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ECO-INNOVATION AND ITS CONTRIBUTION TO SUSTAINABLE DEVELOPMENT AND COMPETITIVENESS

Literature review

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Abstract

In the context of global economy a dominant role of knowledge is the importance of human resources in the process of innovation and value creation. This paper aims to address Romania's competitiveness in the context of global change mitigation by analyzing the counties competitiveness and eco-innovation. The efficiency-driven stage of development, which Romania is part of require specific regulatory measure in order to achieve sustainable development and competitive advantage. Analyzing the eco-innovation local needs by focusing on the SME can be seen as a solution, as they are creative in order to compensate for the lack of funding in research, development and innovation (like cluster research which is beneficial for sharing the risk and cost involved in research activities).

INTRODUCTION

The intensified economic activity of human society in the last century has gradually affected the quality of the surrounding natural environment, and with it, the well-being of its inhabitants. In order to accommodate their needs humanity has brought some major changes with extremely negative environmental impacts.

Among the most alarming problems nowadays is that of climate change, believed to be caused by the greenhouse effect and deforestation. Another important concern is that of the depletion of natural resources and the dependence on traditional fuels and energy sources (fossil fuels, coal, gas etc.) which are becoming more scarce, inefficient, expensive and unable to cope with the increasing demand in energy at a global level.

Taking into account these new global demand the concept of sustainability emerged. Nowadays in order to achieve sustainable development companies must consider the 3 P`s: profit, people and planet, also known as the Triple Bottom Line(TBL; term developed by John Elkington in 1997) with the purpose of measuring financial, social and environmental performance over time.

At a national level the 3 P`s relate to: economic growth, social development and environmental protection. The environmental component is part of the sustainable development and green policies and solutions have been developed in order to address it.

EUROPE 2020 STRATEGY AND INNOVATION UNION FLAGSHIP INITIATIVE

Europe 2020, a 10-year strategy proposed by the European Commission for advancement of the economy in the European Union, aims at "smart, sustainable, inclusive growth" with a greater coordination of national and European policy. The strategy identifies five headline targets the European Union should take to boost growth and employment (http://ec.europa.eu/europe2020/index_en.htm):

- raise the employment rate of the population aged 20–64 from 69% to at least 75%;
- achieve the target of investing 3% of GDP in R&D by improving the conditions the R&D investment in the private sector, and develop a new indicators to track innovation;
- reduce greenhouse gas emissions by at least 20% compared to 1990 levels or by 30% if the conditions are right, increase the share of renewable energy in final energy consumption to 20%, and achieve a 20% increase in energy efficiency;
- reduce the share of early school leavers to 10% from 15% and increase the share of the population aged 30–34 having completed tertiary from 31% to at least 40%;
- reduce the number of Europeans living below national poverty lines by 25%, lifting 20 million people out of poverty.

The Innovation Union Flagship Initiative aims in turning great ideas into products and services that will bring our economy growth and jobs, to improve framework conditions and access to finance for research and innovation in order to strengthen the innovation chain and boost levels of investment. Therefore, Europe needs to become resource efficient with the purpose to help decouple economic growth from the use of resources, by reducing the CO_2 emissions and decarbonising the economy, increasing the use of renewable materials, modernizing the transport sector and promoting energy efficiency.

FROM KNOWLEDGE AND R&D TO ECO-INNOVATION

The relationship between innovation and economic growth as underlined by Petrariu, Bumbac and Ciobanu (2013) has been highlighted in numerous theoretical (Solow, 1956, p. 65-94; Romer, 1986, p. 1002-1037) and empirical studies (Mansfield, 1972, Nadir 1993). Investment in innovation is different from other types of investments because they are characterized by a higher uncertainty rate of results, significant initial costs which cannot be easily recovered , often turns into knowledge of staff involved in research projects that can be lost with the person who hold them(Paunovic, 2012, p. 24-35).

Although the knowledge at the level of organization is important, the knowledge, experience, skills and individual talent of each member of an organization are considered to be crucial. The main reason is that people are able to respond to current situation operatively, to modify their reactions according to changing conditions and circumstances and to develop and enrich their knowledge based on new experience. This fact is decisive because of the innovation cycle acceleration and the necessity of continual improvement. According to Leadbeater and Oakley, creativity is being maintained through inspiration and conversancy supported by inspiration, vitality and engagement. This makes the creative work unstable, dynamic and risky, determined by important tacit knowledge (qualification), often shielded with different shows of behaviour (Rooney, Hearn, Ninan, 2005).

