy:** Production, distribution, utilization of new types of fuel and energy efficiency improvement.
- **Clean technology:** Eco-friendly product design, production and distribution.
- **Pollution prevention and rehabilitation:** Life cycle assessment, controlling air, water and soil, noise minimization.

## 3. Company Performance

Some studies highlight that eco-innovation is related with company size and open market oriented firms have more relevance to the concept (Segarra-Oña, M. et al., 2014: 135). ISO 14001, Total Quality Environmental Management (TQEM), eco-auditing, human resource management practices are the pushing pressures of the companies to survive. Because of the greenhouse effect and resource scarcity the survival of the companies depend highly on environmental practices, as there are public pressures also (Ganapathy, S.P. et al., 2014: 199). Sustainable development necessitates technical, organizational and also institutional changes and innovation. Eco-innovation is simply contributing to the sustainable company survival by challenging the environmental issues in the eyes of multiple stakeholders in the society (Panapanaan, V. et al., 2014: 1217-1218).

Eco-innovation as a daily concept does not seem to be gathering interest in all the actions taken. This is because internalization of this concept hasn't been completed in behaviours of the companies and employees as social responsibility. In fact; the main actor to promote this concept is the society (Scarpellini, S. et al., 2012: 1047). Big companies tend to increase the understanding of the concept as undertaking the role within the framework of social responsibility; because their strategic planning focus on social responsibility and also on innovation for sustainability.

#### **4. Environmental Concern**

Eco-innovation is one of the aims of EU, and establishes a part of the development and economic policies (Segarra-Oña, M. et al., 2014: 135) as improving the ecological state of the regions and local economy (Panapanaan, V. et al., 2014: 1230). Technological progress makes the companies benefit from eco-innovation. Besides the environmental benefits; there are also cost related gains for the companies which apply eco-innovation. Today's benefits should never be described as the expenditures of the future. Organizations take eco-innovative actions because of the governmental pressures, consumers' pleasures and the great risk of changing climate in all over the world (Ganapathy, S.P. et al., 2014: 199-201).

Climate change, ozone layer depletion, acidification, eutrophication, decreasing biodiversity and land degradation are some of the environmental threats that face the humanity and also the companies' survival; but eco-innovation ensures sustainable environmental value-creation process, economic growth, development and social benefits (Panapanaan, V. et al., 2014: 1217-1219). Hence multiple stakeholders of the societies expect the companies to be sensitive about eco-innovation to protect the environment in order to save the nature and human lives.

Eco-innovation is one of the leading strategies to promote resource and energy efficiency and create a low carbon society in EU; because this strategy has other advantages like decreasing the costs of material purchasing. So it leads EU to be more competitive in global world (Panapanaan, V. et al., 2014: 1213).

##### *4.1. Universities and Technology Centers in Eco-Innovation Process*

Universities and technology centers should pave the way to spread eco-innovation concept to society; especially through small and medium size companies. As there are obstacles to bring together public and private sectors in the companies; another way to force innovation is to enhance the relationships with technology centers (TC). TCs are special agents for scientific, technological and social system, which are defined as a legal personality for the purpose of social benefit and business competition by improving research and development (R&D) and innovation efforts. They not only support R&D activities; but also other activities like publishing, training, knowledge transfer, etc. TCs as reducing risks and uncertainty, speeding up the R&D projects are the entities to foster eco-innovation in the companies. TCs' core business is improving R&D; so companies need these centers to enhance their compatibility. They make the companies invest in R&D and develop themselves by gathering the support of university and public professionals with private practitioners (Scarpellini, S. et al., 2012: 1047-1057).

##### *4.2. Measuring Eco-Innovation*

Eco-efficiency and resource efficiency are the themes of eco-innovation measurement approaches. Subject approach is about individual innovations; while object approach is the innovations in organizations as a whole. Eco-innovation indicators should include R&D investment, skills, education and organizational development, eco-efficiency and patents, market shares and trade. For the innovation subjects; organizational development, eco-entrepreneurship, financial sector, knowledge institutions and education, knowledge flows, governance and institutional set up are the indicators (Tarnawska, 2013: 735-738).

