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ECONOMIC DEVELOPMENT OF THE COUNTRY AND INNOVATIVENESS IN THE FOOD INDUSTRY COMPANIES – SELECTED ISSUES

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Abstract. The purpose of the article was to assess the innovation of the food industry in the EU Member States. Innovation of the food industry was compared with the level of economic development of countries, innovative enterprises in general, and the importance of the food industry of individual countries in the domestic economy and the EU. The analyzes were based on data from the Eurostat database. The results indicate the occurrence of the relationship between the level of innovation of enterprises of the food industry and the level of economic development of countries and the overall innovation performance of enterprises in the manufacturing sector. In this regard, we observed it in general as a priority for countries of the old EU. In the case of Germany, Italy, Belgium and the UK, it was also heavily associated with countries in the EU food industry. Estonia, Lithuania, the Czech Republic and Portugal were characterized by high levels of innovation of the food industry despite the relatively low level of GDP per capita and overall enterprise innovation.

Keywords: innovation, food industry, European Union

INTRODUCTION

Currently, innovativeness attracts much interest from entrepreneurs, economists and institutions. The reason behind it is the importance of innovations in building the competitive edge and in the development of enterprises, as emphasized by many authors (Limański, 2011, p. 140; Tylżanowski, 2012, p. 399; Juchniewicz, 2015, p. 1). Increased research into this topic involved the creation of the knowledge-based economy and society paradigm (Grzelak, 2011, p. 37) which emphasizes the growing importance of knowledge and information in the economy. Innovativeness is a term that entered the economic literature a much longer time ago. This was done by Schumpeter who believed innovations "comprise new combinations in the following cases: the making of a new product or the launch of goods of new properties on the market; the introduction of a new production method; the opening of a new market; the acquisition of new sources of raw materials; and the reorganization of economic processes" (Schumpeter, 1960, p. 131). This definition became a point of reference for any discussions on innovations. Currently, the academic literature fails to provide consistent views on how to define and measure this phenomenon. Innovations are seen either in a broad or narrow sense. From a narrow perspective, an innovation means an invention which can be used for specific purposes. Meanwhile, in a broader sense, it means the entire management process which includes various activities aimed at the creation, development and implementation of new values in products or new combinations of means and resources which is a novelty for the creating or implementing entity. When seen from the broader perspective, innovations also include transferring these values to existing or new market partners, and may result from work of a group of enterprises (Niedzielski and Rychlik, 2006, p. 21). According

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to Grzybowska (2012, p. 7), although the studies on innovations have made an obvious progress, more of them still need to be made, especially as regards specific industries. One of the most important industries in the EU economy is the food industry. Therefore, the primary purpose of this paper is to assess the innovativeness of the food industry in EU member states. When summarizing the innovativeness of the food industry, the economic development of specific countries, the total innovativeness of enterprises and the importance of the food industry of specific countries in the national and EU economy were the factors taken into account.

RESEARCH MATERIAL

The innovativeness level of the food industry was assessed based on the size of innovative activities. The percentage share of companies engaged in innovative operations was used as an index. The source of data on innovations were the results of studies performed as a part of the Community Innovation Survey (CIS) research project initiated by the European Commission and implemented under the coordination of Eurostat, the Statistical Office of the European Union. When writing this article, the most up-to-date data, originating from the CIS-2012 batch, was used. The program referred to above is based on the international methodology for defining, classifying and measuring the innovations, as proposed by OECD and covered by the "Oslo Manual: Guidelines for collecting and interpreting innovation data" (Podręcznik Oslo…, 2006). According to the definition proposed by OECD, innovative activities include "all scientific, technological, organizational, financial and commercial steps which lead to the implementation innovations". Such activities may be of three kinds: successful in leading up to the implementation of an innovation; ongoing activities in progress; and activities aborted/suspended before the implementation of an innovation (Podręcznik Oslo…, 2006, p. 20–21). Companies which were engaged in any kind of innovative activities are defined as innovation active (Kowalski, 2011, p. 351). Note that the Eurostat's database and research methodology deployed to assess the innovativeness of the food industry are subject to limitations. The data scope and availability impacts the discovered relationships and the resulting conclusions. The basis used to assess the level of economic development of specific countries and the innovativeness of manufacturing sector companies, and to determine the importance of the food industry in specific countries in the national and EU economy (based on the volume of marketed production) was Eurostat data.

