ISSN 1644-0757
eISSN 2450-4602
http://acta_oeconomia.sggw.pl

ACTA SCIENTIARUM POLONORUM *Oeconomia 15 (4) 2016, 183–193*

DIRECTIONS OF UNDERTAKING ECOLOGICAL INNOVATIONS IN AGRIBUSINESS COMPANIES

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Abstract. Every agribusiness company affects the natural environment, to a smaller or larger extent. There can be no choice between the environment and economic development, therefore the agribusiness companies must adjust their development to the possibilities that the environment offers. The aim of this study is to present ecological innovations in agribusiness companies and their reference to the idea of sustainable development. Survey research was carried out among 156 agribusiness companies from Kujawsko-pomorskie Province of Poland. The only companies participating in the research were those in which some ecological investments were implemented. The research showed that the agribusiness companies consider the policy of introducing ecological investments to be very important. The companies are trying to bring into their management the strategy of eco-innovations so that they can operate with a benefit for its consumers and the natural environment. The basic types of ecological investments in the surveyed agribusiness companies include: careful waste segregation, ecological production and limiting harmful gas emission. The ecological innovations stem from the principles of sustainable development, they support the introduction of sustainable solutions in the companies, they also allow for a more efficient use of natural resources and contribute to the limitation of actions harmful to the environment while maintaining the high level of innovativeness.

Key words: agribusiness, ecological investments, sustainable development

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INTRODUCTION

The concept of stable and sustainable development came into being as a result of the occurrence of negative effects of the environment exploitation and the necessity to protect it. Hence, the agribusiness companies are facing more and more newer challenges – one of those being the possibility to introduce ecological innovations. These innovations result from the principles of sustainable development whose aim is to prevent negative impacts upon the environment, which requires social acceptance for the functioning of the companies [Zuzek and Wielewska 2015]. The idea of sustainable development will be fulfilled when the environment is protected along with the peak economic development of the company, and also when the resources are renewed in the long term. Eco-innovations lead to the acquisition and preservation of the state of sustainable development which includes not only environmental protection itself but also man's activity and relation with basic biological, chemical and physical systems leading to constant economic, cultural and technological evolution.

Within the companies, areas or fields of activity are determined by various aspects of sustainable development, i.e. integration and sustainability of different domains out of which the following must be mentioned [Pawłowski 2011]:

- natural and ecological domain (showing through environmental protection);
- technological domain (showing through new tech, saving resources);
- economic domain (showing through taxes, subsidies and other economic instruments);
- social domain (it is critical to solve the problem of unemployment in the Polish conditions);
- political domain (showing through the formulation of a sustainable development strategy, its implementation and control).

The aim of this article is to present the directions of ecological investments introduced in agribusiness companies as well as as their reference to sustainable development.

MATERIAL AND METHODS

The method applied in the research was the diagnostic survey and the technique was a survey questionnaire. Survey research was carried out among 156 agribusiness companies from Kujawsko-pomorskie Province of Poland. Both small, medium and large companies participated in the research. The study assumed that ecological investments play a key role in the introduction of the idea of sustainable development in rural areas. The choice of the research sample was intentional, as the survey questionnaire was addressed only to those companies which carried out eco-investments between 2013–2015. The questionnaire included mostly closed questions. The addresses of the questionnaire were the owners, managers or other persons responsible for environmental protection in the surveyed companies. The collected data was subject to the statistical analysis.

INNOVATIONS VERSUS ECO-INNOVATIONS

The notion of innovation was first coined and brought into the world economic literature by J.A. Schumpeter. It means a planned change (novelty) in an environment. More broadly, innovations are defined as changes whose aim is to replace previous states in a company by other states which guarantee technological progress and development. They are also characterized by improving standard in such areas of innovativeness as: products, services or even the organization itself [Berliński 2003].