- Environmental and resource productivity of production and consumption
- Natural asset base
- Environmental dimension of quality of life
- Economic opportunity and policy responses

- Renewable energy
- Environmental technologies
- All purpose business R&D
- Environmentally related and all purpose patents
- Structure of environmentally related patents
- Environment related innovation in all sectors are the indicators of green growth (Tarnawska, 2013: 739).

Eco-Innovation Indicators (Rozkrut, 2014: 142) are:

- A. Environmental Benefits During The Production
  1. Reduced material use per unit of output
  2. Reduced energy use per unit of output
  3. Reduced CO<sup>2</sup> footprint
  4. Replaced materials with less polluting or hazardous substitutes
  5. Reduced air, water, soil or noise pollution
  6. Recycled waste, water or materials
- B. Environmental Benefits After Sales
  1. Reduced energy use
  2. Reduced air, water, soil or noise pollution
  3. Recycled waste, water or materials
- C. Motivation
  1. Existing environmental regulations or taxes on pollution
  2. Environmental regulations or taxes expected in the future
  3. Government grants, subsidies or other financial incentives
  4. Current or expected market demand from customers
  5. Voluntary codes, agreements for good practice

In the study of Rozkrut (2014) some important results about the indicator factors of eco-innovation have been achieved. 3<sup>rd</sup> of the three factors in the study; which are reduced material, replaced material, demand from customers and voluntary codes is significantly positive correlated to the proportion of innovative enterprises. This means basic eco-innovation practices and good will are highly related and innovativeness is the prerequisite for this relationship. Other result is that the 2<sup>nd</sup> factor which is about regulations, taxes, grants, subsidies and financial incentives and the turnover from innovative products are positively correlated. So it can be concluded that financial incentives increase the market success of the companies making innovation.

## 5. Key Eco-innovation Indicators for Turkey Compared to The European Union

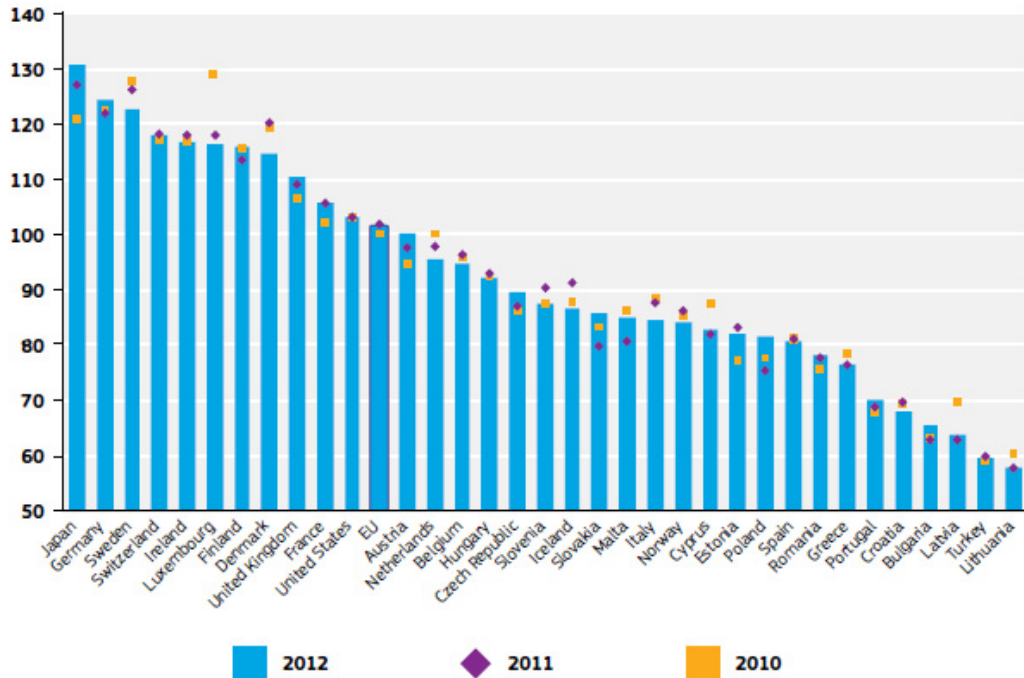
The EU 2020 strategy target of cutting greenhouse gas emissions (GHG) by 20 percent from the 1990 level by 2020 while the ‘Roadmap for moving to a competitive low-carbon economy’ aims at abating 80 percent of GHG emissions by 2050. The adoption of eco-innovations reducing CO<sub>2</sub> emissions, the presence of a market demand for low carbon goods and services is a strong incentive for firms to adopt eco-innovations in this field. Researchers observed a strong positive effect of expected regulation and market demand as drivers of the adoption of eco-innovation to reduce CO<sub>2</sub> emissions (Mazzanti et al., 2014: 11-16).