RESULTS OF THE STUDY

When considering the innovativeness level, the level of economic development of specific member countries needs to be taken into account. This is because many authors emphasize the importance of economic conditions for innovative activities, such as: high costs of innovation, high economic risk, or difficulties in finding adequate sources of financing (Janasz, 2006, p. 339–340; Szopik-Depczyńska and Depczyński, 2012, p. 380). One of the primary variables that characterize such factors of innovativeness is the GDP per capita (Kowalik, 2012, p. 102). Therefore, the share of food industry companies engaged in innovative activities over the period 2010–2012 (%) was compared to 2012 GDP per capita expressed in PPS (Purchasing Power Standard), a common notional currency (Fig. 1).

When shown on a graph, these variables suggest the existence of a general trend for a higher (lower) level of innovative activities in countries at a higher (lower) level of economic development. That pattern is confirmed by the Pearson linear correlation coefficient at the level of 0.55 (Table 1).

When considering the situation of specific member states, it can be noted that nearly all countries with higher than average levels of GDP per capita also demonstrate higher than average levels of innovative activities. This was the case of Luxembourg, Ireland, Belgium, Denmark, Germany, Italy, Finland and UK. In those countries, a fraction of food industry companies ranging from 48.6% to 71.8% were engaged in activities leading to the implementation of innovations. The exceptions were Sweden, France, Austria and the Netherlands which, despite relatively high levels of GDP per capita, demonstrated lower than average levels of innovativeness in the food industry. Note however that the share of innovative companies was close to the average and ranged from 43.8% to 47.8%.

As regards countries with lower than average levels of economic development, many of them also demonstrated lower than average scopes of innovative activities. These mainly included the new EU countries: Slovenia, Cyprus, Croatia, Latvia, Slovakia, Bulgaria,

