GLOBALIZATION PROCESSES IN POLISH FOOD INDUSTRY
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Abstract. The main aim of this paper is to determine if there is any correlation between the degree of globalization of individual sectors of the Polish food industry and their productivity. In the first stage of the research, 17 sectors of the food industry were divided into 3 groups: with a very high degree (Group 1), high degree (Group 2) and low degree (Group 3) of globalization. This division was based on the share of global companies (trans-national corporations) in the value of sales revenues in individual branches of the food industry. Then, the author compared the groups with the use of traditional factors (labour productivity, land productivity) and multi-dimensional productivity factors from the Data Envelopment Analysis. The research indicates that the sectors with very high and high degrees of globalization report definitely higher labour productivity and wages and salaries, with a slightly higher DEA-measured productivity but lower fixed asset productivity.

Key words: globalization, food industry, productivity.

JEL code: F6

Introduction

Globalization is one of the most important processes which is taking recently place in the global economy. However, in literature there is no single widely accepted definition of globalization. It is worth noting that the definitions of globalization also change in time, as this process keeps continuously evolving. The changes in the globalization processes are fuelled by the scientific and technological revolution.

The term ‘globalization’ first entered the Webster dictionary in 1961, and then Marshall McLuhan introduced the term ‘global village’ (Oziewicz, 2012). Twenty years later, John Naisbitt, a futurologist, pointed to the shift from local to global economy as one of the ten mega-trends which would shape the future (Godlewska-Majkowska, 2013). In the 1980s, the term of globalization was commonly used as the description of deep transformations in the global economy due to the liberalization of economic ties, the reduction of state interventionism, the internationalisation of capital, IT revolution and the increase of importance of trans-national corporations (Gorecka, Rokicki, 2014; Rokicki, Baran, 2015).

The International Monetary Fund describes globalization as "increasing co-dependence among countries all over the world in the relation with the increase of the volume and number of transactions which include the exchange of goods and services and capital flows, along with a fast and widespread dissemination of technology" (Pietrzak, Roman, 2014). The World Bank defines globalization as the increasing co-dependence of countries due to the increased integration of commerce, finance, people and ideas (Globalization and International Trade, 2013).

The European Commission defines globalization as the process in which markets and products in various countries become more and more co-dependent due to the dynamics of the exchange of goods and services, flows of capital and technology. In the Polish literature, the multi-faceted scope of globalization was described by authors like: Zorska, Kolodko, Lubbe, Czyzewski and Poczta-Wajda (Zorska, 1999; Kolodko, 2007; Lubbe, 2010; Czyzewski, Poczta-Wajda, 2011).

The research for this paper concerns the food industry, and thus, it is worth to mention M. E. Porter’s definition of the globalization of industry. Porter believes that such globalization takes place if a competitive position of a given enterprise on one market is largely shaped by its position on other markets, and vice versa. Globalized sectors of industry are no longer a collection of separate branches located in various countries but they create a chain of interconnected markets which serve as competing grounds for companies which use global strategies to gain an edge (Porter, 1998).

Globalization increased the power and influence of trans-national corporations on the global economy. In Poland, the process of globalization of the food industry by trans-national corporations started in the late 1990s, along with the growth of the free market economy. The way trans-national corporations entered and acted in individual branches of the food industry was varied (Wysokinski et al., 2015). Faster processes of globalization in individual branches of the food industry were affected first and foremost by (Chechelski, 2013):

• option to buy big enterprises, sometimes with market share, relatively cheap;
• high profitability of the branch;
• expected very high growth of the market;
• scale of the production concentration in the branch worldwide;
• restricted market access for competitors;
• option to get lower production costs.

On the one hand, the branches which experienced deep globalization processes were mainly industries with high level of food processing, little connections with domestic raw resource providers and high imports (Baran et. al., 2016). On the other hand, factors which discouraged trans-national corporations were: low production concentration (small and numerous companies) and high number of raw resource providers (Rokicki, 2015).

Polish food and tobacco industry hosts major global corporations, i.e. Coca-Cola, Nestle, Danone, PepsiCo, Unilever, Kraft Foods. One can safely say that all the biggest trans-national corporations from Europe and North America are present in Poland. The Asian ones include: Tabacco and Lotte (Japan), Tata Group (India), Elite (Israel) (Chechelski, 2013).

