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SELECTED ASPECTS OF INNOVATIVENESS OF THE FOOD INDUSTRY AGAINST A BACKGROUND OF OTHER LOW TECHNOLOGY INDUSTRIES IN POLAND

Key words: innovativeness, food industry, low technology sector

ABSTRACT. In this article, the chosen aspects of innovativeness of food industry against other branches of low technology were discussed. The analysis of innovative potential was made with the use of the following indicators: the share of innovative active enterprises incurring expenses on innovative activity and cooperating in this range and the expenditure level attributable to the enterprise incurring expenses. The innovative position was evaluated based on share indicators of: innovative enterprises (product and process innovations), introducing marketing and organization innovations as well as those sold in 2017 and new or significantly improved products introduced to the market between 2015 and 2017. It was stated that the most innovative branches, both among the subjects of the food industry and other branches of low technology were producers of tobacco and beverages. A significantly lower level of innovativeness was characterized among producers of groceries. They took 7th place among 11 branches of the low technology sector. This tendency is stable over time, as within previous years similar results of this research problem analysis were noted.

INTRODUCTION

Present modern time globalization processes and, at the same time, regionalization of business entity actions lead to a systematic verification of views on the determinants of their success and competitive advantage. There is no doubt, however, that among many determinants of competitiveness (equally on a macro-, meso- and microlevel), the most common is innovative activity, aiming at introducing new solutions in every area of functionality of economic units. In this context, the observations of Mirella Barańska-Fischer [2006] are important, which state that, in the present economy, there are no areas which can be described as non-competitive. Introducing innovations is a necessity not only in areas of high, but also in branches of low technology (R&D intensity below 1%), which is the food industry. Hartmut Hirsch-Kreinsen [2008a] highlight that enterprises involved in this sector play an important part in the economy of all countries, regardless

of their level of development. This is the underlying reason for undertaking research aimed at specifying the innovativeness of the food industry¹ among other branches of low technology in Poland.

RESEARCH METHODS

Innovativeness is a complex and variously defined phenomenon. In this article, it was in accordance with Anna Wasilewska and Mirosław Wasilewski [2016] it was defined as a feature of business entities, meaning the possession of the ability to create and introduce innovations and their absorption. The multidimensional character of this category makes it difficult to evaluate all its aspects. Due to this fact, in this elaboration, the operationalization of this concept was developed, by dividing the notion into innovative potential and innovative position. This enabled the application of a factor-result approach to the evaluation of innovativeness. On this basis, the synthetical indicator of innovativeness specifying the previously mentioned dimensions of innovative activity of low – technology branches.

Innovative potential, which is the ability of creating innovations, results from many factors. In various scientific descriptions [Kolarz 2006, Rojek 2017, Romanowska 2016], the tendency for conducting innovative activity and a level of expenditure as well as establishing and developing cooperation in innovative activities is emphasized. Taking this evidence into account, when evaluating the innovative potential of low-technology sectors, the following were used: share of innovative active enterprises incurring expenditure on innovative operation and ones developing cooperation in this range (% of total enterprises) as well as the level of expenditure attributable to the enterprise incurring expenditure (thousand PLN).

An innovative position reflects the effects of innovative actions. It was adopted that the following indicators will be used: innovative enterprises (product and process innovations), introducing marketing, organizational innovations and those sold during 2017 as well as new or significantly improved products introduced on the market during 2015-2017 (% of total enterprises). What was adopted for calculation variables was a compromise between substantive criteria used in innovativeness analyses and limitations resulting from the availability of statistical data. They were data from the study *Innovative activity of enterprises in 2015-2017* [GUS 2018], which comprised of measurements of innovativeness during 2015-2017.

All the diagnostic variables were considered as a stimulant, meaning that their bigger size/value are simultaneously more favourable in the meaning of innovativeness. Due to the diversity of variables, it was necessary to unify them [Runge 2007]. In the further stage, the choice was made about the development pattern, which is an abstract branch characterized by the highest values of diagnostic variables (after unifications) It enabled the presentation of data in a way that the bigger values testified to a more favourable level

¹ The food industry included: food producers (PKD – *Polish classification of activity* no. 10), beverages (PKD no. 11) and tobacco products (PKD no. 12).

of the analysed phenomenon (bigger innovativeness). Synthetic indicators were used for establishing a branch rank due to innovative potential, effects of innovative actions and the synthetic indicator of innovativeness of food industry branches and remaining branches of low technology (detailed methodology of the calculation of synthetic indicators was presented in a previous elaboration [Juchniewicz 2013]).