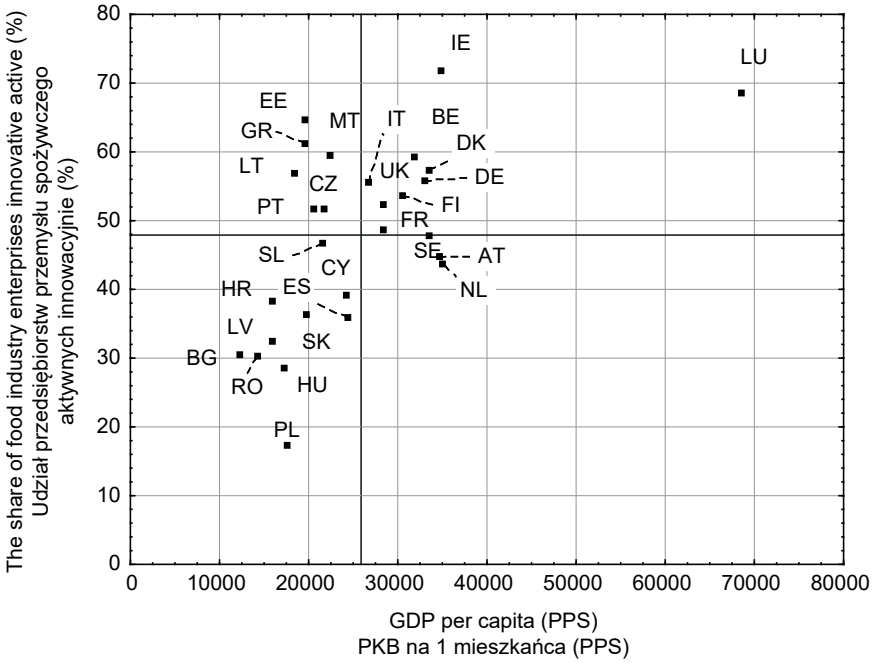

Fig. 1. The share of food industry companies engaged in innovative activities in 2010-2012 (%) and GDP per capita in 2012 (PPS). Reference lines indicate the average for the countries analyzed. AT – Austria, BE – Belgium, BG – Bulgaria, HR – Croatia, CY – Cyprus, CZ – Czech Republic, DK – Denmark, EE – Estonia, FI – Finland, FR – France, GR – Greece, ES – Spain, NL – Netherlands, IE – Ireland, LT – Lithuania, LU – Luxembourg, LV – Latvia, MT – Malta, DE – Germany, PL – Poland, PT – Portugal, RO – Romania, SK – Slovakia, SI – Slovenia, SE – Sweden, HU – Hungary, UK – United Kingdom, IT – Italy

Source: own elaboration based on Eurostat data.

Rys. 1. Udział przedsiębiorstw przemysłu spożywczego aktywnych innowacyjnie w latach 2010-2012 (%) i PKB per capita w 2012 r. (PPS). Linie referencyjne oznaczają średnie dla analizowanych krajów. AT – Austria, BE – Belgia, BG – Bułgaria, HR – Chorwacja, CY – Cypr, CZ – Czechy, DK – Dania, EE – Estonia, FI – Finlandia, FR – Francja, GR – Grecja, ES – Hiszpania, NL – Holandia, IE – Irlandia, LT – Litwa, LU – Luksemburg, LV – Łotwa, MT – Malta, DE – Niemcy, PL – Polska, PT – Portugalia, RO – Rumunia, SK – Słowacja, SI – Słowenia, SE – Szwecja, HU – Węgry, UK – Wielka Brytania, IT – Włochy

Źródło: opracowanie własne na podstawie danych Eurostatu.

Romania, Hungary and Poland, as well as Spain. Among them, Poland was particularly disadvantaged. Although ranked higher than Hungary, Latvia, Croatia, Romania and Bulgaria in terms of GDP per capita, it exhibited by far the lowest share of innovation active companies in the food industry.

Attention should be drawn to the group of countries where the economic development level, measured by GDP per capita in PPS, was below average while the share of innovation active companies was above average. This was the case of Estonia, Greece, Lithuania, Czech Republic, Portugal and Malta. This suggests that, in spite of a general relationship between GDP per capita and the innovativeness of the food industry, innovative activities may be successful even at relatively low levels of economic development.

According to the OECD classification, specific industry domains have been divided into four categories:

Table 1. Pearson linear correlation coefficient
Tabela 1. Współczynnik korelacji liniowej Pearsona

Specification Wyszczególnienie	Share of innovation active companies in the food industry Odsetek przedsiębiorstw aktywnych innowacyjnie w przemyśle spożywczym
Share of innovation active companies in the manufacturing sector Odsetek przedsiębiorstw aktywnych innowacyjnie w przetwórstwie przemysłowym	0.82782*
GDP per capita – PKB na jednego mieszkańca	0.55396*
Share of the food industry in the production of the manufacturing sector Udział przemysłu spożywczego w produkcji przetwórstwa przemysłowego	–0.10521
Production value of the manufacturing sector Wartość produkcji przemysłu spożywczego	–0.011113

*Correlation coefficient statistically significant at the significance level of $\alpha = 0,05$.
Source: own elaboration based on Eurostat data.
*Współczynnik korelacji istotny statystycznie na poziomie istotności $\alpha = 0,05$.
Źródło: opracowanie własne na podstawie danych Eurostatu.

