WORking papers in Management Science

WORMS/19/02

The innovativeness of green sector enterprises

Adam Sulich[1], Małgorzata Rutkowska, Jerzy Tutaj[2]

[1] Department of Strategy and Management Methods, Wroclaw University of Economics and Business
[2] Department of Organization and Management, Wrocław University of Science and Technology, Poland

WORMS is a joint initiative of the Management Science departments of the Wrocław University of Science and Technology, Wyb. Wyspiańskiego 27, 50-370 Wrocław, Poland

Chapter 20

The Innovativeness of Green Sector Enterprises

Adam Sulich, Małgorzata Rutkowska, Jerzy Tutaj

1. Introduction

Business managers today face new tasks that impose stormy times on them and organizations they manage in turbulent business environment. The dynamics of the observed changes is undisputed and is the result of globalization forces. Among many tasks, the ability to manage change, which is now the only constant element of running a business, is of key importance for creating the success of an organization. Organizations adopt different goals and strategies, becoming intelligent, learning or developing organizations through self-improvement. Therefore, managers need to know how to effectively make changes and how to transform their businesses so as to strengthen competitiveness. The competitive position of the organization is an effect of the implemented strategy. The organization needs to learn how to constantly renew its resources and create different innovations to increase its flexibility in adapting to the constantly evolving market and the ability to maintain its distinctive competence. The organization must create a number of conditions that will allow it to take into account future opportunities and foster the emergence of an innovative strategy that ensures the optimization of conditions of functioning in relation to the environment.

Green sector enterprises are a special case of organizations that depend heavily on the natural environment condition, the state's economic policy and technical progress. The green sector consists of enterprises that in the Polish economic reality have been classified under the Polish Classification of Activities (pol. *Polska Klasyfikacja Działalności*), which classification is in based on the international classification (fr. *Nomenclature statistique des activités économiques dans la Communauté européenne*, NACE). The green sector consists of selected sections, in which the so-called green workplaces or green jobs. In this article, the concept of the green sector also means companies that produce the same or similar products or provide services are considered as environmental or ecolog-

ical. Therefore, the green sector gathers organisations which impact on environment is positive or at least neutral.

The purpose of this article is to analyse the main cause of innovation in the green sector among Polish enterprises, which are green innovations (eco-innovations) measured by number of green patents and green jobs. On this background Polish economy greening process was compared with chosen European Union member states.

2. The Green Economy

Greening of the economy and its development are processes related not only to the desire to increase economic efficiency but also to ensure that it takes place in accordance with natural environmental conditions. Such a course of conduct is generated by the concept of sustainable development. This concept promotes a holistic approach to development integrating the economy, society, and the environment. Understanding development in this way is a process that affects almost all areas of management. It is associated with a social change in the hierarchy of values, in which, along with economic growth, the human being and his quality of life and the protection of the natural environment in which we live are recognized as the highest value. The processes of globalization through the pursuit of the development of production cause, on the one hand, threats to man and his environment, on the other hand, in accordance with the concept of sustainable development presented above, aim at eliminating the negative effects of these processes. A set of events, actions, and effects occurring in the global economy with a positive and negative impact on people and the environment.

Economic development, and hence the growing number and diversity of products appearing on the market, mean that eco-innovation activities are becoming increasingly important. However, the environmental pollution is a threat to the current economic development. In the situation of increasing environmental pollution and depletion of natural resources, ecological investments are in the centre of interest both researchers and decision-makers.

Therefore, the concept of green economy is associated with the problems and the philosophy of sustainable development as well as innovation. Already at the beginning of the 21st century, some important assumptions for the development of innovation in the green sector were adopted. In response to the economic crisis, solutions were sought that would combine efforts for sustainable development and solving the problem of unemployment.

The United Nations Environment Program (UNEP) called in 2008 for an agreement, the so-called *Global Green New Deal* was a very first step towards

implementation of sustainable development principles into business. The purpose of this agreement was to create opportunities and opportunities to emerge from the global economic crisis through the development of green economy sectors. In the *Global Green New Deal Report - Policy Brief*, issued in March 2009, were recommended investments in areas that are key to the environment which are especially: renewable energy, public transport, waste management, and recycling. Also, in 2009, there have been many significant changes in legal legislation. The OECD Council in June 2009 decided on the development of a Green Growth Strategy. The goal of this strategy was to support green investments and technological innovations.

OECD announced in 2011 a set of indicators to support statistical evaluation of the effects of strategy implementation. It should be emphasized that the proposed measures complement the gross domestic product (GDP), so that the overall prosperity of the society and the level of greening of the economy can be determined. In addition, the OECD Council proposed that each member country should prepare indicators adapted to its socio-economic situation, based on its achievements. Although these documents created a frame for each country action indeed not many of them did so. Therefore, according to many analyses provided by OECD the economy of Poland does not belong to innovative economies, and its state is not determined by inventions and patents, and the current economic development depends primarily on the economy based on coal and agriculture (Rutkowska-Podołowska & Pakulska, 2016).