Innovations are "the whole process of management, including various actions and undertakings leading to the creation, development and implementation of new values in products or new combinations of means and resources, which are a novelty to the individual who creates or introduces them" [Bujak 2011].

Furthermore, innovative activity is "the engagement of companies into various scientific, technological, organizational, financial and commercial activities, which lead or will lead to the implementation of innovations. Some of those actions are innovative, others are not a novelty but are necessary to the implementation of innovations. Innovative activity also includes research-development activity (R+D), which is not directly connected with the creation of a particular innovation" [Woźniak and Ziółkowski 2006, Roman 2013].

A company can be recognized as innovative is one "which – within the surveyed period, mostly three years – has implemented at least one technological innovation, i.e. a new or improved product or a new or improved process that is a novelty, at least from the point of view of the company" [Stawasz 2006].

According to A. Sosnowska et al. [2000], the criteria which identify an innovative company include:

1. Quantitative criteria, which include:
   - the share of new products and technologies in the annual value of the company sales;
   - the number of new products introduced in the particular year;
   - the number of new technologies introduced in the particular year;
   - the number of patents obtained in the particular year;
   - the number of research subjects being carried out;
   - the value of patents granted for research;
   - the share of research expenditure granted in the particular year in the value of the sales;
   - the share of the basic products in the world market;
   - the number of employees with a degree;
   - the percentage of employees with a degree in relation to other employee groups;
   - the number of scientific publications;
   - the number of college/university degrees acquired;
   - the number of awards received for the company's products at exhibitions and contests;
   - the number of licences sold;
   - the number of foreign licences bought and used.

2. Qualitative criteria, which include:
   - the infrastructure, including the level of scientific infrastructure equipment and the level of computerization;
   - the technologies, including the level of technology modernity, the environment-friendliness of the technology and technological and economic factors;
   - the products, including the level of product modernity, quality, its marketing merits and chances for success;
   - the staff, including the level of qualifications, achievements (college/university degrees, patents, publications), recognition of the environment and contacts overseas.

Contemporary companies must accept the need for constant change and work out mechanisms of effective management of the phenomenon. It was only recently that the environmental aspects started to be included in the group of the most important factors that compel mankind to be extra careful. Socio-economic development cannot be separated from the natural environment, and ecological (environmental) education should play a key role along with modifying the dominant system of values: changing people's way of thinking from the point of view of conqueror to the position of a partner of the natural environment [Pawul and Sobczyk 2011].

In the long term, comprehensive thinking of the challenges of environmental protection and sustainable development translates into elements of impact upon economic and environmental issues [Szpor and Śniegocki 2012], such as:

- improvements in economy efficiency in the use of available resources;
- stimulating innovativeness (eco-innovations);
- creating new markets for ecological technologies, products and services, which translates creating new job opportunities;
- increasing investors' trust thanks to predictable, long-term government policies in the field of environmental protection;
- greater economic stability resulting from the decrease in dependency on natural resource prices and budget consolidation thanks to the improvement in the efficiency of public expenditure as well as income from waste taxation;
- decreasing the risk related to the "bottle neck" effects in the field of the natural resources;
- decreasing the risk of sudden, expensive and irreversible changes caused by a breach in the balance of ecosystems.

The above assumptions give rise to the necessity to introduce ecological innovations in the agribusiness companies. Eco-investments are equalled to such expressions as: green innovations, environmental technology, green technology, technological environmental investments, eco-technologies, ecological technology, green products, green marketing or consumer-friendly products.

Eco-innovation is a novelty, which not only improves the efficiency of the natural resource usage in the economy, but also, more importantly, decreases the negative impact of man's activity upon the environment and strengthens the endurance of the economy to environmental pressures.

This implies that the eco-innovations contribute directly or indirectly to the reduction of various environmental encumbrances; besides, their introduction is primarily oriented towards reaching particular environmental efficiency [Szpor and Śniegocki 2012].

