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## **AGRICULTURAL - FOOD SECTOR COMPETITIVENESS OF ECO COMPANIES**

**JEL Clasification Codes:** *Q56*

**Keywords:** *comparative advantage, environmental goods, agricultural-food sector, international trade, RCA*

**Abstract:** The aim of this paper is to present some methodological aspects connected with the evaluation of the growing market of goods facilitating protection of the natural environment in agricultural – food sector. The paper uses a measure which is used in the studies of foreign trade – RCA.

### **Introduction**

The value of export in the whole world increased from 40 billion USD in 1945 to over 12,147 billion USD in 2009. (including China – 1 202 billion USD and Germany – 1,121 billion USD) whereas the value of import came to 12,385 billion USD in 2009 (including USA – 1,604 billion USD and China – 1,006 billion USD) (Ministerstwo Gospodarki 2010, p. 16). In the face of competitiveness pressure on the export markets in relation to more and more UE resources, the markets should become even more competitive regarding the main trading partners by increasing efficiency.

In huge part of subject literature competitiveness definitions include references to macroeconomics stability as well as trade balance. Competitiveness in common meaning is entrepreneurs' struggle for the market. The choice of the most beneficial interchangeable conditions ensuring the highest income. (Syrek 1994, p. 43). Gronowski (2001) defines competitiveness as the companies' rivalry over economical benefits obtained from the goods and services as well as

delivery markets and men force (Gronowski 2001, p. 6). However, Majewska-Jurczyk (1993) considers it as a situation on the market in which companies and sellers, irrespectively of each other, aim at patronage over the buyers (gaining the support of the purchasers) being for them the condition to gain the given economic aim which may be the profit, sale as well as share on the market increase.

Competitiveness increase may be gained by specialization in e.g. environmental technologies whose development should lead to companies of the given sector competitiveness increase. In 2007 UE-25 sales in the ecological industry reached 227 billion euro of which 214 billion fell to the UE-15 countries. Goods and services for the industry in UE-25 constituted about 2.2% GDP. The biggest shareholders on the market of the ecological industry are France, Germany, Great Britain, Italy and Holland. Only 5.7 % falls on the new member countries (half of which goes to Poland) (Ernst & Young 2006, pp. 5–15). UE usually was the leader as far as ecological solutions were concerned, now, however, this position is threatened by principal rivals such as China and Northern America. UE should preserve the leadership on the environment friendly technologies markets which will ensure the effective use of resources in the whole economy and, at the same time, should remove obstacles in the activities of the most crucial net infrastructures by increasing, in this way, the industry competitiveness.

It is also highlighted in the literature that investments in post environmental activities (e.g. human resources technologies management) will contribute to the development of innovation, learning and integration of the interested parts (Sharma, Vredenburg 1998, pp. 729–753), and increasing environment protection costs make the competitive advantage of the company on the market possible. (Porter, Van der Linde 1995, pp. 97–118). What is more, companies which develop the abilities connected with managing the environment protection are able to gain better financial results. Great significance for the economical success of the industry should be given to the constant development of the balanced products as well as processes and ensuring the technological prevalence. (Triebswetter, Wackerbauer 2008, pp. 1484–1493).

The aim of this article is to assess the competitiveness of the Polish goods and environmental services of the agricultural –food sector of the companies<sup>1</sup> as well as the ability to evaluate the export possibility, first and foremost, for the third markets including DEV countries. The analysis should provide the answer if the increased costs for the protection of the environment, environmental technologies' and environmental services sector development, as well as dynamizing the export of the widely seen goods and environmental services, stand a chance of making it more competitive. Taking the above into consideration the analysis of the industry sector potential considering chances and threats is extremely crucial. They might be the complement of the hitherto research range adapting the

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<sup>1</sup> Unit15 – food products and drinks production Unit16 – tobacco manufacture production.

premise of the strategic possibilities of managing the environment of the agricultural and grocery sector of the companies.