In this essay, the domain approach of classifying industrial processing in accordance with the intensity of Development and Research (D+R) [GUS 2019] was applied. According to the accepted criterion, in the sector of low technology the following were involved: the production of foodstuff, the production of beverages, the manufacture of tobacco products, the production of textiles, clothing production, the production of leather and leather products, the production of wood and wood products, the production of paper and paper products, printing and reproduction of recorded information carriers, furniture production and other production of products.

RESEARCH RESULTS AND DISCUSSION

“Innovative activity means a tendency for introducing innovations and upholding innovative activity which has not ended with success or is being continued” [GUS 2018]. The clear leader in this range were producers of tobacco – the share of enterprises which were innovatively active was almost two-times bigger than the total number of enterprises and industry enterprises (Table 1). To the group of leaders, the producers of beverages must also be included. A less favourable situation was noted in the aspect of foodstuff producers, who ranked 7th among branches of low technology. Significant innovation activity (a bigger share than in the total number of enterprises and food industry) were subjects manufacturing paper and remaining products.

The innovation potential of enterprises is also connected with the possibilities of funding innovations. The level of expenditure incurred by entities on innovative activity depends on many factors. One of them is the type of sector in which enterprises are operating. The intensity of expenditure on innovations in the sector of low technology was, among most branches, lower than in total enterprises and food industry enterprises (Table 1). Against a background of this, entities producing tobacco products and beverages stand out. The share of enterprises producing tobacco products incurring expenditure on innovative activity was almost two times bigger than in other food industry enterprises. On a similar level to industry enterprises was found to be the share of subjects producing beverages. The dominance of tobacco product producers was even more clear when taking the indicator of expenditure on one enterprise into consideration, which had incurred expenditure on innovative activity in 2017. They spent PLN 124,231 thousand on this goal, which is 25-times more than industry enterprises. A greater level of expenditure, in comparison to the total number of enterprises and industry enterprises, was also noted among beverage producers. However, the difference was significantly smaller and only amounted to PLN 2-3 thousand.

Table. 1. Measures of innovative potential in the years 2015-2017

Specification	Share of enterprises			Expenditure per one enterprise which incurred expenditure in 2017
	innovation active	which incurred expenditures	participated in co-operation with other enterprises or institutions	
	% of total enterprises			thousand PLN
Total	20.2	14.7	5.8	5,740
Manufacturing	20.3	14.9	5.9	4,912
Low technology, of which:	14.7	10.2	2.5	4,051
–manufacture food products	16.5	11.5	2.8	3,111
–manufacture beverages	31.3	16.4	7.5	7,704
–manufacture tobacco products	41.7	33.3	8.3	124,231
–manufacture textiles	15.9	11.4	2.9	2,456
–manufacture wearing apparel	7.3	4.1	0.4	277
–manufacture leather and related products	7.7	3.8	2.1	634
–manufacture wood and products of wood and cork, except furniture	10.4	6.9	2.0	4,771
–manufacture paper and paper products	23.1	18.7	5.5	12,620
–printing and reproduction of recorded media	19.6	13.5	3.5	1,428
–manufacture furniture	14.5	10.5	2.2	2,313
–other manufacturing	23.5	19.3	6.6	1,304

Source: own study based on [GUS 2018]

Producers of beverages and paper must also be included in the leader group – on average, one enterprises from these branches spent two-times more on innovative activity in comparison to industry enterprises. The next position was taken by subjects involved in foodstuff production. In this case innovative expenditure were yet 2-times smaller than in processing industry. Irena Łącka [2018], who considered the structure of expenditure on innovative activity, stated that enterprises spent most of their resources on buying machines, technical devices and tools, as well as on means of transport and investments for buildings, structures and lands. This testifies to the concentration of innovative activity being implemented outside of new technologies. The Author also points out to the unfavourable phenomenon of a low and lowering share of expenditure of R+D in total expenditure. She also indicates big fluctuations of these expenditures during the analysed years. From the conducted research by Deloitte [2015], it has been proven that the cause

of this is the fluctuation of the economic situation as well as the availability of public resources for conducting innovative action (not only among enterprises of the food industry). A surprising fact is the vestigial share of expenditure on R+D work in the branch of tobacco production. It relates to the ownership structure of these entities as a result of privatization and next to the consolidation of tobacco production, which was dominated by the four biggest international consortiums that own more than 99% of market share [Badył 2017]. They have their own R+D hubs in their home countries and use their experience of innovative activities within foreign branches.

