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VALUE-ADDED ANALYSIS OF SELECTED BRANCHES OF FOOD INDUSTRY IN POLAND

Abstract:

Value-added is understood as an increase of the value of goods as a result
of a specific production process. It means the difference between the retail selling price of a product and the material cost. It is calculated on the basis of financial statements. The objective of this paper is to assess the level and structure of value-
-added on an example of the selected branches of the food industry in Poland.
The authors carry out comparative analysis of these branches and also indirectly refer to the assessment of the level of their modernity. The results show that remuneration plays a significant role in the value-added structure. Remunerations represent approx-imately 50 percent of the value. Structure of the value creation depicts the level of innovation of the sector.

Keywords:

value creation, value-added, food industry, food marketing chain

JEL Classification: D46, D24, Q13

Introduction

Value-added is one of the most important economic categories. Regardless of the ways it is defined and possible interpretations, it has been remaining in the spotlight of economists for many centuries. In the classical economy, the sphere of production was regarded as value-forming, although no consensus has been reached as to basing the theory of value on labour[1] (Kozera-Kowalska, 2017, pp. 17-24). A. Marshall tried to reconcile approaches perceiving the sources of value in the consumption of production factors (supply-side) and using the usability (demand-side), by indicating that the value and associated price of a given good result from the integration of various forces shaping the demand and supply. The view perceiving the sources of value both in costs and in usability has been functioning in economics to date. We may notice a certain evolutionary string in determining the economic value categories (Kozera-Kowalska, 2017, pp. 20-22). In this string, we can identify three forms referring to the major characteristics of the value of goods, namely: market value, use value and additional value, also known as value-added (Fiedorowicz, 2012, pp. 145-154), the latter taking on particular importance[2]. F. Hutnik (1997, 1998) is one of authors whose publications and research focused on issue od value-added. Also M. Grznár (1998, 1999) described the importance of the value.

It is believed that the (additional) value-added category has been introduced into economics by K. Marx. In adopting the theory of value by A. Smith and D. Ricardo, he considered that its source was living labour (performed by a worker, as opposed to objectified labour inherent in the goods already produced; Zagóra-Jonszta, 2014, pp. 13-21; Kozera-Kowalska, 2017, pp. 19-25). Thus, the source of value was labour (abilities, skills and qualifications of workers). The work by K. Marx has been concluded by a statement that each economy produces more goods and services than needed to pay all real social costs of production (Landreth and Colander, 1998, pp. 282).

Value-added is the part of the market value which creates profit. It brings benefits to capital involved and is also an objective of the production process[3]. Gross value--added is a difference between the global production and intermediate consumption. It expresses a difference between sales revenues and expenses for materials and services purchased externally (i.e. it covers: depreciation and gross salaries with overheads), paid interest on credits and loans, income tax and net profit. This calculation is based on a belief that the sale is a result of processing purchased

[1] A. Smith's dogma, assuming that the sources of value are productive labour, has been refuted by J.B. Say, who pointed to the importance of non-productive work and the usefulness of goods as factors which are relevant from the point of view of the buyer and also determine the value of a given good (Blaug, 1995, pp. 212).
[2] The European Parliament carried out detailed analysis of the share of individual market participants (actors) in creating value-added (Mathews, 2015). This analysis showed a declining share of agricultural producers (decrease to about 20%) in its creation. The share of the food industry has been estimated at about 30%, and that of retail trade and catering services at about 50%. It is worth stressing that the tendency to reduce the share of the agricultural sector in value-added was typical of the most European Union Member States (Chart A2, Annex).
[3] The physiocrats called it a pure product, obtainable only in agriculture, because only there (in agriculture) wealth is multiplied, not only aggregated (Landreth and Colander, 1998, pp. 92-101; Kozera-Kowalska, 2017, pp. 20-21).

raw materials and services, labour done by workers (human capital) and involved own and foreign capital (Kozera-Kowalska, 2017, pp. 21-27).