3. Green sector in Poland

The green sector is made up of enterprises producing products and environmental services for various purposes, the common denominator of which is the impact on the natural environment. The green sector is created by enterprises that offer services and products that do not have a negative impact on the environment also in the process of their provision or production. The green sector can also be defined as the area in which green jobs are created (Rutkowska-Podołowska, Sulich & Szczygieł, 2016). For statistical purposes, the green sector can be defined as presented in Table 1.

The largest number of people employed in green jobs works in agriculture and related industries. This proofs observation that Polish economy is based on this sector of activity. Moreover, majority of energy produced in Poland is based on coal combustion.

The international statistics assume a conventional division into enterprises whose sole purpose is to protect the environment (*core business*). These are companies that manage waste, sewage treatment utilities, companies providing

sanitary services, and companies that deal with production and services related to environmental protection (*non core business*) are, for example, manufacturers of measuring and control devices, companies dealing with training activities, research and development, etc. It follows from the above that the new green sector develops not only on the basis of new types of activities, but also the absorption of existing enterprises in the past, collection and utilization of waste, and disposal of sewage.

Table 1. Green sector as a composition of selected section of Polish Classification of Activities

Green Sector		Employed				
Section	Characteristic	2008	2010	2012	2014	2016
A	Agriculture, forestry, hunting and fishing	2128,3	2376,1	2378,0	2388,1	2390,9
D	Production and supply of electricity	152,7	159,1	143,4	117,4	111,6
E	Water supply, sewerage, waste management and remediation activities	132,0	140,9	143,5	147,7	153,0
M	Professional, scientific and technical activities	472,6	481,3	531,4	586,0	651,0
N	Administration and support activities	347,5	411,7	425,4	467,0	540,3
S	Other service activities	202,4	200,7	217,6	262,3	295,4

Source: (GUS, 2018).

Companies usually use the latest technologies, which reduce the amount of raw materials needed to produce products, and what is associated with it, less waste is created. However, new consumption patterns are not always burdensome for the environment. Organizations and countries are introducing regulations that limit environmentally harmful activities and reduce the risk to the environment.

Macroeconomic processes and regulations affect the operations of enterprises. In enterprises, sustainable development is primarily associated with this way of operating, so that it is as least burdensome to the environment. The increase of ecological awareness in the enterprises of the green sector causes that this issue is already taken into account at every stage of the creation and functioning of the company and the sector. That is why in business activities sustainable development is mainly associated with:

- use of ecological materials,
- ecological way of processing raw materials,
- the production of such products which, after a period of their use by the consumer, may be destroyed in an ecological manner or may be recycled.

Considering the above-mentioned ways of dealing with the concern for ecological development, the 3R rule was formulated in the strategies of enterprises' activities, is:

- reduce – reducing the consumption of materials,

- reuse – reuse of what is possible,
- recycle – the use of materials suitable for reprocessing into wholesome raw materials.

The implementation of these principles is necessary for the process of greening the company, because it contributes to significant changes in production, and through changes in products contributes to new strategies of enterprises and sectors. What is more, sustainable development of enterprises and sectors becomes the basic determinant of not only the direction of changes in these entities, but also an element of their competitiveness. Ecological products and their ecological production become the basic factor of the company's competitiveness.

4. The innovativeness and its meaning to the green sector

The broadly understood ecology is not only preventing the negative impact of humans on the environment but above all, it is creating benefits for the whole economy. The green sector of the economy includes responsible resource management, the use of economic instruments conducive to environmental protection, and sustainable consumption. In this sector, production and development is largely based on renewable energy sources, which are a way to ecological production of electricity and heat. That is why many countries, especially the European Union, are trying to increase the number of innovative and ecological investments.

There are many definitions of the concept of innovation in the subject literature. The best known is the one that was introduced by Schumpeter in 1912, which distinguished innovation from the invention. In his view, "innovation is possible without all that we identify with the invention because the invention does not necessarily have to induce innovation" (Schumpeter, 1939). For the purposes of this article, it was assumed that "an innovation is a new or significantly improved product (good or service) placed on the market or the introduction of a new or significantly improved process in a company. Innovations use the results of technological development, new combinations of existing technology or the use of other knowledge desired by the enterprise" (Woźniak, 2006). Innovation plays an important role in building and maintaining a competitive position and competitiveness of individual enterprises, regions or entire countries (Nowakowska, 2010).