Knowledge management is an important mechanism for companies to be more innovative, efficient and effective. Organizations know that with a clear knowledge management strategy they can be more innovative, achieve better financial results, improve processes and develop human resources` capabilities. (Caralina Lopez-Nicolas, Angel L. Merono-Cerdan, 2011).

The primarily benefit of eco-innovation is the fact that it generates positive spillovers in related areas. Janicke (2008) argues that "ecological modernization-understood as systematic eco-innovation and its diffusion –has by far the largest potential to achieve environmental improvements".

WHAT IS ECO-INNOVATION?

In the last few years, much attention has been paid to innovation which was seen as a solution, as a way for industry and policy makers to work towards more radical and systemic improvements in environmental performance. The term eco-innovation demands attention to the positive contribution that industry can make to sustainable development and a competitive economy in the context of climate change mitigation.

Sustainable manufacturing require changes that are facilitated by eco-innovation. Integrated initiatives such as closed-loop production can potentially yield higher environmental improvements but require appropriately combining a wide range of innovation targets and mechanisms.

Eco-innovation is the introduction of any new or significantly improved product (good or service), process, organizational 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

Eco-innovation can be an idea for a new start-up or product as well as for making improvements to existing operations. One focus of eco-innovation is new technologies, but creating new services and introducing organizational changes are just as important. At its core, eco-innovation is about creating business models that are both competitive and

respect the environment by reducing resource intensity of products and services.

Already existing data sources can provide information on general aspects of eco-innovation, such as total investments in R&D, numbers of scientific publications or patents, numbers and descriptions of innovations, sales of new products from innovations etc. Nevertheless, these indicators are not designed to measure eco-innovation; therefore the insights that can be extracted are limited. For example, there is no official statistical classification for eco-innovation in patent data, R&D statistics or trade statistics. No single indicator or method can be considered ideal and investigations of eco-innovation based on these sources are best undertaken by combining a number of different indicators.

The future growth of eco-innovation is expected to be significant, even if it is a relatively new concept, among its inventors being Fussler and James.

DEFINING ECO-INNOVATION

According to Pujari C. (2006) in the paper "Eco-innovation and new product development: understanding the influence on market performance" eco-innovation is also known as environmental innovation, green innovation or sustainable development innovation.

Kemp and Foxon in 2007 define eco-innovation as: "the production, application or exploitation of a good, service, production process, organizational structure or management or business method that is novel to the firm or user and which results, throughout its life cycle, in a reduction of environmental risk, pollution and the negative impact of resources use (including energy use) compared to relevant alternatives".

The European Commission in a report in 2011, defined eco-innovation as "any form of innovation resulting in or aiming at significant and demonstrable process towards the goal of sustainable development pressures, or achieving more efficient and responsible use of natural resources".

In 2009 OECD considered eco-innovation to be any type of innovation but with two distinctive features:

- The innovation hast result in a reduction of the environment impact, no matter if this effect is intended or not
- And the scope of eco-innovation may transcend the conventional organizational boundaries of the organization innovating and may involve broader social arrangements that trigger changes in existing socio-cultural norms and institutional structures.

Kemp and Foxon made a classification of eco-innovation in:

- Environmental technologies (green energy technology, pollution control technologies, cleaning technologies, water supply, cleaner process technologies, etc)
- Organizational innovation for the environment (environmental management and auditing systems, pollution preventing systems, chain management, etc)
- Product and service innovation offering environmental benefits(environmental consulting, testing and engineering, new environmentally improved products, waste management etc)
- Green systems changes innovations (alternative systems of production and consumption that are more environmentally friendly).

MEASURING COMPETITIVENESS

The Organization for Economic Co-operation and Development (OECD) in 1996 defined competitiveness as the "ability of companies, institutions, regions, nations, and supranational regions to generate, while being and remaining exposed to international competition,

relative high factor income and factor employment levels on a sustainable basis"

Increasing competitiveness is part of the Lisbon strategy- EU policies encourage companies to increase their individual competitiveness, by increasing their capacity to sell products in the home and foreign market. The European Commission in COM/2002/0714 final defines competitiveness as being "the ability of the economy to provide its population with high and rising standards of living and high rates of employment on a sustainable basis.