On the other hand, raising the value in food products is an appealing goal to a variety of interest group. Farmers want value-added to enhance the demand for the commodities and have viewed value-added processing ventures as an investment opportunity to capture more of the consumers' food dollar. Policymakers interested in perceive value-added food processing firms as contributors to employment and economic development. Consumers demand high-value products to satisfy their specific tastes for food variety (Salin, Atkins, Salame, 2002, pp. 136-137).

The objective of this paper is to assess the level and structure of value-added on an example of the selected branches of the food industry in Poland. The authors carry out comparative analysis of these branches and also indirectly refer to the assessment of the level of their modernity.

1. Essence of value-added

As a microeconomic category, value-added is for a company a difference between sales revenues and costs of acquiring goods and services from other companies. Thus, it is valuable information about an increase in the value of goods as a result of the manufacturing process (Begg et al., 2007, p. 27). In practice, it expresses a difference between revenues and costs of purchasing materials and services from other entities, i.e. a difference between sales revenue and costs of acquiring goods and services externally (Barro, 1997, pp. 5-9).

The calculation of value-added in a company is based on an assumption that the sale is a result of purchasing raw materials, materials and services, labour done to transform them into a final product and involving capital (own and foreign). The value-added statement may be conceived as a modified version of the income statement. Value-added can be determined by the following formula:

value-added = net sales revenues – actual costs = intangible costs + profit

or in broader terms:

value-added = net sales revenues – actual costs without depreciation (Sierpińska, Jachna, 2004, p. 186)[4].

As a result, the structure of creating added value can be described by the formula:

value-added = depreciation + intangible costs (personnel costs, salary overheads, other labour costs, rents, fees, interest, etc.) + profit (Kozera-Kowalska, 2017, pp. 23-24).

[4] Actual costs include costs of consuming material process components (raw materials, materials, fuels, energy, foreign transport, repair or telecommunications services).

The value is a category present both in macroeconomics[5] and in microeconomics. The structure of value-added in microeconomic terms is identical to the components in macroeconomic terms (they are: salaries, social security contributions paid by workers, social security contributions paid by employers, other costs related to employment (awards, bonuses, etc.), taxes decreasing producers' income, subsidies to producers decreasing value-added as well as gross operating surplus (Kowalski, Rembisz, 2003, pp. 3-13; Boratyński, 2009, pp. 108-110). Regardless of the approach and measurement method, value-added also indicates the labour productivity (Gołaś, 2010, pp. 30-50; Sielska et al., 2015, pp. 77-89). In this approach, the labour productivity is an economic category reflecting the efficiency of the emergence of new, value--added in economic processes (Sielska et al., 2015, pp. 76-106)[6].

As mentioned before, the value is understood as a value obtained by reducing sales by materials and services purchased externally. If a company is involved in producing intermediates, then sales revenues are recognised as costs of customers of that company. Value-added to be created by this analysed company will not be counted twice. When goods and services are acquired by the end consumer, the price includes whole value-added generated at each stage of the production process. In most European countries, the measurable value is subject to taxation in a form of value-added tax, also known as tax on goods and services (VAT).

Value-added is measures using various methods. One of them is the equation proposed by M.F. Morley:

$$Z = S - M - Am - I - DD - T, \tag{1}$$

where:

Z – retained profit,

S – net sales revenues,

M – value of purchased and consumed materials and services,

Am – depreciation,

W – gross salaries with overheads,

[5] The total of value-added that appears at the subsequent stages of economic processes over a period of one year is the Gross Domestic Product of a given country. It is calculated as a difference between the total value of goods and services produced and costs incurred for producing them (Taylor, Mankiw, 2009, pp. 30-32).

