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**INTENSITY OF INTERNATIONALIZATION OF FOOD
INDUSTRY SECTORS AND THEIR ECONOMIC
AND FINANCIAL RESULTS**

Key words: internationalization, economic and financial results, food industry, markets, Poland

ABSTRACT. The aim of the article is to determine the relationship between the level of internationalization of food industry sectors and their economic and financial results. Unpublished CSO data for the years 2000-2017 were used. The data concerned the processing of fish, milk, meat, fruit and vegetables, beverage production, bakery and flour products, oils and fats, grain mill products, starches and starch products, ready-made feed and animal feed. To conduct the analysis, the internationalization intensity index calculated for individual food sectors was used. The analyzed sectors of the food industry were divided into 3 groups according to the intensity of internationalization. The most internationalized sectors were fish processing and the production of tobacco products, and the least internationalized sectors were milk and meat processing. In the next step, selected groups were compared in terms of economic and financial indicators. In order to confirm the statistical significance of the diagnosed differences, the Kruskal-Wallis rank sum test was used. The research confirmed that the increase in the internationalization of the food industry sectors mainly affects indicators related to the labor factor, technical progress and asset productivity.

INTRODUCTION

The literature on the subject lacks a single, universal definition of internationalization, as it is a complex phenomenon that can be analyzed at various levels: macro (economy), meso (markets/sectors) and micro (enterprises), in various dimensions: economic, scientific, political and political – legal, socio-cultural [Müller 2003, p. 34] and taking different perspectives into account [Daszkiewicz, Wach 2012, p. 7]. The internationalization of an enterprise can be defined in many ways, from definitions that identify it with specific forms of internationalization [Rymarczyk 2004, Witek-Hajduk 2010, p. 24] and the involvement of enterprise resources abroad [Duliniec 2004], through those that refer to the phased

process of developing the enterprise's involvement abroad [Daszkiewicz 2017, p. 20] or international development within business networks [Pierścionek 2011, Jarosiński 2013], to such definitions as internationalization as part of a strategic process or emphasize the importance of geographically expanding the reach of the enterprise [Duliniec 2004, Strzyżewska 2005, Gorynia 2007]. Internationalization may take a passive form - not requiring the involvement of the company/sector on foreign markets and focused on acquiring resources from abroad, and an active form – related to the involvement of the company's resources on foreign markets [Witek-Hajduk 2010]. In relation to the market/sector, internationalization means the process of forming passive and active links between the domestic market/sector and foreign markets/sectors [Baran 2019b].

The agri-food processing sector is particularly important for Poland. Poland is the sixth food producer in the EU and the gross value added generated by the Polish food industry constitutes 6% of GDP. Despite significant transformations, the Polish agri-food sector still faces new challenges. They arise due to very strong competition from Western European and Asian countries. Within the food industry, there are sectors that differ from each other, among others: production conditions and costs, product characteristics (their durability, susceptibility to transport and storage, price flexibility – luxury goods, basic goods), specific transport conditions (appropriate temperature, specific vehicles: tanks, cold stores), entry barriers (tariff and non-tariff) [Baran 2019a, Domagała 2020]. These specific features of individual food sectors may determine a different level of internationalization. As part of the literature review, it can be noted that the analysis of the relationship between internationalization and the performance of enterprises initially focused mainly on the benefits of internationalization. It was concluded that the increase in the degree of internationalization of companies contributes to the improvement of their economic situation [Pera 2017, p. 192]. Subsequently, researchers also began to pay attention to the costs of projects carried out abroad [Bausch, Krist 2007, p. 320, Ruigrok et al. 2007, Witek-Hajduk 2013, p. 83].

In the literature, however, there is a gap in the analysis of the impact of internationalization on the economic and financial results of sectors, including food sectors. Considering the above, it was assumed that the aim of the research is to try to verify whether the level of intensity of internationalization of food industry sectors differentiates their economic and financial results.

MATERIAL AND METHODS

The source material for the research was unpublished CSO data for 2010-2017 on food processing sectors. To conduct the analysis, the internationalization intensity index calculated for individual food sectors was used. The structure of the sector

internationalization intensity index (IIS) takes into account the forms of foreign activity: trade (export and import) and capital (inflow and outflow of foreign investments to / from the sector) (more about the IIS [Baran 2019b]). The individual partial indices included in the IIS index were expressed as a percentage and characterized:

- (W_1) the importance of exports in the production of the sector,
- (W_2) the importance of direct investments abroad by a given sector in investment outlays of the analyzed sector,
- (W_3) the importance of raw material imports in the total purchase of raw materials by a given sector,
- (W_4) the importance of imports of finished products in the total consumption of these products in the country,
- (W_5) the importance of the inflow of foreign direct investment to the sector compared to the investment outlays of the analyzed sector.