Kemp and Horbach in a project for the European Commission called " Measuring of competitive of eco-innovation" conclude that eco-innovation is an important factor in increasing EU`s competitiveness, and provide a set of measurement indicators. According to them one can measure competitiveness by assessing the overall performance of the market (exports, sales, global market shares of goods and services sold, which contain eco-innovation) or by the economic benefits obtained from competing with world economies by innovating firms(referring to internal or national functions such as production, marketing, the value chain, competition, macroeconomic factors).

The key challenge for Romania is its low level of competitiveness, a challenge which has powerful consequences for the research, development and innovation system. Romania's economy is characterized by the high preponderance of low and medium–technology sectors, with a weak demand for knowledge and an underdeveloped innovation culture when it comes to eco-innovation.

ASSESSING THE COMPETITIVENESS OF ROMANIA

Throughout its history, various provinces and parts of Romania have had different degrees of economic development. The innovation policy has been too broad to address specific environmental concerns appropriately. It has focused on spurring economic growth by developing new technologies for improving productivity and new areas of functionality. As a result, eco-innovation has not been a primary objective of environmental or of innovation policy. From the innovation point of view, it is increasingly recognized that "third-generation innovation policies have to become fully horizontal and support a broad range of social goals if they are to achieve their objective of increasing the overall innovation rate in societies" (OECD, 2005, p. 57).

Identifying the appropriate focal areas of eco-design for a company's products and services is crucial. For example, a production company in the wood processing industry explores opportunities to improve product-related environmental performance in six focal areas: reduced weight, increased energy efficiency, reduced packaging, increased recyclability, substitution of hazardous materials and increased longevity of its products.

Feedback from market research and ongoing communications with the firm's customers and other stakeholders can identify new opportunities for eco-innovation. Promotion based on clear evidence-based claims related to environmental performance will enhance internal and external reputation underlining the organizations corporate social responsibility.

The notion of eco-innovation has grown in importance in relation to sustainable manufacturing but its characteristics and impacts are often clouded to both policy makers and companies. Quantitative and qualitative measurement of eco-innovation activities would improve understanding of the concept and practices and help policy makers to analyze market trends and

identify drivers and barriers. This would also raise awareness of eco-innovation among industry, policy makers and other stake-holders.

Therefore, the heart of an eco-innovation cannot necessarily be represented adequately by a single set of target and mechanism characteristics. Instead, eco-innovation seems best examined and developed using an array of characteristics ranging from modifications to creations across products, processes, organizations and institutions. The characteristics of a particular eco-innovation furthermore depend on the observer's perspective. The analytical frame work can be considered a first step towards more systematic analysis of eco-innovation.

Barsoumian et all 2011 note that eco-innovation is strongly linked to county competitiveness which is not among Romania`s strengths. According to the report for the Global Competitiveness Index for 2012 Romania ranks 78 out of a total of 144 countries analyzed in the study with an overall score of 4.1 (out of 7; 7 being maximum-the most desirable outcome). The Global Competitiveness Index is calculated on the basis of 3 subindexes: Basic requirements, Efficiency enhancers and Innovation and sophistication factors (a percentage share is attributed to each subindex according to its contribution to the overall GCI.

Romania belongs to the efficient driven stage of development, along with Bulgaria being the only member states in the EU which belong to this stage of development. Estonia, Hungary, Latvia, Lithuania and Poland are transitioning from stage 1 factor-driven to stage 2 efficiency-driven and the remaining 20 are included in the innovation-driven stage.