The sector of the agricultural - food industry is one of the most important productive ones in Poland in which numerous subjects dominate (ab. 16,7 thousand.), that is, meat (21.7%), other grocery products (18.6%), drinks (16.7%), dairying (12.7%) and others. Small and medium companies constitute 95% (99% in EU) of all active economic subjects. About 417,8 thousand of people (about 4,5 billion of people in UE) found employment in this sector. The production sold increased in the years 2005–2007 by 22,5 billion PLN.

## **The protection of environment costs as the basis of creating new environmental goods**

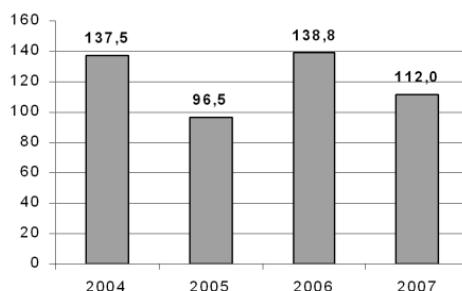
The value of fixed assets for the protection of the environment has been analyzed accordingly with the Polish Statistics Classification. It concerns the activity and devices connected with the protection of the environment (The Council of Ministers Regulation from 2<sup>nd</sup> March, 1999) in 9 domains: the atmospheric air and climate protection, sewage economy and water protection, waste economy, the protection and restoration of soils usage value as well as the protection of underground and surface water, decreasing the noise and vibration, the biological and landscape variety protection, protection against ionizing radiation, research and development activity and other activities connected with the protection of environment (GUS 2008). The data from GUS which enable separating enterprises so called *the end of the pipeline* and *integrated enterprises* have been taken into account in the analysis. The first do not interfere in the production process but either reduce or neutralize the pollution which came up in the production process. The aim of the second ones is modernization of the technological processes making them cleaner and more friendly to the environment.

In accordance with the data gathered by GUS, the costs for fixed assets in the protection of the environment increased from 31,8 billion PLN (2004 ) to 39,7 billion PLN (2007 r.) while their part in GDP has remained still at the level of 3.4 % in comparison with 2004. To compare in 2007 in the United States, according to "Environmental Business Journal", the water sewage technologies market reached the value of 127 billion USD. Nevertheless, in China, according to the report of China Greentech Initiative from 2009, the forecast of the Green Technologies market greatness for 2013 is based on two alternatives – pessimistic estimation – 500 billion USD a year, optimistic estimation assumes doubling the value. (Ministerstwo Środowiska 2009, pp. 2–7).

The value of costs for fixed assets being present in the environment protection in the agricultural – food industry is varied – oscillating in 100 billion PLN. Relatively high level of the assets has been noted in 2004 (137,5 billion PLN)

and 2006 (138,8 billion PLN), and the lower was noted in 2005 (96,5 billion PLN) and 2007 (112 billion PLN) (figure1).

**Figure 1. Costs on fixed assets serving for the protection of environment in 2004–2007 in agricultural – food industry (current prices, billion PLN)**



**Source:** own study on the basis of GUS data.

The share of “the end of the pipeline” investment in fixed assets serving the environment protection in agricultural – food industry constitutes almost 81% (90,62 billion in 2007). The value of investment in integrated technologies in 2007 amounted to over 22,15 billion PLN.

## **Foreign trade evaluation of Polish goods as well as environmental services**

Increase of the costs for the protection of the environment influences positively the ecological activity development and the level of country goods export and foreign goods import as well as economical subjects competitiveness.

Ecological activity in the discussed branches comprises goods and services applied to measurements, prevention and minimizing of the pollution of environment of water, air and soils. According to OECD definition, ecological products and services comprise *goods and services applied to measurement, prevention, limiting or improving the quality of water, air and soil as well as used for solving problems concerning waste, noise and ecosystems*. The discussed products and services are related with cleaner technologies using natural resources in a rational way and decreasing the emission. (OECD 1996). OECD subdivides goods groups promoting environmental protection into three groups:

- *Pollution Management* – technological processes, devices(goods) and methods (services) whose aim is measuring, controlling, processing of the pollution as well environment degradation and depletion of mineral resources; there may also be here integrated technologies, technical use

of which is less harmful for the environment than proper alternative solution;

- *Clean technologies and Products* – Technologies, goods and services aiming at reduction, prevention as well as elimination of environmental damages: waste, sewage, pollution emission to the atmosphere, soils and surface water as well as noise and vibration sources and landscape transformation;
- *Resource Management Technologies* – Technologies, goods and services needed to management (and/or protection) of the natural resources; The group includes technologies and products connected with re-using and recycling of the material, with administering resources, measurements and control considered in this group as well as products connected with renewable sources of energy.