The mathematical form of the sector internationalization intensity index (IIS) followed the formula [Baran 2019b, p. 138]:

$$IIS_i = \sum_{j=1}^5 W_j \times p_j$$

- IIS_i – indicator of the intensity of internationalization of i -th sector, ($i = 1, 2, \dots, n$),
- W_j – value of the j -th partial index,
- p_j – weight of the j -th partial index of internationalization.

In the first stage of the research, food industry sectors were divided into three groups according to the internationalization intensity index (Table 1):

Table 1. Intervals of the internationalization intensity index in particular groups of food industry sectors

| Group | Food industry sectors | Intervals (min-max) of the internationalization intensity index |
|-------|---|---|
| 1 | processing fish, crustaceans and mollusks; manufacture of tobacco products; production of oils and fats of plant and animal origin; | 0.39-0.68 |
| 2 | processing fruit and vegetables; production of grain mill products, starches and starch products; production of ready-made feed and animal feed; production of beverages | 0.24-0.38 |
| 3 | meat processing; milk processing; production of bakery and flour products | 0.15-0.23 |

Source: own calculation

- group 1: with the highest intensity of internationalization (30% of the population),
- group 2: with an average intensity of internationalization (40% of the population),
- group 3: with the lowest intensity of internationalization (30% of the population).

In the second stage of the research, the selected groups of sectors were compared in terms of economic and financial results. In order to verify the statistical significance of the indicated differences, the Kruskal-Wallis rank sum test was used.

RESULTS

One of the most important indicators for assessing the efficiency of economic activity is labor productivity. It is particularly important in the food industry, which is highly labor-intensive. The research shows that the food industry sectors with a high and average degree of internationalization intensity were characterized by a significantly higher level of economic labor productivity and higher technical equipment for work (Table 2). The average economic efficiency of work in this group was at a level of approx. PLN 800 thousand per person and in the analyzed period it was almost twice as high as in sectors with a low degree of internationalization intensity (Table 2). This situation resulted, *inter alia*, from the fact that the sectors with a high intensity of internationalization had over 2.5 times higher technical equipment for work, which in the analyzed period was additionally characterized by very high dynamics (group 1 recorded an increase by 50%). In sectors with a low level of internationalization, the dynamics of improving the technical equipment of work was lower, which translated into lower dynamics of improving labor productivity indicators.

The increase in technical equipment at work is also related to incurred investment expenditures, which, in sectors with a high degree of internationalization, were 5 times higher than in sectors from the average group and almost 7 times higher than in sectors with a low level of internationalization (Table 2).

Higher economic labor efficiency and higher technical equipment of work in more internationalized sectors may result from several reasons. Firstly, in the food industry, in sectors with a high level of internationalization (e.g. the tobacco industry) there are transnational corporations which pay special attention to issues related to the employment and qualifications of employees. The entry of transnational corporations into the Polish food industry in the early 1990s was often dictated by a search for cheap labor. However, this situation was slowly changing, investors, apart from low labor costs, also began to notice the high qualifications of Polish workers, which is why, for example, many companies established their research and development centers in Poland, e.g. Dr Oetker [Chechelski 2008]. Internationalized sectors with a greater share of transnational corporations that transfer know-how and innovation may have a technological advantage and better equip

Table 2. Average values of economic and financial indicators for individual groups of food industry sectors in 2010-2017

| Variables | Measure | Group 1 | Group 2 | Group 3 |
|---|---------|---|--|--|
| | | the highest intensity of internationalization | an average intensity of internationalization | the lowest intensity of internationalization |
| Productivity of fixed assets | average | 2.08 | 1.97 | 2.73 |
| | median | 1.87 | 1.77 | 2.77 |
| Productivity of current assets | average | 2.13 | 2.08 | 3.95 |
| | median | 2.06 | 2.02 | 3.80 |
| Total asset productivity | average | 1.01 | 0.98 | 1.58 |
| | median | 0.89 | 0.85 | 1.57 |
| Economic productivity of work [PLN thousand/employee] | average | 813 | 822 | 451 |
| | median | 614 | 676 | 479 |
| Technical equipment for work [PLN thousand/employee] | average | 578 | 459 | 208 |
| | median | 501 | 416 | 180 |
| Average employment [people/company] | average | 329 | 211 | 199 |
| | median | 287 | 193 | 223 |
| Average salary [PLN/person/month] | average | 4,674 | 4,658 | 3,085 |
| | median | 4,696 | 4,653 | 3,059 |
| Investment outlays [PLN million/company/year] | average | 24.1 | 4.3 | 2.6 |
| | median | 5.5 | 3.6 | 2.5 |
| Sold production [PLN million/company/year] | average | 268 | 177 | 99 |
| | median | 234 | 165 | 109 |
| Current liquidity ratio | average | 1.39 | 1.36 | 1.28 |
| | median | 1.39 | 1.38 | 1.22 |
| ROS [%] | average | 5.86 | 6.92 | 5.03 |
| | median | 5.17 | 6.24 | 3.04 |
| ROA [%] | average | 5.26 | 6.47 | 6.81 |
| | median | 4.57 | 6.03 | 6.19 |
| ROE [%] | average | 12.82 | 16.60 | 18.97 |
| | median | 12.46 | 16.50 | 16.15 |