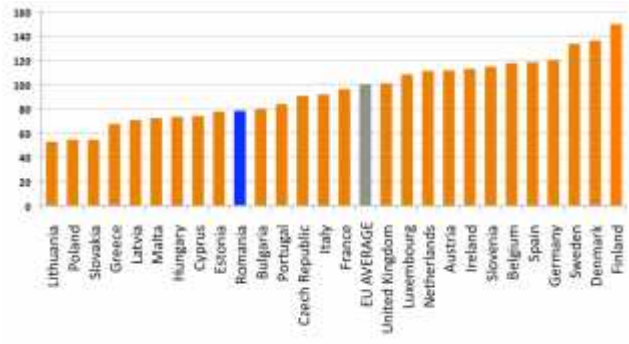
ECO-INNOVATION SCOREBOARD 2012

New surveys designed for analyzing eco-innovation could provide in-depth data on a number of specific aspects of eco-innovation, particularly those which are hard to get from generic sources. These could include more specific information on the nature of the eco-innovation, the drivers of innovation, the barriers, and the final impacts of innovation. These surveys should be careful to include questions that are relevant to the development of policies that can encourage eco-innovation at both national and regional level. Innovation surveys are typically conducted via smaller one-off or official, large-scale projects surveys. The large-scale national innovation surveys have a wider scope and are conducted on a regular basis, but are more limited in their ability to provide specific and detailed information (an example may be the eco-innovation module introduced in the EU's Community Innovation Survey 2008). Smaller, more specialized surveys are often limited in their geographical or sartorial coverage but provide more in-depth information.

The Eco-Innovation Scoreboard developed by the EIO is the first tool to assess and illustrate eco-innovation performance across the 27 EU Member States. The Eco-IS shows how well individual Member States perform in different dimensions of eco-innovation compared to the EU average. The 2011 scoreboard is based on 16 indicators in 5 areas (eco-innovation inputs, eco-innovation activities, eco-innovation outputs, environmental outcomes and socio-economic outcomes).

In order to exclude statistical outliers, the 5 % and the 95 % quintile are introduced as thresholds. Values above/below the thresholds are replaced by the corresponding threshold value. The EU average is calculated with the data corrected by the thresholds. The score of the index in each of the five areas is calculated by the unweighted mean of the underlying indicators. Consequently each indicator has the same importance in the five areas. The overall scoreboard of an

EU-27 Member State is calculated by the unweighted mean of the 16 sub-indicators in order to avoid bias by areas of the scoreboard which consist only of a few indicators (Source: http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=2&Itemid=34).



Source: 2012 Eco-innovation Scoreboard ranking and eco-innovation index composites for Romania, http://www.eco-innovation.eu/index.php?option=com_content&view=article&id=483&Itemid=71

The Romanian political instability in the first half of 2012 lead to delays in the policy-making process and small policy steps in the field of eco-innovation have been made towards the end of the year, (there have not been any signs of significant changes in policies or of new funding programmes in the field of eco-innovation). Romania's has improved its position in the Eco-innovation Scoreboard by rising from the 22nd position in 2011 to the 17th position in 2012. The driver behind the this improved position is the country's performance in terms of eco-innovation outputs, which has more than doubled since previous year, especially in terms of media coverage and eco-innovation related publications.

CONCLUSIONS

Countries in the innovation-driven stage, according to the World's Economic Forum Global Competitiveness Index, are considered to be the most competitive ones. Therefore innovation plays a strategic role in economic growth. Nowadays, policy makers in order to address the new global challenges (high unemployment rates, greenhouse effect, fossil fuel resource dependent economies, etc) turn toward sustainable alternatives, green innovation or eco-innovation.

Romania faces a number of long-medium term challenges in the bid to secure smart, sustainable and green growth. At 46 % of the EU average, Romania's GDP per capita is one of the most telling indicators of the country's developmental gap compared to the rest of the member states. Particular challenges include the need to increase labour market participation, improve overall competitiveness and reform the public administration in and addressing global change mitigation. European funds can provide an important source of public investment that can address the challenges of eco-innovation.

In order to successfully implement eco-friendly initiatives in Romania, a re-evaluated regulatory framework for innovation and especially for eco-innovation should be developed. This framework should integrate crucial provisions that can support the activity of local companies in the eco-field by facilitation knowledge of and financial options to: specialized training, public-private research programs, financing options, cluster research, etc.

By stimulating creative approaches, diverse concepts and involve stakeholders/experts and reward buy-in when eco-innovative ideas are implemented a company can create a competitive advantage over the other players on the market. Companies pertaining to counties in the efficiency driven stage of development should carefully plan their transition towards the innovation driven stage in order to have a clear view of the measures needed to be taken and the objectives needed to be attained.

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