The share of goods export and environmental products in the general agricultural – food industry is slight. (0.08%). What is more, the fall in their export from 37,1 billion PLN (2004 ) to 18,7 billion PLN (2007) has been noted. The dominating group products are the goods from *pollution management group* (97%), first and foremost those concerning sewage (70%), constant dust (19%), steering air pollution (9%) and other. The rest of the groups constitute marginal share, those are: *resource management technologies* (2.9 %), *clean technologies and products* (0.1%).

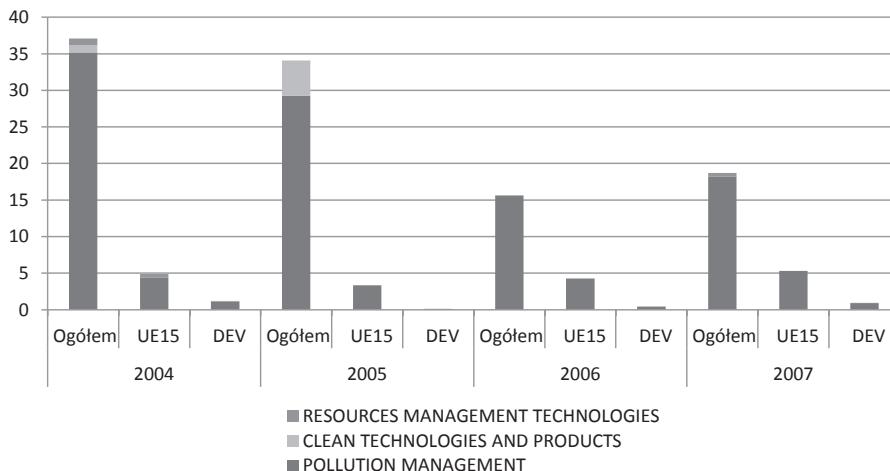
In 2007 the sale of *pollution management products* to individual countries in the discussed branches fluctuated from 0,2 thousand PLN to 4,7 billion PLN. The biggest recipients of this product group in individual sectors were Belarus (22.2%), Germany (2.8%), Russia (25.8%).

The next group of export products are *resource management technologies*. The biggest recipient of this product group in individual sectors was Belarus (9.4%).

The goods of little value from the *pollution management group* and *prevention management* are exported to the countries of the Third Word. In 2007 their value increased to 915 thousand PLN in relation to the 2004 value – 402 thousand PLN (figure 2).

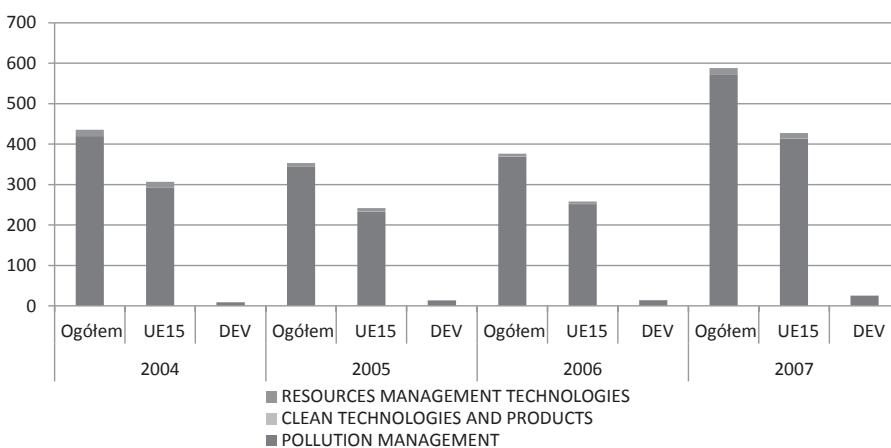
The share of import value of all goods and environmental services in import generally remained at the level of 3.2%. The value of import of those products increased in 2007 by 7% in relation to 2004. The goods from *pollution management group* which come mainly from the European Union (for example: France, Spain, Ireland dominate (97%). The import from the Third World Countries in 2007 increased from 13,7 billion PLN (2006 ) to 24,7 billion PLN (figure 3).