The activities of the companies which help to decrease the pressure on the natural environment and bring financial economization [KosteckaandKostecki 2006] amount to the economic aspect in:

1. Energy management:
   - determining areas of unfounded energy use;
   - analysis of bills and data from energy meters with the current activity of the company;
   - switching on all devices only in cases of justified emergency;
   - switching off any equipment operating in stand-by;
   - maintenance of thermostats regulating the temperature of hot water;
   - tightening windows and doors and installing heat-retaining curtains;
   - introduction of insulation for the hot utility water installation;
   - good technical condition of the equipment and electro-tools;
   - cleaning lamps and introducing energy-saving light bulbs and light switch sensors;
   - introduction of heat switch regulators;
   - introduction of magnetic cards which automatically switch off energy in company rooms and halls;
   - exchange of household devices for energy-saving ones.
2. Waste management:
   - determining areas in which it is possible to limit waste and to analyze its composition and quantity, in order to determine the policy of purchase (e.g. cleaning supplies, office supplies, food);
   - making purchases for the company in large and/or recyclable packaging;
   - cost analysis of the used type of packaging;
   - working out a waste recycling scheme;
   - limiting the use of packaging for hygiene products, introducing soap dispensers;
   - limiting the number of information brochures for customers, printing them on recycled paper;
   - composting organic waste at the place where they are generated;
   - "earthworm ecological box" (lower cost of waste disposal);
   - using electronic mail (lower paper consumption).
3. Water management
   - determining areas that enable water saving;
   - measurements in particular places of water consumption (e.g. washbasins, toilet cisterns);
   - water recycling where possible;
   - repairing leaky devices (e.g. taps, toilet cisterns), introducing water usage limiters (self-switching taps, infrared sensors, tap aerators);
   - collecting rain water and using it for e.g. watering greeneries;
   - application of cleaning agents which are biodegradable and phosphorus free.

In the general meaning, eco-innovations aim at: soil protection, rational water management policies in the economic aspect, protecting waters from pollution, limiting dust and pollution emission, sorting out issues of municipal economy and land use [Kozłowski 1997].

To conclude, ecological innovations support the introduction of sustainable solutions in the companies, allow for a more effective use of the natural resources and also contribute to the limitation of activities harmful to the environment while maintaining a high level of innovativeness.

RESULTS AND DISCUSSION

According to the data from the Central Statistical Office of Poland [GUS 2016], the expenditure for innovative activities was 31,094.1 million PLN in industrial companies and 12,640.6 million PLN in services (in 2014 that expenditure was 24,621.6 million and 12,995.2 million PLN respectively). Between 2013 and 2015, the innovations were introduced in 18.9% of industrial companies (0.3% increase compared to the years 2012––2014) and in 10.6% of service companies (compared to 12.3% in the years 2012–2014). New or significantly improved product or process innovations were introduced by 17.6% of industrial companies and 9.8% of service companies.

The research included 156 agribusiness companies operating in Kujawsko-pomorskie Province of Poland, in which some ecological innovations had been introduced. The survey research conducted by the author implies that eco-innovation activities are undertaken most frequently: when the entire company is being modernized (62.2%), in order to improve the company's image (66.7%), in order to improve the condition of the environment in the region (69.9%), for economic benefits arising from their implementation (39.1%), but most of all in order to lower the costs of operation (82.1%). The business people rarely indicated legislation or local authority pressure as a significant factor for undertaking action for the environment (Fig. 1).