The measurement framework used for the EU in the Innovation Union Scoreboard 2014. The Scoreboard uses the most recent statistics from Eurostat and other internationally recognised sources such as the OECD and the United Nations. The Scoreboard distinguishes between 3 main types of indicators – Enablers, Firm activities and Outputs – and 8 innovation dimensions, capturing in total 25 indicators. For instance, ‘human resources’ includes 3 indicators and measures the availability of a high skilled and educated workforce. The indicators capture New doctorate graduates, Population aged 30-34 with completed tertiary education and Population aged 20-24 having completed at least upper secondary education.

The general average innovation performance of the EU Member States fall into four different performance

groups: 1-) Denmark (DK), Finland (FI), Germany (DE) and Sweden (SE) are “Innovation Leaders” with innovation performance well above that of the EU average; 2-) Austria (AT), Belgium (BE), Cyprus (CY), Estonia (EE), France (FR), Ireland (IE), Luxembourg (LU), Netherlands (NL), Slovenia (SI) and the United Kingdom (UK) are “Innovation followers” with innovation performance of the EU average; 3-) The performance of Croatia (HR), Czech Republic (CZ), Greece (EL), Hungary (HU), Italy (IT), Lithuania (LT), Malta (MT), Poland (PL), Portugal (PT), Slovakia (SK) and Spain (ES) is below that of the EU average. These countries are ‘Moderate innovators’; 4-) Bulgaria (BG), Latvia (LV) and Romania (RO) are “Modest innovators” with innovation performance well below that of the EU average. The top innovation leaders are Japan, Switzerland and US outside the EU in the world (European Commission, 2014: 4-5).

Figure 1: Innovation Output Indicator



Source: DG Research and Innovation, Eurostat, OECD, Innovation Scoreboard 2014.

As above Figure 1 shows the top performers in the EU are Germany and Sweden with a high R&D intensity. Ireland and Luxembourg are the best performers. Finland and Denmark came next in the EU ranking. The EU’s three lowest performers are Bulgaria, Latvia and Lithuania and Turkey is among them as the EU candidate country (European Commission, 2014: 18).

Eco-innovation Scoreboard also available which is a set of indicators assessing eco-innovation performance across the EU. The indicators are ranging from ‘eco-innovation push’ indicators (such as R&D and investments) to aggregated output indicators (like eco-patents) and outcomes (socioeconomic and environmental performance). The EU Member States have been clustered into four groups as: countries catching up, average performers, good achievers and leaders in eco-innovation. Denmark, Sweden and Finland are the best performing countries in the EU and thus form the group of ‘Eco-Innovation Leaders’. Scoring rather low but catching up quickly were Bulgaria and Romania due to substantial improvements in eco-innovation outputs and eco-innovation activities (ISO14001 registered organisations). Countries who experienced a downward trend were Latvia, Malta and Hungary. This trend

occurred mainly on the backdrop of decreasing eco-innovation inputs (government R&D appropriations and outlays) and environmental outcomes (for example water and energy productivity) (Eurostat, 2013: 75).