**Figure 2. Export of goods and environmental services in agricultural – food industry in 2004–2007 according to countries' groups (current prices, billion PLN)**



Source: own elaboration on the basis of GUS data.

**Figure 3. Goods and environmental services import in the agricultural – food industry in 2004–2007 accordingly with the countries' groups (current prices, in billions PLN)**

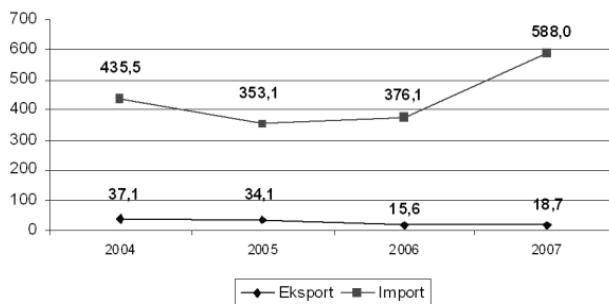


Source: own elaboration on the basis of GUS data.

The dynamics of environmental products and goods export value in the analyzed period (2004–2007) is varied. The highest at the level above 1228 (2007) has been noted in the as far as the *prevention management group* is concerned. What is more, in 2007 the dynamics of the *pollution group* has risen by 16.5%. Despite the great environmental products and goods export dynamics the value

of import in 2004–2007 outweighed the export value. General sales balance of the environmental goods and services is deficient and the biggest fall took place in 2007 – over 569 billion PLN (figure 4).

**Figure 4. Trade balance of environmental foods and products in the agricultural – food industry in 2004–2007 (current prices, billions PLN)**



Source: own elaboration on the basis of GUS data.

## Polish goods and environmental services competitiveness evaluation

The statistics presented above indicate obvious lag of Polish food industry as far as constructing competitive *green industry*.

With the aim to evaluate the competitiveness and explain regularities in international goods and services trade theories deriving from the comparative advantage theories are applied (Hidley, Smith 1984). “The key aspect of comparative advantage measurement for the n goods model is the use of the balance price costs while measuring. If the markets are not in balance, courses variations or salaries may lead to a temporary or permanent inability to export some or all goods. It means that comparison of the costs based on market prices can not be the basis for calculating comparative advantages. If the costs are measured on the basis of (probably not in balance) market prices, we deal with competitive advantage seen as price competitiveness” (Sigel 2006, pp. 137–159).

The most common measurement in research concerning the foreign market is RCA – revealed competitive advantage. It enables to determine if the P goods ratio from the C country to the whole export of the C country from the P branch share in the world trade. To evaluate the competitive advantage of Polish food industry (in accordance with formula introduced in B. Balass thesis) the ratio of relative environmental goods share in export/import of Poland with the developing countries to the share of the same goods group in OECD countries export has been agreed, that is:

$$RCA = (X_{P-DEV}/X_p) / (X_{OECD-DEV}/X_{OECD}),$$

where:

$X_{P-DEV}$  – total goods and environmental products export from Poland to the developing countries;  $X_p$  – total goods and environmental products export from Poland to the world countries;

$X_{OECD-DEV}$  – total goods and environmental products export from OECD/UE countries to the developing ones;

$X_{OECD}$  – total goods and environmental products export from OECD/UE countries to the world countries.