The importance of innovations for enterprises with the contemporary dynamics of development, competition and globalization of markets is obvious. Companies cannot simply settle for accidental favourable circumstances. Instead, they must create conditions conducive to the systematic search for innovations, because today the greatest successes are achieved by the original form of activity, not by striving to outperform rivals in conventional factors of activity (Penc, 1999).

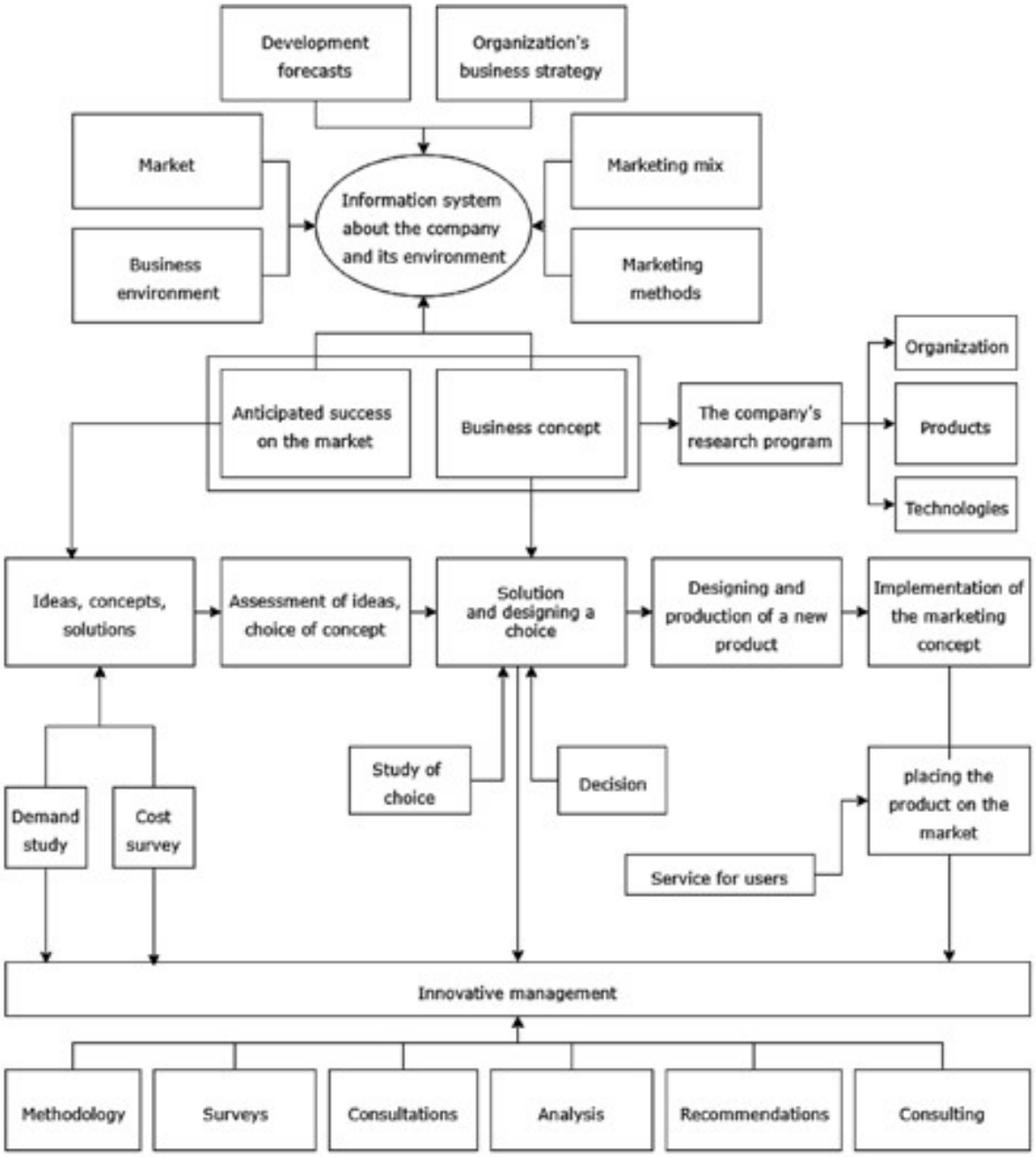

Figure 1. Management procedure for controlling the innovative process in the organization
Source: own elaboration based on (Penc, 1999, p. 302).

Therefore, among the enterprises of the green sector, the implementation of innovations means that their creation is not an accidental, occasional activity, but a programmed activity consisting of seeking development opportunities, developing new technologies, new products and forms of marketing as well as constant staff training so that they are able to create innovations and their implementation according to the challenges and needs of the market.