high-technology industries, medium-high-technology industries, medium-low-technology industries, and low-technology industries (Wściubiak, 2015, p. 221). The food industry was classified as a low-technology industry. This means that the innovativeness level of food manufacturers may be lower compared to high- or medium-technology industries which show a relatively high level of innovativeness, a short product and process lifecycle, a rapid dissemination of technological innovations and a close scientific and technological cooperation on the international scene. However, a general relationship between the level of innovative activities of the food industry and the innovativeness of companies, seen as a whole, is noticeable in particular member countries (Fig. 2). The Pearson linear correlation coefficient between the share of innovation active companies in the manufacturing sector and the share of innovation active companies in the food industry stands at a high level of 0.83 (Fig. 2).

A relatively high innovativeness level of the manufacturing sector and the food industry could be seen in Ireland, Luxembourg, Germany, Belgium, Italy, Finland, Greece, Malta, Denmark, UK and France. The aforesaid countries also demonstrated a high level of economic development, except for Greece and Malta where high innovation rates were reported both in the food industry and in the entire manufacturing sector in the analyzed period, despite lower than average levels of GDP per capita. Note also that while Germany outperformed the other countries in terms of innovations in the manufacturing sector, it was only ranked 9 in the food industry.

The group of countries with higher than average levels of innovativeness in the manufacturing sector also included other countries with higher than average levels of economic development, i.e. France, Austria, Sweden and the Netherlands. Meanwhile, the share of innovation active companies in the food industry was slightly below average.

Low levels of innovativeness in the manufacturing sector and food industry were recorded in such countries as Slovenia, Croatia, Cyprus, Spain, Slovakia, Bulgaria, Latvia, Hungary, Romania and Poland. In this group, Romania set itself apart with a share of innovation active companies in the food industry (30.2%) by far higher than the general result (23.0%). Poland was the most disadvantaged country with by far the lowest scores in both of the analyzed categories (17.4% in the food industry, 23.6% in the manufacturing sector).

The fourth group comprised countries which, while showing relatively low innovation levels in the manufacturing sector, reported high innovation levels in the food industry, namely Estonia, Portugal, Czech Republic and Lithuania. As regards this aspect, Lithuania and Estonia were the most remarkable examples with a share of companies in the food industry of, respectively, 56.9%