The lack of detailed data concerning the value of environmental goods export and import value in the analyzed branch, for example for the UE as well as OECD countries, excluded applying the RCA indicator. The analysis of foreign trade competitiveness of the goods and environmental services for the food industry has been made by using export - import relation indicator. It has been calculated for the three variants in compliance with the following formulas:

$$CR_O = X_{iO}/M_{iO} \times 100$$

$$CR_{UE15} = X_{iUE15}/M_{iUE15} \times 100$$

$$CR_{DEV} = X_{iDEV}/M_{iDEV} \times 100$$

where:

$M$  – import value

$X$  – export value

$i$  – environmental goods

$O$  – all countries in total

$DEV$  – the developing countries

$UE15$  – 15 UE countries

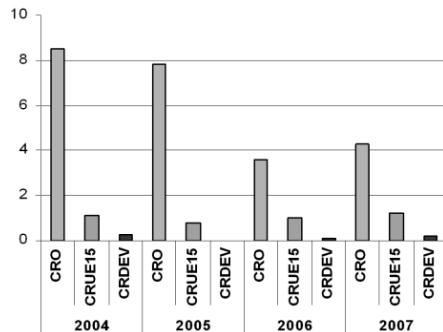
The relative competitive advantage over the partners takes place if  $CR > 100$ . As it results from the analysis of 2004–2007 the competitive analysis is most often present in the case of foreign exchange in total ( $CR_O$ ).

Currently, the Polish agricultural – food industry, as far as environment protection friendly goods production is concerned, does not indicate any competitive advantages. It is the analysis done by using export-import relation indicator (CR) of the environmental goods in total as well as for the developing countries (DEV) and 15 UE countries (UE-15) that indicates its competitiveness. The calculated indicator was below 9%, and the relative competitive advantage over the partner takes place if  $CR > 100$  (figure 5).

In accordance with the conducted export value forecast in 2008–2010 for the agricultural - food industry on the basis of GUS statistic data (that is, transaction value according to constant prices from 2004–2007) will have a rising tendency. Econometric methods, by using trends (linear, multinomial) characterized by the highest  $R^2$  indicator value were used in the study. Acquired forecast for the ag-

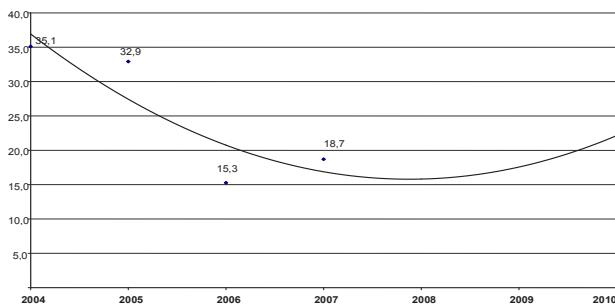
ricultural - food industry were introduced in two variants: environmental goods and services export forecast in total, fig.5, as well as to the DEV countries, fig.6.

**Figure 5. Export – import relation indicators of the environmental goods in the agricultural – food industry in 2004–2007 (in %)**



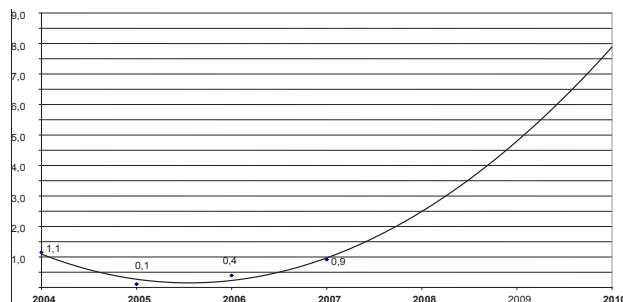
Source: own elaboration on the basis of GUS data.

**Figure 6. Services and environmental goods forecast in total agricultural food industry in 2004–2010 (in constant prices, billions PLN)**



Source: own elaboration on the basis of GUS data.

**Figure 7. Services and environmental goods forecast in total agricultural – food industry to the DEV countries in 2004–2010 (in constant prices, billions PLN)**



Source: own elaboration on the basis of GUS data.

## Conclusion

Agricultural – food sector is one of the most important production sectors in Poland as well as Europe. The production of varied high quality products and high clients' demands which are the impulse for the innovation as well as new products development and at the same time raising the competitiveness of particular manufacturers are its strong points.