[6] The gross value-added can be expressed in current prices (when the production is expressed in market prices, i.e. including indirect taxes on goods and services). It can also be calculated at prices of manufacturing factors (when taxes are not taken into account). Thus, the gross value-added expressed in market prices is higher than value-added expressed in prices of manufacturing factors by the value of indirect taxes less the amount of subsidies and direct payments to production of costs (Kulawik, 2008, pp. 13-15).

I – interest paid,

DD – dividends,

T – taxes.

In order to obtain gross value-added, it is required to transform formula No. 1 as follows:

$$S - M = Am + W + I + DD + T + Z, \quad (2)$$

In turn, net value-added is expressed by the following formula:

$$S - M - Am = W + I + DD + T + Z, \quad (3)$$

Value-added (gross and net, respectively) is determined by the right side of the equation. This means that gross value-added is a total of the following components: depreciation, salaries, interest, dividends, taxes, and retained profit. The left side of the formula No. 2 is a difference between the sales result and the value of purchased materials and services needed to produce marketed products or goods. A similar method has been proposed by R. Urban (2001) who defined gross value-added as a total of: salaries, depreciation, taxes on costs (excluding VAT and excise duties), financial costs and gross financial result. The authors of this article to a large extent refer to the approach by R. Urban.

2. Analysis of the level of value-added and its structure for the selected branches of the food industry in Poland

At the beginning of empirical studies, it should be clarified that as part of the Polish Classification of Activities (PKD)[7] various types of the socio-economic activity have been classified. There are five levels of this classification. The first level is the section marked with a letter from the modern Latin alphabet. There are 21 sections (from "A" to "U"). The second level of aggregation is the division. Individual sections may contain various number of divisions. 88 divisions have been identified in total. The third, fourth and fifth levels of classification are groups, classes and subclasses.

Analysis of the value in this article has been carried out on an example of division 10 (belonging to section C – Industrial processing) and the groups and classes contained within this division. According to PKD, division 10 means: „Production of food products" and consists of nine groups (**1-9**):

1) 10.1 – Processing and preserving of meat and production of meat products:

- 10.11 – Processing and preserving of meat, excluding poultry meat,

[7] https://stat.gov.pl/Klasyfikacje/doc/pkd_07/pkd_07.htm; http://stat.gov.pl/Klasyfikacje/; PKD code: https://www.biznes.gov.pl/en/tabela-pkd.

- 10.12 – Processing and preserving of poultry meat,
- 10.13 – Production of meat products, including poultry meat products,

2) **10.2 – Processing and preserving of fish, crustaceans and molluscs,**
3) **10.3 – Processing and preserving of fruit and vegetables:**
   - 10.31 – Processing and preserving of potatoes,
   - 10.32 – Production of fruit and vegetable juices,
   - 10.39 – Other processing and preserving of fruit and vegetables,
4) **10.4 – Production of vegetable and animal oils and fats:**
   - 10.41 – Production of oils and other liquid fats,
   - 10.42 – Production of margarine and similar edible fats,
5) **10.5 – Production of dairy products:**
   - 10.51 – Milk processing and cheese making,
   - 10.52 – Production of ice cream,
6) **10.6 – Production of cereal milling products, starch and starch products:**
   - 10.61 – Production of cereal milling products,
   - 10.62 – Production of starch and starch products,
7) **10.7 – Production of bakery and flour-milling products:**
   - 10.71 – Production of bakery: production of fresh pastry and cakes,
   - 10.72 – Production of rusks and biscuits, production of preserved pastry and cakes,
   - 10.73 – Production of pasta, noodles, couscous and similar flour-milling products,
8) **10.8 – Production of other food products:**
   - 10.81 – Production of sugar,
   - 10.82 – Production of cocoa, chocolate and confectionery,

- 10.83 – Processing of tea and coffee,
- 10.84 – Production of spices,
- 10.85 – Production of ready-to-eat meals and dishes,
- 10.86 – Production of homogenised food products and dietetic food,
- 10.89 – Production of other food products, not classified elsewhere,

9) 10.9 – Production of ready-to-eat feed for animals and pet food:

- 10.91 – Production of ready-to-eat feed for farm animals,
- 10.92 – Production of ready-to-eat pet food.