In the Polish food industry, there is a high variety of globalization degrees in individual sectors: from the highly globalized tobacco or beer industry to the lack of global enterprises in baking or wine industries. Therefore, the main purpose of this research is to define the degree of globalization in individual sectors of the Polish food industry and to determine if there is any correlation between the degree of globalization and effectiveness of a given sector. To achieve the aim, several research tasks were set: 1) to identify the degree of globalization in individual sectors of the Polish food industry; 2) to identify the efficiency of branch of the Polish food industry; 3) compare branches with a different degree of globalization base on sales revenues, wages and salaries and efficiency factors. For the purpose of this study the following hypothesis was assumed: the sectors of the Polish food industry which received very high and high degree of globalization achieved better efficiency indicators than sectors with low degree of globalization.

The research used data for 2010–2013 on 17 Polish sectors of the food industry published in GUS Industry Manuals. Based on Chechelski’s methods (2008), the author determined the share of global companies (trans-national corporations) in the value of sales revenues in individual branches of the food industry. In this way, the author identified branches with a different degree of globalization:

- **Group 1** – very high degree of globalization (more than 60% share of global companies);
- **Group 2** – high degree of globalization (30%–60% share of global companies);
- **Group 3** – low degree of globalization (less than 30% share of global companies).

For comparison, the author used traditional economic factors like labour productivity, fixed asset productivity, sales revenues per company and DEA-based productivity. DEA is the non-parametric approach relied on the linear programming (Baran, Rokicki, 2015). The DEA model may be presented mathematically in the following manner (Cooper et al., 2007):

\[
\max \sum_{r=1}^{s} u_r y_{rj} \leq 1 \\
\sum_{j=1}^{m} V_j x_{ij} \\
\sum_{i=1}^{m} u_r y_{rj} \geq 0
\]

where:
- \(s\) – quantity of outputs;
- \(m\) – quantity of inputs;
- \(u_r\) – weights denoting the significance of respective outputs;
- \(v_i\) – weights denoting the significance of respective outputs;
- \(y_{rj}\) – amount of output of \(r\)-th type \((r = 1, ..., R)\) in \(j\)-th object;
- \(x_{ij}\) – amount of input of \(i\)-th type \((i = 1, ..., I)\) in \(j\)-th object; \((j = 1, ..., J)\).

In the DEA model, \(m\) of inputs and \(s\) of diverse outputs come down to single figures of “synthetic” input and “synthetic” output, which are subsequently used for calculating the object efficiency index (Baran, 2015). The quotient of synthetic output and synthetic input is an objective function, which is solved in linear programming. Optimized variables include \(u_r\) and \(v_i\) coefficients which represent weights of input and output amounts, and the output and input amounts are empirical data (Cooper et al., 2007).

By solving the objective function using linear programming it is possible to determine the efficiency...
curve called also the production frontier, which covers all most efficient units of the focus group. Objects are believed to be technically efficient if they are located on the efficiency curve (their efficiency index equals 1, which means that in the model focused on input minimization there aren't any other more favourable combination of inputs allowing a company to achieve the same outputs). However, if they are beyond the efficiency curve, they are technically inefficient (their efficiency index is below 1). The efficiency of the object is measured against other objects from the focus group and is assigned values from the range $[0, 1]$ (Charnes et al., 1978).

**Research results and discussion**

Taking into account the share of global companies in the value of sales revenues of the individual branches of food industry, the author identified sector with varied degrees of globalization (Table 1). The sectors with a very high degree of globalization (more than 60% share of global companies) include: manufacture of vegetable and animal oils and fats, manufacture of beer, manufacture of rusks and biscuits, manufacture of preserved pastry goods and cakes, manufacture of cocoa, chocolate and sugar confectionery, processing of tea and of coffee, manufacture of sugar. The sectors with a high degree of globalization include: manufacture of soft drinks, production of mineral waters and other bottled waters, manufacture of prepared animal feeds, manufacture of ice cream, distilling, rectifying and blending of spirits. The branches with a low degree of globalization are: processing and preserving of fruit and vegetables, operation of dairies and cheese making, processing and preserving of meat and production of meat products, manufacture of grain mill products and manufacture of macaroni, noodles, couscous and similar farinaceous products, manufacture of starches and starch products, processing and preserving of fish, crustaceans and molluscs, processing and preserving of fish, crustaceans and molluscs, manufacture of bread, manufacture of fresh pastry goods and cakes. The examples of trans-national corporations in individual branches of the Polish food industry are given in Table 1.