The main problem hindering competitiveness development is great number of small, varied as far as kind of manufactured products of the companies are concerned (specialization in local products), which are difficult to spring up on the sales markets. The complexity of law regulations prevailing in Poland as well as excluding, in some UE programs (structural funds) , the food sector from the possibility of qualifying for investment financing, as well as low level of costs for research and development and the import necessity of many basic resources may become a barrier. The issue that raises a lot of controversy, namely, introduction of transgenic organisms into agriculture, should also be paid attention to. Amendments to the Polish Law on seed puts into question the traditional values of Polish agriculture, which potentially can only decide on the competitiveness of Polish food products.

The members of the *The High Level on the Competitiveness of the Agro-Food Industry*<sup>2</sup> recognized the below factors (in macro scale) as the most important ones having positive or negative influence (depending on the circumstances) on competitiveness of certain subjects in agricultural - food industry (Sankiewicz 2009, pp. 14–21):

- globalization connected with cheap transport, massive production, low prices of the access to the information and low transaction costs;
- UE law regulations in varied fields and particularly high ecological standards and food security which sometimes may limit the competitiveness and dynamic development;
- structural adjustments in UE – changing social structure and consumers' preferences ( modern consumer seeks not only varied, high quality, healthy products with reasonable prices but also demands balanced and ethical system of their production);
- technology and new organization methods development;
- changes in trade exchange structure between main participants of the international market;

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<sup>2</sup> Decision of 28<sup>th</sup> April, 2008 (No. 2008/359/WE), European Commission brought *The High Level on the Competitiveness of the Agro-Food Industry* into life.

- increasing significance of biological sciences (biotechnology especially) creates new possibilities which may, in the future, change the way in perceiving food; however, it is connected with the mentality change of the Europeans mostly oriented skeptically to new technologies by education and informing about modern food production technologies as well as ensuring clear system of informing about products manufactured in that way;
- influence of food production on the environment (animals welfare, climatic changes, resources management, that is water and energy);
- new information and communication technologies introduction (ICT – *Information and Comunication Technologies*).

The main factors of building competitive advantages in Polish agricultural - food industry are first and foremost: price as well as the quality of products being the company's image and its product brand. Competing only on the price is possible on the traditional product markets with lower degree of modification and higher consumers' needs fulfillment. Gaining a significant advantage (competitiveness) happens through searching cheap resources, areas with lower work costs, as well as distribution channel with lower processing margins. Competing on the products' quality is, in turn, often connected with high quality clients' service and creates product brand unique to consumer. Such activities are applied mainly for new product categories, especially of high processing level characterized by lower needs' fulfillment. It especially concerns expensive dairy products, meat preserves, sweets, vegetable fat, pet feed, frozen products as well as fruit and vegetable juice. Maintaining high quality of products also requires strategy aimed at introducing innovation, not only technological but also productive. The greatest possibilities of introducing new things to customize clients' needs have so called market leaders i.e. companies that are capital firm. Smaller companies base their strategies on following the products of the competitive ones. The possibilities to gain competitive advantage of Polish companies of agricultural – food industry branch should take into consideration the market conditionings.

The increase of Polish agricultural food industry concentration which will strengthen the market strength of the biggest companies, and in consequence:

- increase their profits and own capital that are the best buffer absorbing risk and at the same time a tool increasing the value created for the shareholders and other stakeholders,
- the necessity to gain new sales markets, often outside the Union.

Polish agricultural – food industry should also maintain the introduction of the environmentally friendly technologies to the market which will ensure the effective use of the resources in the whole economy. Investing in new environmental technologies influences the decrease of pollution and the use of natural resources in a way that ensures their longer availability. They comprise not only single technologies but also whole systems, productive processes, manufactures,

services, machines as well as organizational procedures and management<sup>3</sup>. The activities concerning environmental technologies using the ecological innovation potential effectively with the aim of realization of ecological challenges, maintaining the pace of economical growth as well as increasing competitiveness are crucial elements of forming ecological as well as innovative policy of the companies.

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<sup>3</sup> In compliance with the definition introduced in COM Announcement (2004) 38 referring to the definition included in 34 Chapter of 21ONZ Agenda