Source: own research based on unpublished data from the Central Statistical Office

their plants with machines, devices and also office equipment. Moreover, transnational corporations can remunerate for work better than enterprises with domestic capital, which allows them to gain an advantage in terms of employee qualifications and commitment. The conducted research confirmed that the average monthly salary of employees in sectors with a higher degree of internationalization was higher by approx. 40% compared to sectors with a low degree of internationalization (Table 2). Such a phenomenon may lead to an increase in wage gaps between more and less internationalized food industry sectors.

Moreover, companies with domestic capital within sectors with a higher level of internationalization are likely to employ employees with higher qualifications, especially in terms of experience and knowledge of the conditions prevailing in international markets, which is useful for foreign expansion. It can be assumed that they also care more about improving their qualifications and use effective instruments of human resource management, which translate into an increase in labor productivity.

Sectors with a high degree of internationalization are characterized by, on average, higher employment per company than sectors with a low level of internationalization (Table 2). This means that large enterprises operate within these sectors characterized by a large scale of production, which may contribute to increasing their international competitiveness. Moreover, such enterprises have greater bargaining power, both with respect to suppliers and customers. The strong position of more internationalized sectors is confirmed by a higher value of output sold per company compared to sectors with a lower level of internationalization (Table 2).

The groups of sectors with a high and average degree of internationalization are characterized by a much lower productivity of fixed assets, current assets and in total than the group of sectors with a low degree of internationalization (Table 2).

Current liquidity ratios are slightly higher in groups of more internationalized sectors than in other sectors. On the other hand, the return on assets and equity is higher in the group of sectors with a low level of internationalization, and more internationalized sectors record an advantage in terms of return on sales, which may be associated with greater sales opportunities on foreign markets (Table 2).

In order to verify the statistical significance of the abovementioned differences, an analysis of variance for variables illustrating economic and financial results was considered – as dependent variables, with a variable degree of intensity of sector internationalization – as a grouping variable. In the first stage of the analysis, the assumptions about normal distribution were verified, and, in the second stage, the assumptions about the homogeneity of variance of the dependent variables in the groups were verified. After analyzing normality graphs, it was found that the distributions of some variables significantly deviate from normal distribution and that for some variables the assumptions about the equality of variance in groups were not met, and, therefore, the results of the variance analysis could be unreliable.

The above-mentioned formal imperfections of variance analysis were overcome by applying the non-parametric equivalent of the analysis of variance – the Kruskal-Wallis rank sum test. This test does not require the assumptions about the normality of distribution and the homogeneity of variance. The Kruskal-Wallis test verified the null hypothesis that all groups (samples) were taken from a population with the same distribution (or distributions with the same median). For seven analyzed variables (productivity of current assets and in total, economic labor productivity, technical equipment of work, average wages, investment outlays per company, sold production per company), the null hypothesis at significance level $\alpha = 0.05$ was rejected, which means that the degree of intensity of internationalization significantly differentiates the analyzed groups of sectors in terms of these indicators (Table 3).

Table 3. Results of the Kruskal-Wallis test

| Variables | Kruskal-Wallis test (confirmation of significance of differences) | | Multiple comparisons between groups – post – hoc analysis | | |
|--------------------------------|---|---------|---|-------------------|-------------------|
| | H | p-value | group 1 > group 2 | group 1 > group 3 | group 2 > group 3 |
| Productivity of fixed assets | 2.18 | 0.336 | Yes | No | No |
| Productivity of current assets | 12.58 | 0.002 | Yes* | No | No |
| Total asset productivity | 6.3 | 0.042 | Yes* | No | No |
| Economic productivity of work | 3.82 | 0.046 | No | Yes* | Yes |
| Technical equipment for work | 7.45 | 0.024 | Yes | Yes* | Yes |
| Average employment | 9.74 | 0.008 | Yes* | Yes* | Yes* |
| Average salary | 7.44 | 0.024 | Yes | Yes* | Yes* |
| Investment outlays per company | 5.74 | 0.048 | Yes* | Yes | Yes |
| Sold production per company | 3.22 | 0.020 | Yes* | Yes* | Yes |
| Current liquidity ratio | 0.35 | 0.840 | Yes | Yes | Yes |
| ROS | 2.11 | 0.348 | No | Yes | Yes |
| ROA | 2.06 | 0.357 | No | No | Yes |
| ROE | 3.217 | 0.200 | No | No | No |

Notes: Yes/No means that the index of a given group is / is not greater than the index of the compared group.