To calculate gross value-added, the method proposed by R. Urban (2001) has been used, which in practice was a reference to the following equation:

$$S - M = Am + T + W + KF + WFB, \quad (4)$$

where:

S – net sales revenues,

M – value of purchased and consumed materials and services,

Am – depreciation,

T – taxes,

W – gross salaries with overheads,

KF – financial costs,

WFB – gross financial result.

Table 1 presents the calculations for the whole division 10 and its twelve classes that have created the highest level of gross value-added in the years 2009-2016. The values in parentheses (superscript) means the position (in the annual ranking) in the level of production of the analysed quantity.

Table 1. Calculation of gross value-added in division 10 and its major classes in the years 2009-2016 [current prices, million PLN]

Items	2009	2010	2011	2012	2013	2014	2015	2016
Division 10	**28,949**	**28,193**	**30,217**	**32,129**	**32,755**	**33,402**	**34,698**	**38,101**
10.11	3,135 (2)	3,130 (2)	2,725 (3)	2,931 (3)	2,411 (5)	3,439 (2)	3,323 (4)	3,413 (4)
10.12	1,397 (9)	1,322 (10)	1,599 (8)	1,652 (8)	1,230 (10)	1,437 (9)	1,478 (10)	1,693 (10)
10.13	1,958 (5)	2,269 (3)	2,388 (5)	2,687 (5)	3,699 (2)	3,368 (3)	3,821 (1)	3,839 (2)
10.20	1,282 (10)	999 (12)	1,139 (12)	1,116 (12)	1,114 (12)	1,533 (8)	1,670 (7)	1,773 (9)
10.39	1,919 (7)	1,785 (6)	1,735 (7)	1,714 (7)	1,628 (7)	1,785 (6)	2,160 (6)	2,219 (6)
10.51	3,672 (1)	3,567 (1)	3,667 (1)	3,589 (1)	3,873 (1)	3,561 (1)	3,587 (2)	3,922 (1)
10.71	1,932 (6)	2,106 (5)	2,142 (6)	2,379 (6)	2,757 (5)	3,109 (4)	3,478 (3)	3,626 (3)
10.81	1,983 (4)	1,593 (8)	2,415 (4)	2,909 (4)	2,199 (6)	1,339 (11)	1,101 (12)	1,908 (7)
10.82	2,187 (3)	2,115 (4)	2,908 (2)	3,043 (2)	3,305 (3)	2,680 (5)	2,792 (5)	2,629 (5)
10.84	1,114 (11)	1,404 (9)	1,212 (11)	1,325 (9)	1,404 (9)	1,430 (10)	1,559 (9)	1,531 (12)
10.89	1,505 (8)	1,660 (7)	1,238 (10)	1,162 (11)	1,130 (11)	1,187 (13)	1,465 (11)	1,680 (11)
10.91	789 (13)	1,157 (11)	1,329 (9)	1,322 (10)	1,588 (8)	1,557 (7)	1,626 (8)	1,878 (8)

Source: Own calculations based on the unpublished CSO data.

The first position (designated as (1)) means the leader in creating gross value-added. In all analysed years, the leader in this ranking was class 10.51 called “Milk processing and cheese making”. Only in 2015, the leader was class 10.13 (Production of meat products, including poultry meat products). The eleven first classes in this ranking (superscripts (1)-(11) in Table 1) generated at least 75% of gross value-added in the whole division 10. We can also note that each year, the six largest classes generated at least 50% of gross value-added (they were: 10.11, 10.13, 10.51, 10.71, 10.81 and 10.82).