In the implementation of innovation, in accordance to many previous researchers [Klimas, Czakon 2018, Liu 2013, Romanowska 2016, Sopińska, Mierzejewska 2017], cooperation processes, inter-organizational networks and cooperation with competitors are favourable. Taking this partial indicator of innovative potential into consideration, it may be stated that tobacco and beverage producers are the most used factor within low technology enterprises as a source of innovativeness. Cooperation between foodstuff producers has less meaning in creating innovations. Against remaining branches of low technology there are those unwilling to conduct such actions. Arkadiusz Świadek [2012] also points out that there is a bigger tendency for cooperation and innovative activities in food industry enterprises operating on domestic and international market. It also needs to be underlined that the results of research [Dziurski 2019] indicate an ambiguity of dependences between the tendency for cooperation and the level of innovativeness of the sector. The Author indicates that it may be explained by the prism of activity (activity conducted in a narrow scope) and maturity (innovative activity conducted multilaterally and systematically).

Innovative activity and its funding relate to the possibility of gaining measurable benefits. The basic measurement in this range is the innovative indicator specifying the share of innovative enterprises (introducing a product and/or process innovations) in relation to the total number of enterprises. Having these relations, it needs to be highlighted that the most enterprises which were innovative were again among subjects manufacturing tobacco (Table 2). Other places were taken by entities producing beverages and the production of other products. These were branches in which the commonness of innovations was bigger than in total industry and industry enterprises. The share of enterprises introducing innovations, both product and process among foodstuff producers was lower. This indicator was 15.5% placing this branch in 6th position among other subjects of the low technology sector. Definitely the lowest indicator of commonness of product and process innovation was noted among enterprises producing leather – it was lower than in industry enterprises by 12 percentage points (p.p.) and from tobacco manufacturers by about 35 p.p. in relation to the producers of foodstuff. The percentage of innovative enterprises producing leathers was lower by 8.9 p.p. Joanna Szwacka-Mokrzycka [2017] highlights, at this point, that among factors influencing the possibilities of diversification of food products, special meaning is given both to the quantity of product elements and the difference in preferences of various client groups. She also adds that this is a result of adaptation of polish subjects of food industry to the recommended international models and standards, resulting mainly from pro-health or pro-ecological standards. Similar conclusions about the whole sector of low technology are presented by Hartmut Hirsch-Kreinsen [2008] and

Oliver Som [2012]. These authors state that products are often improved gradually in terms of materials, functions and quality, to be consistent with the changing needs of customers.

In the literature of the subject, most attention is paid to product and process innovations which are, as previously mentioned, technological, but there is a growing part of non-technological innovations, which are organizational and marketing [Przybylska et al. 2016]. The share of organizational and marketing innovations was, in almost every branch of the low technology sector lower than in comparison with product and process ones, with an analogical situation during previous years [Juchniewicz 2009]. Such data is in line with the general tendency presented among economical entities functioning not only in Poland but also abroad [Huang et al. 2010, Rammer et al. 2011]. According to Martin Heidenreich [2009] and Eva Kirner and others [2009], it results from the strong cost competition which is present on the market of low technology. It causes them to focus their attention mainly on process innovations which enables them to lower costs in a fast way, improve productivity, and thus, the same, competitiveness. Only in the case of tobacco producers was the share of innovative enterprises the same as with those introducing organizational innovations.

Such a situation, according to Oliver Som [2012], may be explained as the fact that technical and organizational innovations (specified as strategies of “process specialization”) are often present in branches in which there are normalized products, produced with a high level of automatization. Producers of beverages have also seen the benefits of implementing organizational innovations. The share of subjects introducing these kinds of innovations was lower than in producers of tobacco, but bigger in industry enterprises and remaining of low technology branches. The tendency to implement organizational innovations among producers of grocery articles was the lowest among branches of the food industry (10-fold comparing to the producers of tobacco and 3-fold in relation to producers of beverages).