The median value of the dependent variables in the cross-section of the groups is presented in Table 2

* Coefficients are statistically significant with $p < 0.05$

Source: own research based on unpublished Central Statistical Office data

Due to the fact that the three groups were compared, a post-hoc analysis was necessary. In order to analyze the relationships between the individual groups, multiple comparisons were made (Table 3), allowing to accurately assess which differences between economic and financial indicators of the studied groups are statistically significant ($\alpha = 0.05$). The conducted analysis confirmed a statistically significant advantage of sectors with the highest level of internationalization in relation to sectors with an average intensity of internationalization in terms of the productivity of current assets and total, investment outlays and sold production per 1 company. In addition, the analysis confirmed the advantage of the group of food industry sectors with a high intensity of internationalization compared to the group with a low intensity of internationalization in terms of the economic efficiency of work, the technical equipment of work, average salary and sold production per 1 company. It was also confirmed that the average salary was significantly higher in the group with the average intensity of internationalization compared to the group with a low degree of internationalization. The sectors with the highest level of internationalization intensity are also characterized by the highest employment in relation to other groups, and the difference in this respect is statistically significant. However, the conducted analysis did not confirm that the differences in liquidity and profitability ratios (ROS, ROA, ROE) are statistically significant.

SUMMARY AND CONCLUSIONS

Internationalization is a complex and multi-dimensional economic phenomenon. This issue is widely analyzed at a macro- and microeconomic level, both in theoretical and empirical terms. On the other hand, at the mesoeconomic (sector) level, there is a lack of separate and comprehensive economic theories and methods of measuring this phenomenon. The indicator of sector internationalization intensity used in the research is a comprehensive approach because the partial indicators include both trade and capital forms of internationalization, passive and active forms, as well as the approach to the sector from the supply and demand side. Based on the research, it was found that the sectors of fish processing and the production of tobacco products are the most internationalized, while the sectors of milk processing, meat processing and the production of bakery products were in the group with the lowest intensity of internationalization.

Summarizing the conducted analyzes, it can be concluded that the increase in the internationalization of food industry sectors mainly affects indicators related to the labor factor (including labor productivity, wages), technical progress (technical equipment at work, investment outlays) and property productivity. On the other hand, it has not been found that the internationalization of food industry sectors affects liquidity and profitability ratios.

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INTENSYWNOŚĆ INTERNACJONALIZACJI SEKTORÓW PRZEMYSŁU SPOŻYWCZEGO A ICH WYNIKI EKONOMICZNO-FINANSOWE

Słowa kluczowe: internacjonalizacja, wyniki ekonomiczno-finansowe, sektor, przemysł spożywczy, Polska

ABSTRAKT

Celem artykułu jest określenie zależności między poziomem internacjonalizacji sektorów przemysłu spożywczego a ich wynikami ekonomiczno-finansowymi. Wykorzystano niepublikowane dane GUS za lata 2000-2017, dotyczące przetwórstwa mleka, mięsa, owoców i warzyw, ryb oraz produkcji wyrobów tytoniowych, wyrobów piekarskich i mącznych, produktów przemiału zbóż, skrobi i wyrobów skrobiowych, olejów i tłuszczy, napojów, gotowych pasz i karmy dla zwierząt. Do przeprowadzenia analizy wykorzystano wskaźnik intensywności internacjonalizacji wyliczony dla poszczególnych sektorów spożywczych. Badane sektory przemysłu spożywczego podzielono na 3 grupy według intensywności umiędzynarodowienia. Najbardziej umiędzynarodowionym sektorem okazały się sektory przetwórstwa ryb oraz produkcji wyrobów tytoniowych, a najmniej umiędzynarodowionymi – przetwórstwo mleka i mięsa. Następnie porównano wyodrębnione grupy pod względem wskaźników ekonomiczno-finansowych. W celu potwierdzenia istotności statystycznej zdiagnozowanych różnic wykorzystano test sumy rang Kruskala-Wallisa. Badania potwierdziły, że wzrost internacjonalizacji sektorów przemysłu spożywczego wpływa głównie na wskaźniki związane z czynnikiem pracy, postępem technicznym oraz produktywnością majątku.

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