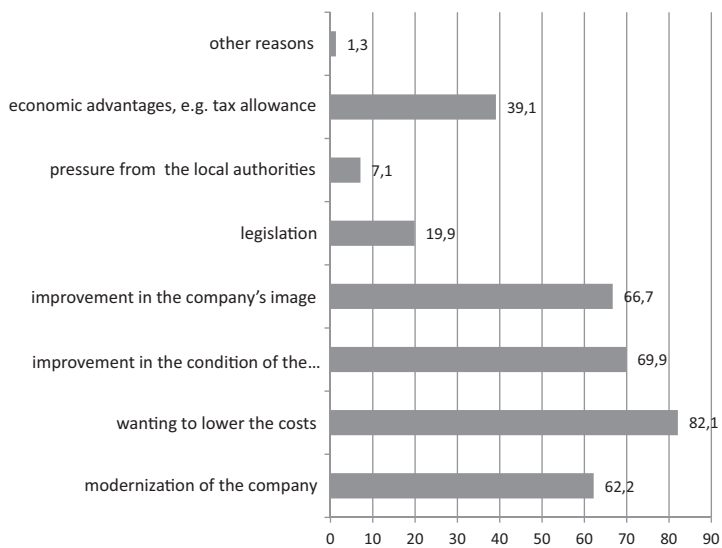

Fig. 1. Decisive factors for undertaking action for the environment in the surveyed agribusiness companies

Source: Author's own study based on research conducted.

Although Polish companies not only implement few eco-innovations, but few innovations altogether [GUS 2015], the research showed that, according to the surveyed, eco-innovations take up a high rank in the general policies of Polish agribusiness companies. This was the opinion of 94.2% of the surveyed. Two people (1.3%) were of the opposite opinion and the remaining 4.5% of the surveyed did not have an opinion in this matter. Similar results were obtained about the rank that eco-innovations take within the policy of own companies of the surveyed. As much as 87.2% of the surveyed saw ecological innovations as important – according to them, these take up a high position in the company's policy; one person (0.6%) claimed that they do not matter much; another 12.2% did not produce an opinion in this matter.

The company's policy ought to oscillate towards the production of goods in the way that is the least harmful to the consumer and the natural environment. Eco-innovations give small and medium-sized companies an opportunity to improve their images and their general presence on the market.

The research showed that the types of ecological innovations implemented in the surveyed companies are primarily: detailed segregation of waste (71.8%), ecological production (66%) and limitations in harmful gas emission (56.4%). What mattered less was media infrastructure modernization or technology line modernization (Fig. 2).

The development of eco-innovations is dependent on macroeconomic factors, institutional support, legal conditions, social expectations or relations with suppliers and customers [Zuzek 2015]. However, there are often various obstacles during the realization of those enterprises. The research showed that the surveyed agribusiness companies also encounter a number of barriers that withhold their development in the field of eco-innovations (Fig. 3).

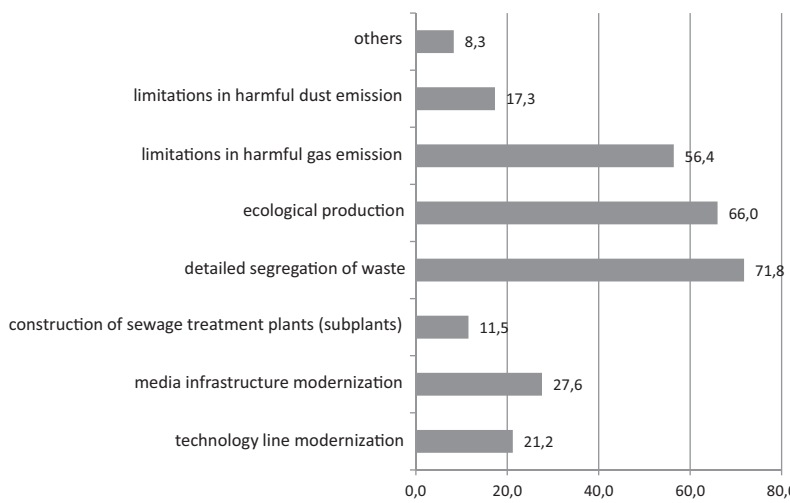

Fig. 2. Types of ecological innovations implemented in the surveyed agribusiness companies

Source: Author's own study based on research conducted.