Among the above classes, the greatest development was characteristic of the classes marked as: **10.91** (Production of ready-to-eat feed for farm animals), **10.13** (Production of meat products, including poultry meat products) and **10.71** (Production of bakery: production of fresh pastry and cakes) that have increased generating new gross value-added by, respectively, 138%, 96% and 88% in the analysed period. It is worth stressing that only in four classes (10.41, 10.42, 10.62 i 10.81) those results deteriorated in the analysed years 2009-2016.

Table 2 showed the coefficients of variation (V) for all classes in division 10. The results have been sorted in ascending order in relation to the value of this coefficient. Only for three classes, the coefficient of variation was lower than 0.1, which meant the best stability of their results over time. It must be noted that class **10.51*** (Milk processing and cheese making) proved to be most stable.

Table 2. Values of the coefficient of variation (*V*)[8] for the analysed PKD classes in division 10 [dimensionless quantity]

No.	Class in division 10	*V*	No.	Class in division 10	*V*	No.	Class in division 10	*V*
1	**10.51***	**0,0359**	13	10.82	0,1398	25	10.71	0,2272
2	*10.5*	*0,0384*	14	10.52	0,1420	26	10.86	0,2309
3	10.92	0,0735	15	10.83	0,1453	27	10.13	0,2381
4	10.8	0,0818	16	10.61	0,1470	28	*10.4*	*0,2746*
5	10.73	0,0846	17	10.89	0,1536	29	10.41	0,2844
6	***10***	***0,0937***	18	*10.3*	*0,1557*	30	10.81	0,2847
7	10.84	0,1030	19	10.32	0,1665	31	10.85	0,3866
8	10.12	0,1031	20	*10.9*	*0,1742*	32	10.31	0,4636
9	*10.6*	*0,1052*	21	*10.7*	*0,2044*	33	10.62	0,5601
10	10.39	0,1076	22	*10.2*	*0,2051*	34	10.42	0,6772
11	10.11	0,1094	23	10.72	0,2072			
12	*10.1*	*0,1168*	24	10.91	0,2226			

Source: Own calculations based on the unpublished CSO data.

For more detailed analysis, Chart A1 (Annex) shows the *V* coefficient values in comparison to the growth rate. This chart illustrates a correlation between the coefficient of variation (ordinate axis) and the gross value-added growth rate (abscissa axis). When ignoring outliers (classes: 10.41, 10.42, 10.62, 10.81 and 10.85), we may observe a strong correlation between these two values (coefficient of correlation is, in fact, 0,9050). This means a relationship similar to the directly proportional one – along with the increase in the *V* coefficient, the growth rate of the analysed PKD classes was increasing.

On the other hand, Table 3 shows the structure (share of individual components) in creating gross value-added in the whole division 10 and in the selected class (10.51 - Milk processing and cheese making) whose results were least changed (varied) in the years 2009-2016. We can observe that in division 10 there were no significant changes in the share (importance) of the individual components determining value--added in the analysed period. As clearly seen in Table 3, its most important determinant were gross salaries with overheads whose share in the whole division 10 ranged from 50 to 54% and in class 10.51 – from 52 to 65%.

[8] This coefficient is a classic indicator of the diversification the trait distribution. This is a ratio of the standard deviation to the arithmetic mean. It can be expressed in dimensionless or percentage terms (Wasilewska, 2015).

Table 3. Share of the individual components in creating value-added [%]