The 2013 version of the Eco-IS shows performance across the 28 EU Member States which consists of 16 indicators from 9 different data sources. Regional innovation leaders are located in eight Member States which the four national innovation leaders and four innovation followers consist of Denmark, Germany, Finland, France, Ireland, the Netherlands, Sweden and the United Kingdom. Northern European countries are leaders in eco-innovation. Another set of four countries made up of France, Italy, Ireland and the Netherlands, has values rather close to or exceeding the EU average in 2013. The less well performing countries are in Eastern and Southern Europe (Eurostat, 2015: 69-72).

Growing political commitment to science, technology and innovation is reflected in The Tenth Development Plan (2014-2018) adopted on 2 July 2013 and continuing rise shown by the government funding for R&D in Turkey. As below Table 1 shows Turkey has a lower performance compared to the European Union. Relatively low performance in patents linked to large agricultural and low-tech sector (textiles) of economic structure with a limited number of large Turkish multinational companies and division of work within international companies which have production in Turkey but tend to do research and patenting in the headquarter country (European Commission, 2014: 329-335).

Table 1: Key Indicators of R&D Performance of Turkey Compared to the EU and the USA

R&D intensity 2012: 0.86 % (EU:2.07%; US:2,79%) 2007-2012:+4.4%	Exelence in S&T <sup>†</sup> 2012:17.6 (EU:47.8; US:58.1 2007-2012:+6.7% (EU:+2.9%; US:-0.2)
Innovation Output Indicator 2012:59.2 (EU:101.6)	Knowledge-intensity of the economy <sup>‡</sup> 2012:19.5 (EU:51.2; US:1.02%) 2007-2012:+5.3% (EU:+1.0%;US:+0.5%)
Areas of marked S&T specialisations: Energy, construction and construction Technologies and automobiles	HT + MT contributon to the trade balance 2012: -3.1% (EU:4.23 %; US:1.02%) 2007-2012:n.a. (EU:+4.8 %; US:-32.3%)

Source: European Commission, 2014.

As above Table 1 shows the European Commission report is to provide an empirical inventory of policies in place in Turkey explain R&D performance of Turkey compared the EU and US. These key indicators of R&D shows us that 0.86% R&D intensity of Turkey is very low comparing to the EU average performance of 2.07% and Turkey must promote R&D and also eco-innovation. Considering that European countries had developed roadmaps for eco-innovation policies in the context of the European Commission Environmental Technology Action Plan (ETAP). The Gross Expenditure on Research and Development (GERD) as a percentage of GDP was 0.72 in 2001 and 0.67 in 2004. In 2005 Turkey decided to gradually increase the GERD as a percentage of GDP to 2 per cent in 2010. But the indicator only reached 0.86 in 2012. Turkey's 2 per cent objective though was still below the EU Lisbon target of 3 per cent GERD/GDP, but unreachd. The Programme covers the period 2003-2023 and aims to: build long-term science and technology objectives; determine strategic technologies and priority areas for R&D; formulate science and technology policies for the next 20 years; and create public awareness of the importance of science and technology. 2023 Program consists of these topics: clean coal technologies; fuel cells for transport, stationary and portable applications; wind energy technologies; hydrogen combustion technologies; electricity production from solar energy; energy storage technologies; hydropower plants (mini and micro); nuclear energy; control technologies for power systems; energy conservation technologies in industry; reduction of energy consumption; and using renewable energies in buildings (OECD, 2008: 6-15).

<sup>†</sup> Composite indicator that includes PCT per population, ERC grants per public R&D, top universities and research institutes per GERD and highly cited publications per total publications.