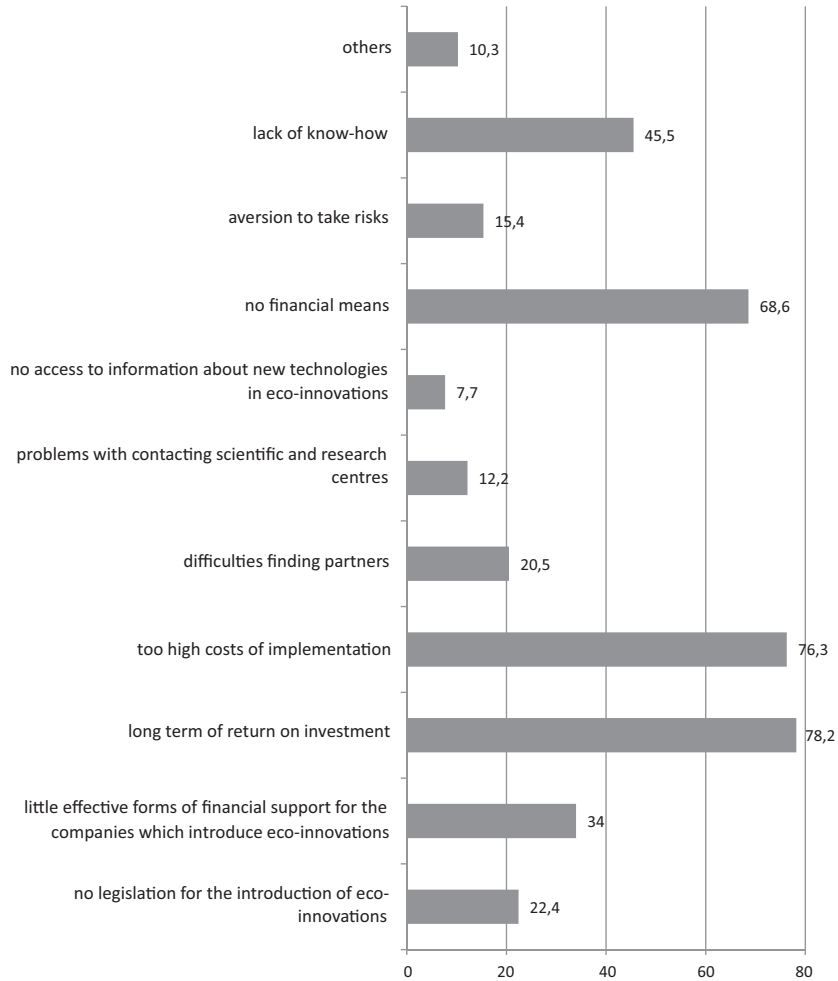

Fig. 3. Barriers in the introduction of ecological innovations in agribusiness companies, in the opinions of the surveyed

Source: Author's own study based on research conducted.

The surveyed saw the basic barriers or obstacles which obstruct the introduction of eco-innovation solutions in: long term of return on investment (78.2%), too high costs of the introduction of eco-innovations (76.3%), lack of financial means (68.6%), lack of know-how (45.5%) or ineffective forms of financial support for companies that introduce eco-innovations (34%). The financial limitations generally arise from the fact that the current economic activity of the agribusiness companies is financed from own capital which is not sufficient for innovations. The problem is also the acquisition of external sources of financing, such as loans, credits or EU funds [*Strategy of innovativeness...* 2011, Zuzek 2015].

Eco-innovations play an important role in mitigating the effects of changes in the environment caused by man – both their impact on nature and the economic system itself, so it is essential that they be constantly implemented. As much as 68.6% of the surveyed are thinking of implementing eco-innovations in the future, 16.7% do not see a perspective of their further implementation and 14.7% do not have an opinion in this matter.

In conclusion, innovations are a priority for building economic growth and social and cultural development. Eco-innovations, however, refer primarily to the companies' sustainable development.