Items		Depreciation	Taxes	Salaries	Financial costs	Gross financial result
Division 10	*2009*	12.84%	3.84%	50.27%	9.97%	23.09%
	2010	13.87%	2.78%	53.22%	6.08%	24.04%
	2011	13.65%	2.80%	53.13%	8.46%	21.96%
	2012	13.36%	2.82%	52.67%	7.26%	23.90%
	2013	13.58%	3.24%	52.68%	5.43%	25.07%
	2014	13.93%	2.80%	53.76%	5.39%	24.12%
	2015	14.33%	2.68%	53.19%	6.24%	23.55%
	2016	13.70%	2.43%	53.25%	5.13%	25.49%
Class 10.51	*2009*	16.29%	3.05%	52.30%	5.86%	22.51%
	2010	17.48%	3.06%	57.59%	4.23%	17.64%
	2011	17.07%	3.19%	58.70%	5.15%	15.89%
	2012	17.22%	3.34%	61.88%	4.96%	12.59%
	2013	15.89%	2.93%	57.92%	3.19%	20.08%
	2014	17.87%	3.23%	64.32%	3.23%	11.34%
	2015	17.16%	3.14%	64.45%	2.68%	12.57%
	2016	15.58%	2.90%	61.69%	2.82%	17.01%

Source: Own calculations based on the unpublished CSO data.

In order to check the competition among the individual branches of the food industry, three types of convergence: beta, sigma and gamma[9] have been analysed. In general, convergence is understood as a process of becoming similar to each other. In the case of the data analysed in this paper, convergence may be understood as a process of approximating (obtaining similar values) in the level of generating value added among the analysed classes (or groups).

Beta-convergence applies to a situation where classes (groups) whose level of value added was initially lower are characterised by the faster level of development than classes (groups) which initially generated more value added. Beta-convergence may be analysed using both cross-sectional and panel data. In the event of using cross-sectional data, the model is as follows:

$$\ln\left(\frac{y_{i,t_0+T}}{y_{i,t_0}}\right) = a + b * \ln\left(y_{i,t_0}\right) + u_{i,t}. \quad (5)$$

[9] To verify each type of convergence, different methods are used.

where:

y_{i,t_0+T} – value of the analysed characteristic in the class (group) i in the period $t_0 + T$,

y_{i,t_0} – value of the analysed characteristic in the class (group) i in the period t_0,

$u_{i,t}$ – random component,

a – constant.

The negative value of the b parameter means the occurrence of beta-convergence while its positive value – the occurrence of beta-divergence[10].

In turn, when we use panel data, the relation is as follows:

$$\ln\left(\frac{y_{i,t}}{y_{i,t-1}}\right) = a + b * \ln(y_{i,t-1}) + \eta_i + \upsilon_t + u_{i,t}. \quad (6)$$

where:

η_i – effects specific to individual classes (groups),

υ_t – effects specific to individual periods.

The above formula can be converted to the form:

$$\ln(y_{i,t}) = a + (1 + b) * \ln(y_{i,t-1}) + \eta_i + \upsilon_t + u_{i,t}. \quad (7)$$

No matter if cross-sectional or panel data has been used, the negative value of the b parameter means the occurrence of beta-convergence (positive value – the occurrence of beta-divergence).

However, even the occurrence of beta-convergence does not need to mean that dispersion of the distribution of the analysed variable is reduced. To this end, we need to analyse the occurrence of sigma-convergence which means that the disparity of the given characteristic is reduced over time. There are many indicators to measure this disparity. These indicators may include the coefficient of variability, standard deviation, standard deviation of logarithms, Theil index or Gini coefficient. Then, we should apply the trend model as follows:

$$S_t = \alpha_0 + \alpha_1 * t + \xi_t. \quad (8)$$

[10] Divergence is the reverse of convergence.

where:

S_t – indicator of dispersion in the period t (t=1, 2, …, T),

α_0, α_1 – model parameters,

ξ_t – random component.

If the α_1 is negative (positive) and statistically significant, then we have sigma-convergence (divergence).

The last type of convergence is gamma-convergence which is used to verify if classes (groups) which initially generated the lower level of value added not only catch up with the larger classes (groups) as in the case of beta-convergence but also surpass them? To this end, classes (groups) are assigned ranks. Then, a number of indicators are calculated as follows:

$$RC_t = \frac{wariancja(\sum_{t=0}^{T} AR(Y)_{i,t})}{wariancja((t+1)*AR(Y)_{i,0})}. \quad (9)$$

where:

$AR(Y)_{i,t}$ – rank of the i^{th} class (group) in the period t,

$AR(Y)_{i,0}$ – rank of the i^{th} class (group) in the initial period,

t = 1, 2, 3, …, T.