<sup>‡</sup> Composite indicator that includes R&D, skills, sectoral specialisation, international specialisation and internationalisation sub-indicators.

Turkey is a modest innovators. Turkey is performing strongly in the contribution of medium-high-tech product exports to the trade balance and Sales due to new innovative products. Turkey's growth rate at 3.2% is also above that of the EU (European Commissions, 2014: 28).

Table 2: Key Eco-innovation Indicators for Turkey Compared to The European Union

Factor for Structural change and addressing Societal challenges related to eco-innovation in the EU and Turkey											
TURKEY	2000	2005	2006	2007	2008	2009	2010	2011	2012	Average annual growth 2007-2012 in Turkey (%)	EU average
Environment-related Technologies: patent applications to the EPO per billion GDP in current PPS (EUR)	0.004	0.01	0.01	0.01	0.01	0.01				-2.6	0.44
Europe 2020 Objectives for Growth, jobs and Social challenges											
Employment rate of the population aged 20-64 (%)			48.2	48.2	48.4	47.8	50.0	52.2	52.8	1.8	68.4
R&D intensity (GERD as % of GDP)	0.48	0.59	0.58	0.72	0.73	0.85	0.84	0.86	:	4.4	2.07
Greenhouse gas emissions 1990 = 100	159	176	187	203	196	198	:	:	:	-6	83
Share of renewable energy in gross final energy consumption (%)	:	:	:	:	:	:	:	:	:	:	:
Share of population aged 30-34 who have successfully completed tertiary education (%)	:	:	11.9	12.3	13.0	14.7	15.5	16.3	18.0	7.9	35.7
Share of population aged 18-24 with at most lower secondary education and not in further education or training (%)			48.4	46.9	45.5	44.3	43.1	41.9	39.6	-3.3	12.7
Share of population at risk of poverty or social exclusion (%)			72.4								24.8

Source: European Commission, 2014: 336.

Turkey's relative innovation performance has improved from 36% in 2006 to 40% in 2013. Turkey is performing well below the average of the EU for almost all indicators except for SMEs with Marketing and/or Organisational innovations and Sales share of new innovations. Relative strong weaknesses are in license and patent revenues from abroad, Community designs, Community trademarks, Non-EU doctorate students and Public-private scientific co-publications. Most indicators are positively growing in Turkey. High growth is observed for Community trademarks, PCT patent applications in societal challenges and New doctorates graduates (European Commission, 2014: 76).

As below Table 3 shows Turkey has a very lower level of average emissions of air pollutants, greenhouse gas emissions (GHG), municipal waste, generation and treatment and domestic material resources consumption according to the recent data of the OECD. The State Planning Organization (SPO) estimates and implement energy-saving (CO2 emission-reducing) abatement-investments of 1.5% of the GDP in 2006-2020 in Turkey. Such investments will help reducing the energy-input related emission coefficients by 5% in Turkey. But, turkey is facing investment problem on green sector (Apak *et al.*, 2012: 500).

Table 3. Selected Eco-Innovation Indicators (Comparison of OECD-Europe and Turkey)

	OECD-Europe average (%)	Turkey (%)
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Emissions of air pollutants	6.194,92	2.739,00
Greenhouse gas emissions	4.852.593,10	439.873,73
Municipal waste, Generation and Treatment	272.517,00	29.733,00
Domestic Material Resources Consumption	7.582,03	860,42

Source: OECD.