It is clear from the Central Statistical Office of Poland research [2015] that still very few Polish companies implement innovations or eco-innovations. It is the large companies, which employ more than 249 employees, that most frequently undertake the implementation of eco-innovations. Also, it is usually the organizations that operate in industry rather than services. Although eco-innovations still have a small share in small and medium-sized companies, it is hardly possible to turn the economy "green" without them.

CONCLUSIONS

The basic condition for the implementation of any innovation is perceiving it as a potential opportunity, rather than a threat. Eco-innovations lead to acquiring maintaining the state of sustainable development, which includes not only the environmental protection, but also man's activity and relation with basic biological, chemical and physical systems leading to constant economic, cultural and technological evolution.

The following conclusions arise from the analysis of subject literature and the author's own study:

1. Each agribusiness company affects the natural environment, to a smaller or larger extent. Because of this, the companies ought to pay more attention to decreasing the use of raw materials and to optimizing the production process.
2. The surveyed agribusiness companies consider the policy of implementation of eco-innovations to be very important. The basic types of ecological investments in the surveyed agribusiness companies include: careful waste segregation, ecological production and limiting harmful gas emission.
3. The implementation of the selected ecological innovations means having to overcome a number of barriers. The surveyed concluded that the problem here is primarily the long term of return on investment, lack of know-how or financial means. In spite of this, most surveyed companies are willing to further implement ecological innovations.

It must be noted that undertaking voluntary obligations in the environmental protection is beginning to constitute an important element of the companies' strategies of development, which contributes to an increase in the pro-ecological orientation of management, thus also to an increase in competitiveness of the companies. Ecological, consumer- and environment-friendly production is conducive to the company's competitiveness on the market.

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WDRAŻANIE INNOWACJI EKOLOGICZNYCH W PRZEDSIĘBIORSTWACH AGROBIZNESU – KIERUNKI DZIAŁAŃ

Streszczenie. Każde przedsiębiorstwo agrobiznesu w mniejszym lub większym stopniu wywiera bezpośredni wpływ na środowisko naturalne. Nie może też wybierać między nim a rozwojem gospodarczym, dlatego swój rozwój musi podporządkować możliwościom, jakie to środowisko daje. Celem niniejszego opracowanie jest przedstawienie innowacji ekologicznych w przedsiębiorstwach agrobiznesu i ich odniesienie do idei zrównoważonego rozwoju. Badania sondażowe przeprowadzono wśród 156 przedsiębiorstw agrobiznesu z województwa kujawsko-pomorskiego. W badaniach uczestniczyły tylko te przedsiębiorstwa, w których realizowane były inwestycje ekologiczne. Badania wykazały, że przedsiębiorstwa agrobiznesu politykę wdrażania innowacji ekologicznych uważają za niezwykle istotną. Starają się one wprowadzać do swojej strategii zarządzania ekoinnowacje, aby produkować z pożytkiem dla konsumenta i środowiska naturalnego. Podstawowe rodza-

je innowacji ekologicznych w badanych przedsiębiorstwach agrobiznesu to: szczegółowa segregacja odpadów, produkcja ekologiczna, ograniczenie emisji szkodliwych gazów. Innowacje ekologiczne wynikają z założeń zrównoważonego rozwoju, wspierają wdrożenie zrównoważonych rozwiązań w przedsiębiorstwach, pozwalają na bardziej efektywne wykorzystanie zasobów naturalnych, a także przyczyniają się do ograniczania obciążającego środowisko oddziaływania przy równoczesnym zachowaniu wysokiego stopnia innowacyjności.

Słowa kluczowe: agrobiznes, innowacje ekologiczne, zrównoważony rozwój

Accepted for print: 28.11.2016

For citation: Wielewska I., Kacprzak M. (2016). Directions of undertaking ecological innovations in agribusiness companies. Acta Sci. Pol., Oeconomia, 15 (4), 183–193.