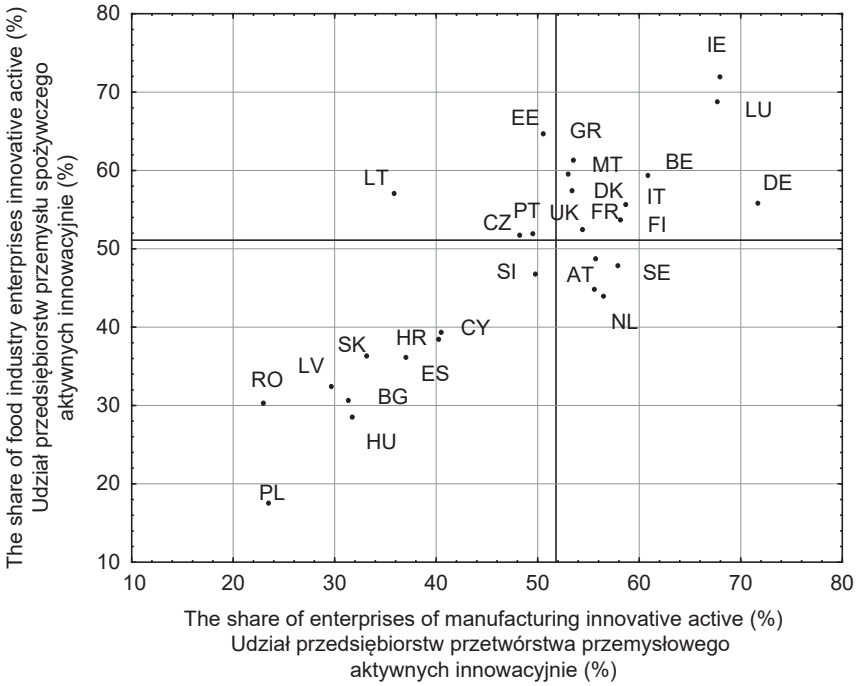

Fig. 2. The share of food industry and manufacturing companies engaged in innovative activities in 2010–2012 (%)
Source: own elaboration based on Eurostat data.
Rys. 2. Udział przedsiębiorstw przemysłu spożywczego oraz przetwórstwa przemysłowego aktywnych innowacyjnie w latach 2010–2012 (%)
Źródło: opracowanie własne na podstawie danych Eurostatu.

and 64.6%, compared to 35.9% and 50.6% in the manufacturing sector.

When assessing the innovativeness of food industry in specific member countries, the role of this industry in the national economy should also be considered. In this case, there were no obvious relationships. However, when comparing the share of innovation active companies in the food industry to the share of the food industry in the marketed production of the manufacturing sector, four groups of countries were distinguished (Fig. 3).

The first one comprised countries where the food industry played a significant role in the economy while demonstrating a high innovativeness level, namely: Ireland, Greece, Denmark, Lithuania and France. In these countries, the food industry generated a share ranging from 16.88% to 21.50% of marketed production of the manufacturing industry, and the share of companies engaged in innovative activities ranged from 48.6% to 71.8%. In this group, Lithuania delivered a significantly better innovation performance in the food industry than in the manufacturing sector. Innovativeness is therefore likely to be one of the competition factors between Lithuanian food companies on the domestic market.

The second group includes six countries where the food industry plays an important role in the production pattern while showing a worryingly low level of innovation, i.e. the Netherlands, Croatia, Spain, Latvia, Cyprus and Poland. Note that all of these countries (except for the Netherlands) report relatively low levels of GDP per capita and of enterprise innovativeness in general. Therefore, it seems that the environment of food companies in these countries is one of the factors that affect their innovativeness.

Other groups included countries where the food industry played a minor role compared to the EU average. Six of them, i.e. Sweden, Slovenia, Austria, Slovakia, Romania, Hungary and Bulgaria, demonstrated low levels of food industry innovativeness. Nine of them,