Green enterprises can use different exemplary strategies for creating and introducing innovations. However, they have to decide themselves how to act inno-

vatively without improvisation, which is the strategy of creating innovations and their use to ensure a good position on the market.

The innovation creates a long-term framework for various innovation-friendly activities and coordination of these activities, inspiring ideas and effective use of information. This scheme presented in Figure 1 can be supported by some indicators of innovativeness. One of them is a number of green patents in selected EU countries presented in Table 2.

Table 2. Patents related to recycling and secondary raw materials (thousands)

Year / Country	2006	2007	2008	2009	2010	2011	2012	2013
EU-28	229,33	211,04	265,82	281,57	284,93	305,19	346,84	363,78
Belgium	4,86	4,22	6,4	10,44	11,12	7,79	6,87	15,42
Czechia	2,39	6,00	2,02	7,24	8,27	5,92	9,95	7,33
Germany	81,66	78,03	92,04	92,88	71,41	86,81	82,65	92,65
Poland	12,33	10,83	24,8	20,17	33,00	39,08	53,82	34,5

Source: (European Commision, 2019).

Creating a knowledge-based economy is to a large extent related to the need for cooperation in the field of knowledge transfer between universities, non-governmental organizations and business. A special role is attributed to the development of science, as a result of which new products and services are created. The implementation of inventions and innovative solutions translates in a clear way to improving the quality of human life while respecting the natural environment. Transfer of knowledge perfectly describes the pyramid model (Fig. 2).

The knowledge transfer presented above in Figure 2 and in Table 2 is best visible in Germany, which influence on European economy is not disputable. Therefore, Poland as Germany's neighbour country in this analysis is second among chosen EU countries. As the presented in Figure 2 highest level of knowledge has highest impact on process of knowledge to practice transfer, and this occurs mostly among small groups leaders who initiate the changes.

5. Conclusion

The concept of green economy and green jobs are relatively new ideas, still valid due to the ongoing climate change and environmental degradation, as well as increasingly occurring financial, economic, migration and famine crises. The activities leading to savings and improvement of the effectiveness of undertaken actions are becoming more and more important, the aim of which is not only to temporarily solve the existing problems, but also to prevent their occurrence in

the future. One of the trends of change gaining in this context is the transition from a basic economy to a green and sustainable economy. The efforts of individual countries and supranational institutions focus not only on the promotion of the green economy, but also on innovative solutions to the challenges of the modern world. This innovation consists in the greatest possible involvement of science and its discoveries as part of the transfer of knowledge to the economy.

Bibliography

1. European Commision. (2019). *Patents Related to Recycling and Secondary Raw Materials. Eurostat Database – Main Tables*. Retrieved on 10/07/2019, from: https://ec.europa.eu/eurostat/data/database?node_code=cei_cie020.
2. Główny Urząd Statystyczny. (2018). *Bank Danych Lokalnych. Zatrudnieni wg PKD 2007*. Retrieved on 06/09/2018, from: https://bdl.stat.gov.pl/BDL/metadane/podgrupy/479.
3. Nowakowska, A. (2010). Regionalna polityka innowacyjna – bilans dziesięcioletnich doświadczeń. [in:] M. Klamut & E. Szostak (Eds.), *Jaka polityka spójności po roku 2013?*. Wrocław: Wydawnictwo Uniwersytetu Ekonomicznego we Wrocławiu.
4. Penc, J. (1999). *Innowacje i zmiany w firmie*. Warszawa: Agencja wydawnicza Placet.
5. Rutkowska-Podołowska, M., & Pakulska, J. (2016). Innowacje ekologiczne szansą rozwoju gospodarczego w Polsce. [in:] Z. Malara (Ed.), *Oblicza innowacji w gospodarce i społeczeństwie*. Wrocław: Oficyna Wydawnicza Politechniki Wrocławskiej.
6. Rutkowska-Podołowska, M., Sulich, A., & Szczygieł, N. (2016). Green Jobs. [in:] E. Kovářová, L. Melecký & M. Staníčková (Eds.), *Proceedings of the 3rd International Conference on European Integration 2016*. ICEI 2016. Ostrava: VŠB – Technical University of Ostrava.
7. Schumpeter, J.A. (1939). *Business Cycles: A Theoretical, Historical, and Statistical Analysis of the Capitalist Process*. New York: McGraw-Hill.
8. Woźniak, L. (2006). Innowacje ekologiczne w rolnictwie i przetwórstwie rolno-spożywczym oraz na obszarach wiejskich. [in:] J. Woźniak, J. Krupa & J. Grzesik (Eds.), *Innowacje ekologiczne w rozwoju społeczno-gospodarczym*. Rzeszów: Wydawnictwo Wyższej Szkoły Informatyki i Zarządzania.