In the next stage of research, the author compared the three groups of food industry sectors as to sales revenues, wages and salaries and efficiency factors. The research indicates that the branches of food industry with a high degree of globalization reported a significantly higher level of sales revenues per one company and in 2013 it was 50% more than in sectors with a high degree of globalization and 75% more than in sectors with a low degree of globalization (Figure 1).

The author could also speculate that the average wages and salaries in branches with a high share of trans-national corporations should be higher, too. The research confirmed that in the food industry sectors with a very high and high degree of globalization, monthly wages and salaries in 2013 were higher by ca. 30% than in the sectors with a low degree of globalization (Figure 2). Research by other authors (Chechelski, 2008) confirm that trans-national corporations provide higher remunerations than companies with domestic capital. Therefore, they may gain an edge as to the qualifications and commitment of their employees. However, this phenomenon may lead to negative effects like increasing the gap in wages and salaries among food industry sectors and increasing the competitive edge of trans-national corporations over companies with domestic capital, especially the smaller ones.
### Trans-national corporations in the Polish food industry

<table>
<thead>
<tr>
<th>Branches of food industry</th>
<th>The share of TNCs in the revenue of sectors [%]</th>
<th>Average sold production per company [PLN million/company] (2013)</th>
<th>Example of transnational corporation in the Polish food industry by sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Branches of food industry with a very high degree of globalization</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>manufacture of vegetable and animal oils and fats</td>
<td>92</td>
<td>353.7</td>
<td>Bunge Investment</td>
</tr>
<tr>
<td>manufacture of Beer</td>
<td>86</td>
<td>429.4</td>
<td>Heineken International, Carlsberg</td>
</tr>
<tr>
<td>manufacture of rusks and biscuits; manufacture of preserved pastry goods and cakes</td>
<td>68</td>
<td>67.3</td>
<td>Kraft Foods, PepsiCo, Mars, Nestle, Ferrero</td>
</tr>
<tr>
<td>manufacture of cocoa, chocolate and sugar confectionery</td>
<td>72</td>
<td>169.4</td>
<td>Kraft Foods, Nestle</td>
</tr>
<tr>
<td>processing of tea and of coffee</td>
<td>72</td>
<td>132.0</td>
<td>Unilever, Tata Group</td>
</tr>
<tr>
<td>manufacture of sugar</td>
<td>62</td>
<td>1076.7</td>
<td>Nordzucker, Pfeifer&amp;Langen</td>
</tr>
<tr>
<td><strong>Branches of the food industry with a high degree of globalization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>manufacture of soft drinks; production of mineral waters and other bottled waters</td>
<td>51</td>
<td>176.0</td>
<td>Coca-Cola, PepsiCo</td>
</tr>
<tr>
<td>manufacture of prepared animal feeds</td>
<td>49</td>
<td>307.5</td>
<td>Cargill, Nestle, Smithfield Foods</td>
</tr>
<tr>
<td>manufacture of ice cream</td>
<td>42</td>
<td>85.5</td>
<td>Unilever, Nestle</td>
</tr>
<tr>
<td>distilling, rectifying and blending of spirits</td>
<td>38</td>
<td>185.9</td>
<td>Pernod Ricard, Philips Beverage, CDEC</td>
</tr>
<tr>
<td><strong>Branches of the food industry with a low degree of globalization</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>processing and preserving of fruit and vegetables</td>
<td>21</td>
<td>89.8</td>
<td>Bonduelle, Royal Numico, H.J. Heinz</td>
</tr>
<tr>
<td>operation of dairies and cheese making</td>
<td>19</td>
<td>187.8</td>
<td>Hochland, Zott, Danone</td>
</tr>
<tr>
<td>processing and preserving of meat and production of meat products</td>
<td>18</td>
<td>112.9</td>
<td>Smithfield Foods, Danish Crown</td>
</tr>
<tr>
<td>manufacture of grain mill products and manufacture of macaroni, noodles, couscous and similar farinaceous products</td>
<td>15</td>
<td>86.5</td>
<td>Nestle, Dr Oetker</td>
</tr>
<tr>
<td>manufacture of starches and starch products</td>
<td>12</td>
<td>47.6</td>
<td>Cargill</td>
</tr>
<tr>
<td>processing and preserving of fish, crustaceans and molluscs</td>
<td>4</td>
<td>100.7</td>
<td>Frosta</td>
</tr>
<tr>
<td>manufacture of bread; manufacture of fresh pastry goods and cakes</td>
<td>0</td>
<td>19.2</td>
<td></td>
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</tbody>
</table>