On the other hand, eco-innovations lead to less environmental impacts due to a reduction of energy use and are therefore crucial for climate protection. Eco-innovation fields such as the development of renewable energies are also economically may lead cost-savings. Also, the determinants of eco-innovation activities have been widely explored for single countries but there is still a lack of country comparisons mainly because of data restrictions. In 2008, a special module on eco-innovation has been included in the Community Innovation Survey (CIS) allowing a comparison of the determinants of eco-innovation in 19 different European countries. The reduction of energy use is an important innovation field in nearly all the EU countries. The recycling sector seems to be important for the Czech Republic, Germany, Hungary, Ireland, Luxembourg, and Portugal. On average, the Eastern European countries, except Hungary, are less eco-innovative compared to the other countries. Traditional fields such as air, noise, soil, water, recycling, dangerous substances the marginal effects for the importance of regulation measures are slightly higher for the Eastern European countries (Horbach, 2014: 3).

According to a recent study by the Wuppertal Institute, the share of eco-industries (a sector that goes well beyond industry and includes services and agriculture) in EU member states' GDP is 31 per cent for Germany, 21 per cent for France and 15 per cent on average (Schepelmann et al. 2009). Simultaneously, industrial greenhouse gas emissions in Europe have been declining constantly over the past two decades. They were reduced by 26 per cent between 1990 and 2008. Nevertheless, the industrial sector remains the major energy consumer, with more than 40 per cent of total electricity consumed in the final energy sector. It is also the major consumer of solid fuels and natural gas (Öko-Institut 2011, on Eurostat data) (Rondinella, 2015: 92-93).

## 6. Conclusion

Eco-innovation requires the coordination of R&D, stakeholders and political decision-makers at all levels of governance. Between 2007 and 2013 the total amount of Structural and Cohesion Funds allocated to environmental activities which has doubled compared to the previous funding period to around 100 billion euros (30 per cent of total spending) in the EU. Half of this investment will be devoted to end-of-pipe technology, nature protection and risk prevention. The other half will be spent on indirect investments with an impact on areas such as transport and energy systems, eco-innovation, environmental management for business, urban and rural regeneration and eco-tourism. The EU Regional Policy could boost overall resource efficiency primarily in resource-intensive CEE industry. However, in reality most of the budget is still primarily dedicated to end-of-pipe environmental protection. The Europe 2020 flagship initiatives for a resource-efficient Europe also have implications for the 'European Resource-efficiency Transition Action Platform' (ETAP) which aims to evolve the EU from an innovation and technology platform into a platform from which the transition towards a resource-efficient Europe could be launched (Schepelmann, 2015: 58-62).

Effective shaping of consumer awareness lead to eco-innovation in the companies. These companies gain a positive image in the eyes of the society as they stress on their environmental responsibility. For the countries to encourage eco-innovation in the companies, it is essential to apply initiatives besides the general innovation policies. It is impossible to create eco-innovative strategies in the countries which have a non-innovative environment. Innovative countries tend to have better eco-innovative solutions for the green growth in all over the world (Rozkrut, 2014: 147). While Turkish companies do well in absorbing the latest technology, a stronger focus on innovation-led investments and innovative products would provide important impetus towards improving long-term productivity. The country faces the challenge of embarking on significant efforts in environmental sustainability, particularly the ratification of environmental treaties, as well as lowering its CO2 emissions and improving its air quality to converge with the EU average (World Economic Forum, 2014: 31).

Turkey holds strong trade ties with the EU in a customs union since 1996 which it conducts half of its trade. Since the start of accession negotiations in October 2005, 22 chapters have been opened, including company law, enterprise and industry, and one—science and research—has been closed. Turkey is in the process of becoming an EU member and hence in the position to transpose and implement the EU *acquis*. Regarding the Europe 2020 strategy, Turkey performs slightly above the EU average in enterprise environment, however, important steps remain to be taken to catch up to the EU average. This leads to a significant amount of uptake of environmental technologies and systems less “innovative” compared to EU standards. Turkey needs to build its human resource base by advancing its education and training system, investing in innovation-led growth is critical. Turkey also needs to put in place or renovate environmental infrastructures such as water and waste water systems, waste facilities, transport infrastructures, etc. Potential EU accession is one of the most important drivers for the uptake of these eco-innovations in Turkey.

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