Another indicator specifying the level of the innovative position of low technology branches is the share of enterprises introducing marketing innovations. They consist of introducing new concepts or marketing strategies which is significantly different from marketing methods used up until now in enterprises. Their goal is to fulfil the needs of customers in a better way, opening new markets or new positions of product placement in order to increase sales [GUS 2018]. In the greatest scope, the necessity of introducing such kinds of innovations was seen by producers of beverages (Table 2). The share of enterprises in this branch, introducing marketing innovations was 2-times bigger than in industry enterprises and producers of tobacco. It must be highlighted that this indicator, in the case of tobacco producers, was the only one in which there was a lower level in comparison to the branches of low technology and the food industry, among all indicators analysed. It may be a result of legal regulations restricting the advertisement process of tobacco products. Producers of foodstuff are using these kinds of innovations on a level similar to total enterprises and industry enterprises.

The direct reflection of efficiency of innovative actions of enterprises is the value of sales of new and modernised goods. In this context, the valid indicator of evaluation of innovative activity within the enterprise is the share of enterprises which, in 2017, sold new or significantly improved products introduced to the market during 2015-2017.

Table 2. Indicators of the innovative position during 2015-2017

Specification	Share of enterprises			
	innovative (product or process)	which introduced organisa- tional innovations	which introduced marketing inno- vations	which in 2017 sold any new or significantly improved products introduced into the market in the years 2015-2017
	% of total enterprises			
Total	18.5	8.4	7.5	11.9
Manufacturing	18.6	8.5	7.8	12.6
Low technology, of which:	13.6	5.4	7.1	8.3
–manufacture food products	15.5	4.6	7.5	9.8
–manufacture beverages	29.9	13.4	16.9	18.4
–manufacture tobacco products	41.7	41.7	8.3	16.7
–manufacture textiles	14.4	10.2	12.8	10.4
–manufacture wearing apparel	7.2	2.1	4.1	3.2
–manufacture leather and related products	6.6	4.3	4.3	3.4
–manufacture wood and products of wood and cork, except furniture	9.6	4.5	4.6	4.6
–manufacture paper and paper products	20.9	11.1	6.6	11.2
–printing and reproduction of recorded media	18.7	8.0	5.4	13.4
–manufacture furniture	13.3	5.2	8.7	7.8
–other manufacturing	21.0	8.9	12.4	16.0

Source: own study based on [GUS 2018]

Analysis conducted in this way allows to formulate the following conclusions. There is big interprofessional diversity of the share of enterprises which, in 2017, sold new or significantly improved products introduced to the market within 2015-2017. It does not change the fact that producers of beverages and tobacco products are the ones of low technology branches, which, once again, are positioned the highest. Producers of foodstuff take 7th place among branches of the analysed sector.

The presented characteristics of innovative potential against other branches of low technology, based on partial measures, have a cognitive value and, at the same time, make it possible to assess the impact of individual indicators on the level of the synthetic innovation indicator (Figure 1). Such an approach allows to make a complex diagnosis of the