*Source: author’s calculations based on Statistical Yearbooks of Industry – Poland and Chechelski (2013)*
One of the most important efficiency indicators is labour productivity. It is particularly important in the food industry, which is labour intensive. Branches of the food industry with a very high and high degree of globalization reported labour productivity in 2013 at PLN 854/person and PLN 856/person, respectively. Such labour productivity was ca. 40% higher than in the sectors with a low degree of globalization (Figure 3). On the one hand, the author can speculate that in the branches with a high share of foreign capital, employment decreased and capital-to-labour ratio increased. On the other hand, the branches with a low share of trans-national corporations experienced a higher rate of production growth, lower employment reduction and lower dynamics of the capital-to-labour ratio.

When comparing fixed asset productivity, one can see that the group of sectors with a very high degree of globalization has lower fixed asset productivity than the group with a low share of trans-national corporations.
Therefore, one can question in the highly globalized sectors are indeed more efficient – does their higher labour productivity compensate for their lower fixed asset productivity? (Baran et al., 2016).

![Comparison of fixed asset productivity among the groups](image)

**Source:** author’s calculations based on Statistical Yearbooks of Industry - Poland

**Fig. 4.** Comparison of fixed asset productivity among the groups

Considering the above issue, the author also made a comparison on the basis of a multi-dimensional method of measuring productivity with DEA. The results indicate that in 2010–2013, the studied groups of industries reported lower DEA-measured productivity (Figure 5). Sectors with a very high or high degree of globalization reported on average a higher productivity than branches with a low degree of globalization. However, this gap significantly decreased in 2010–2013 from 10% to 5%.

![Comparison of group as to their DEA-measured productivity](image)

**Source:** author’s calculations based on Statistical Yearbooks of Industry - Poland

**Fig. 5.** Comparison of group as to their DEA-measured productivity

### Conclusions, proposals, recommendations

The analyses conducted in this paper can be used to draw the following conclusions:

In Poland, as everywhere else in the world, the food industry sectors with the biggest share of trans-national corporations are sectors related to stimulant production: tobacco or beer. Most trans-national corporations which do business on the global food market are present in Poland, too. The branches in Poland with the highest share of global companies include: manufacture of vegetable and animal oils and fats, manufacture of beer, manufacture of cocoa, chocolate and sugar confectionery, processing of tea and of coffee. However, there are industries with virtually no presence of global companies, e.g. baking.

High wages and career opportunities at trans-national corporations lead to an outflow of the best employees from domestic companies to big corporations. Innovative resource management at trans-national corporations make them use their employees much better than the sectors with companies based on Polish capital, which in turn gives them competitive edge. On the top of that, this translates into labour productivity, which is much higher in branches with a high degree of globalization than the others.

1) The DEA measurement method indicates that the sectors with a high degree of globalization have
a slightly higher productivity than the sectors with a low degree of globalization; however, this gap decreased in 2010–2013.

2) The author can expect the share of global companies in the Polish food industry to continue to grow. The presence of trans-national corporations in the food industry activates domestic companies, thus helping the entire food sector grow. On the one hand, the author can expect that in the upcoming years, labour productivity and efficiency of food companies will increase, along with the volume of foreign trade in agricultural and food products. On the other hand, the competitive edge of trans-national corporations may cause problems to small and medium Polish companies or even drive them into bankruptcy.

Bibliography