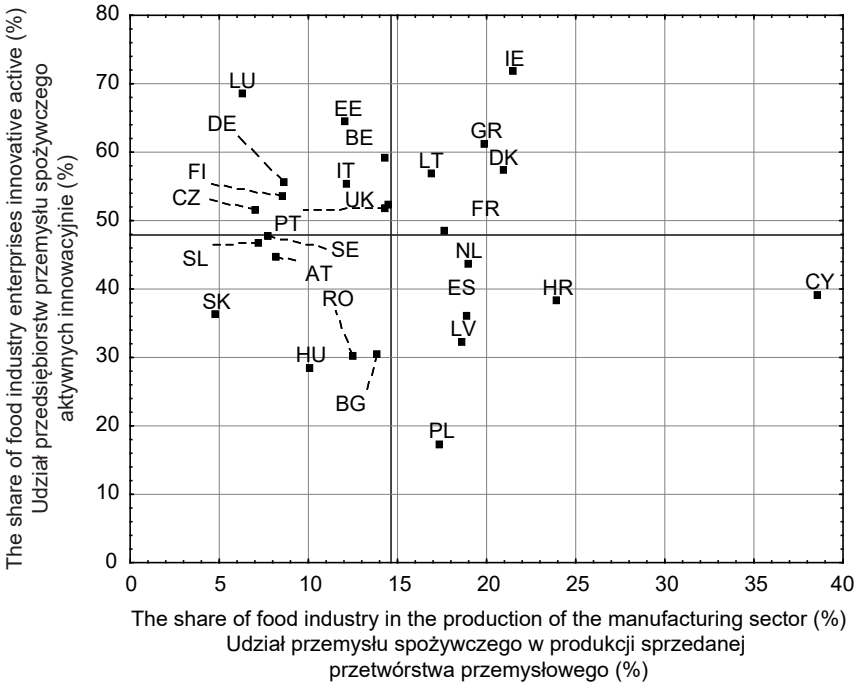

Fig. 3. The share of food industry companies engaged in innovative activities in 2010–2012 (%) and the share of the food industry production of manufacturing in 2012 (%)
Source: own elaboration based on Eurostat data.
Rys. 3. Udział przedsiębiorstw przemysłu spożywczego aktywnych innowacyjnie w latach 2010–2012 (%) i udział przemysłu spożywczego w produkcji sprzedanej przetwórstwa przemysłowego kraju w 2012 roku (%)
Źródło: opracowanie własne na podstawie danych Eurostatu.

despite a relatively limited importance of the food industry, recorded a high innovativeness level of food companies. These were Luxembourg, Estonia, Belgium, Italy, Germany, Finland, UK, Czech Republic and Portugal. Except for Estonia, Czech Republic and Portugal, this group was characterized by above average levels of economic development and of enterprise innovativeness in general.

The next step consisted in comparing the innovativeness of the food industry in specific countries to the importance of these countries in the food industry of the entire EU. Four groups of countries were distinguished on that basis (Fig. 4).

When analyzing the importance of specific countries in the production volume of the EU's food industry, concentration is clearly visible. Seven countries had an above average share in the value of the EU marketed production, namely (in descending order): Germany, France, Italy, UK, Spain, the Netherlands and Poland. The first three and the first seven of them represented a total share of 46.89% and 78.39%, respectively, in the sales value. Among these countries, a relatively high innovativeness level of the food industry was noted in Belgium, UK, Italy, France and Germany. For this group, the implementation of innovations is likely to be a competitive advantage on international markets. Compared to the EU average, the Netherlands and Spain showed a relatively lower level of innovativeness. Poland was by far the most disadvantaged country with a share of food industry companies engaged in innovative activities at the level of 17.4%, which is lower than Germany by as much as 38.3 percentage points. However, previous research shows that Poland is a strong competitor on the EU market (Juchniewicz and Łukiewska, 2014, p. 132), and the reason for its competitive edge are price and cost advantages (Kociszewski and Szwacka-Mokrzycka,