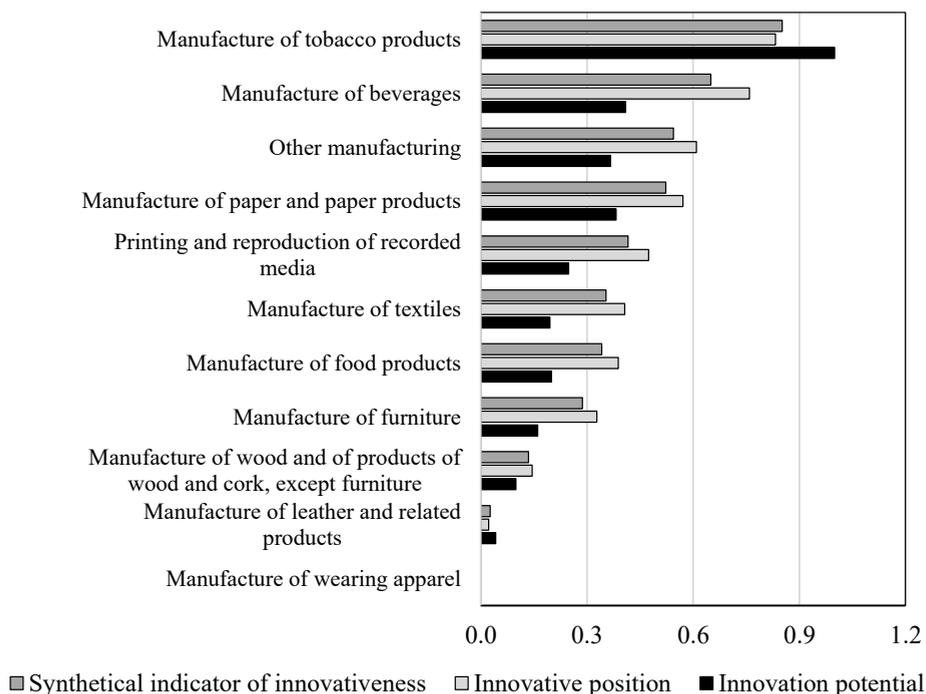


Figure 1. Level of innovativeness of low technology branches

Source: own study based on Tables 1 and 2

innovative potential of analysed branches. The highest level of the synthetical indicator of innovativeness was noted in the case of the tobacco branch.

Subjects manufacturing beverages were included in the group of the low technology sector characterized by high innovativeness. It was a consequence of high innovative potential and a high or medium level of effects of innovative activities achieved after the implementation of innovations. Besides the high ranking of these branches, it is worth mentioning one more issue – the stability of results obtained in all meters of innovative activity. Also, it needs to be considered that the producers of tobacco are not only one of the most innovative branches of the low technology sector but also in comparison to all industry branches.

CONCLUSIONS

Changes occurring in modern economy and an ever more unstable market environment force the necessity of quick adjustment do changeable factors upon entrepreneurs. The ability to innovate is commonly perceived as a factor which enables that, contributing also in gaining a lasting competitive advantage. It concerns all sectors of the economy, both those operating in technologically advanced sectors, and also those within the sec-

tors of low technology. Among so called traditional sectors, a significant position is taken by the food industry. Conducted research points out that it includes the most relatively innovative branches of the low technology sector. Producers of tobacco and beverages have positioned themselves in first places. It results from their high innovative potential, as well as innovative position. A slightly worse situation was present among producers of foodstuff, which among 11 branches of low technology, claimed 7th place.

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**WYBRANE ASPEKTY INNOWACYJNOŚCI PRZEMYSŁU SPOŻYWCZEGO
NA TLE POZOSTAŁYCH BRANŻ NISKIEJ TECHNIKI**

Słowa kluczowe: innowacyjność, przemysł spożywczy, sektor niskiej techniki

ABSTRAKT

W artykule omówiono wybrane aspekty innowacyjności przemysłu spożywczego na tle pozostałych branż niskiej techniki. Do analizy potencjału innowacyjnego przyjęto następujące wskaźniki: udział przedsiębiorstw aktywnych innowacyjnie, ponoszących nakłady na działalność innowacyjną i podejmujących współpracę w tym zakresie oraz poziom nakładów przypadających na przedsiębiorstwo, które ponosi te nakłady. Pozycję innowacyjną określono na podstawie wskaźników udziału: przedsiębiorstw innowacyjnych (innowacje produktowe i procesowe), wprowadzających innowacje marketingowe i organizacyjne oraz tych, które sprzedały w 2017 roku nowe lub istotnie ulepszone produkty wprowadzone na rynek w latach 2015-2017. Stwierdzono, że najbardziej innowacyjnymi branżami, zarówno wśród podmiotów przemysłu spożywczego, jak i pozostałych branż niskiej techniki, byli producenci tytoniu i napojów. Zdecydowanie niższy poziom innowacyjności charakteryzował producentów artykułów spożywczych. Zajmowali oni 7. lokatę wśród jedenastu branż sektora niskiej techniki. Tendencja ta jest trwała w czasie, gdyż w latach poprzednich uzyskiwano podobne wyniki w analizach tego problemu badawczego.

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