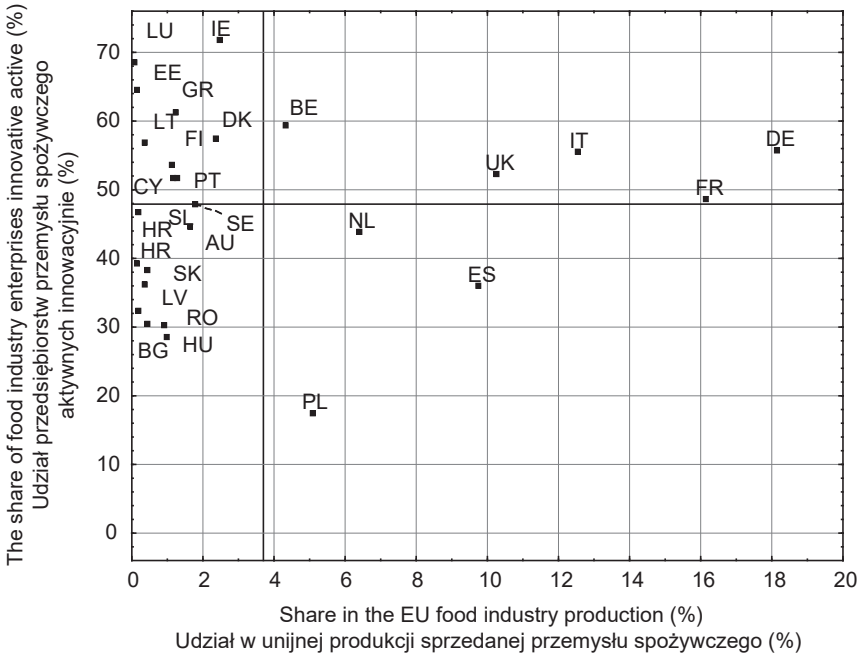

Fig. 4. The share of food industry companies engaged in innovative activities in 2010–2012 (%) and participation in the EU's food industry production in 2012 (%)
Source: own elaboration based on Eurostat data.
Rys. 4. Udział przedsiębiorstw przemysłu spożywczego aktywnych innowacyjnie w latach 2010–2012 (%) i udział w unijnej produkcji sprzedanej przemysłu spożywczego w 2012 roku (%)
Źródło: opracowanie własne na podstawie danych Eurostatu.

2011, p. 71). Other countries had a relatively limited importance for the value of the EU marketed production. Two groups were distinguished among them: the ones with a low innovativeness level of the food industry, i.e. Sweden, Slovenia, Austria, Slovakia, Romania, Hungary and Bulgaria, and those with a high innovativeness level of the food industry, i.e. Luxembourg, Estonia, Belgium, Italy, Germany, Finland, UK, Czech Republic and Portugal.

SUMMARY

The importance of innovative activities in food companies varied across specific EU member countries. A significant positive correlation was discovered between the scope of such activities, the economic development level of specific countries and the general innovativeness of manufacturing sector companies. To that extent, best results were achieved by the EU-15 member countries such as Luxembourg, Ireland, Belgium, Germany, Italy, Finland and UK. Among them, Germany, Italy, Belgium and UK had an above average share in the EU marketed production of foodstuffs. Therefore, for this group, the implementation of new innovative solutions is likely to be a competitive advantage on international markets. A relatively low innovativeness of companies, including in the food industry, was related to less than average levels of GDP per capital in many new EU countries, i.e. Slovenia, Croatia, Latvia, Cyprus, Slovakia, Romania, Hungary and Poland, as well as in Spain. In Spain and Poland, the food industry played a major role in the national economy and an important one in the EU's entire food industry. Therefore, in these countries, competitiveness stems from other sources of basic importance, e.g. advantages related to the size of the manufacturing capacity, price and cost advantages or advantages in terms of effectiveness. It should be noted that some countries demonstrated a high innovativeness of food

industry companies while having relatively low levels of GDP per capita and a limited degree of general innovativeness of enterprises. These were Estonia, Lithuania, Czech Republic and Portugal. In Lithuania, the food industry had a relatively significant share in the production mix. And the reason could actually be the innovativeness of that sector.

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Streszczenie. Celem artykułu jest próba oceny innowacyjności przemysłu spożywczego w krajach członkowskich Unii Europejskiej. Innowacyjność przemysłu spożywczego zestawiono z poziomem rozwoju gospodarczego krajów, innowacyjnością przedsiębiorstw ogółem oraz znaczeniem przemysłu spożywczego poszczególnych państw w gospodarce krajowej i unijnej. Analizę przeprowadzono na podstawie danych pochodzących z bazy danych Eurostat. Wyniki badań wskazują na występowanie zależności między poziomem innowacyjności przedsiębiorstw przemysłu spożywczego a stopniem rozwoju gospodarczego krajów oraz ogólną innowacyjnością przedsiębiorstw sektora wytwórczego. W tym zakresie można było zaobserwować ogólne pierwszeństwo krajów starej UE. W przypadku Niemiec, Włoch, Belgii i Wielkiej Brytanii było to związane także z dużym znaczeniem tych krajów w przemyśle spożywczym UE. Wysoką innowacyjnością przemysłu spożywczego – mimo relatywnie niskiego poziomu PKB per capita i ogólnej innowacyjności przedsiębiorstw – wyróżniały się Estonia, Litwa, Czechy i Portugalia.

Słowa kluczowe: innowacyjność, przemysł spożywczy, Unia Europejska

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