Finally, the trend model is constructed as follows:

$$RC_t = \alpha_0 + \alpha_1 * t + \xi_t.$$

If the α_1 parameter is negative and statistically significant, then we should check if the value of subsequent RC_t indicators is lower than 0.25. The value of 0.25 corresponds to the point in which, regardless of the initial ranks of classes (groups), ranks of all classes (groups) become equal at the end. This means that below this critical point, classes (groups) with poorer initial results surpassed classes (groups) with better initial results.

Analysis covered separately 9 groups and 25 classes belonging to section 10 (Table 4). In addition, the occurrence of convergence among classes belonging to the same group has been analysed. In each of these case, there was no gamma-convergence.

Table 4. Results with regard to the occurrence of beta- and sigma-convergence

Items	Classes	Groups	10.1	10.3	10.4	10.5	10.6	10.7	10.8	10.9
(1+b)	0,629*	0,347*	0,258*	0,218	0,471*	0,727*	0,110*	0,214	0,362	0,266*
α_1	0,021*	0,004	0,015	-0,048*	0,041	-0,023*	0,074	0,028	0,001	0,037*

Designations: * coefficient is statistically significant at the level of 0.05.

Source: Own calculations based on the unpublished CSO data.

Based on the values „$1 + b$" (referring to beta-convergence) and „α_1" (referring to sigma-convergence) included in Table 4, it may be concluded that in most analysed cases beta-convergence takes place. This means that the rate of development of initially smaller classes (groups) was faster than that of larger classes. An exception were analyses carried out inside groups 10.3, 10.7 and 10.8 where the value „$1 + b$" turned to be statistically insignificant. Despite the occurrence of beta-convergence, the occurrence of sigma-divergence was also found. This means that despite the faster rate of development of weaker classes in relation to better classes, the stratification among classes was growing over the analysed period.

3. Discussion of results

R. Urban (2001) analysed the level and structure of value-added in the food industry in the years 1994, 1999-2001 (in several basic sectors of the food industry and in the whole food industry). Similarly as the authors of this article, he obtained results showing the significant share of salaries in creating value-added in the food industry in Poland. Salaries also represented there more than 50% of analysed value. Also, R. Urban showed in empirical studies that the food industry had increased its share in creating gross value-added in relation to the whole industry.

The analyzed examples showed stagnation of results in the PKD classes (division 10). The prime leader was class 10.51 (Milk processing and cheese making). Probably, the improving labour productivity and a technological innovation process were the causes of the beneficial changes (a growth of value-added) in this case. It can be assumed that the opportunities brought by an accession of Poland to the European Union were visible here (class 10.51). Very similar conclusions presented D. Czerwińska-Kayzer, J. Florek and Joanna Stanisławska (2014).

J. Wrzesińska-Kowal and K. Drabarczyk showed that productivity of Polish employees ranged above average for the studied counties (EU), and the percentage of added value of food products in total added value of the processing sector is nearly 15%.

J. Mezera, J. Špička (2013) examined the impact of EU subsidies on the level of some economic indicators of the food industry in the Czech Republic, including value added. Results show that the supported businesses consolidated their economic

position to a certain extent. The investment support increases labour productivity. The overall effects on economic results were slightly reduced due to the higher depreciation (a consequence of investments in fixed assets).

4. Summary and conclusions

Value-added of a particular sector (or its individual divisions) is an important indicator, as it illustrates the importance of this sector in the economy. Analysis of this value over time helps diagnose the economic standing of the sector, its bargaining power (e.g. in a food chain) and outline trends for the future. Useful for this purpose are the CSO input–output models and the data from the World Input-Output Database (WIOD)[11].

The food sector in Poland became an essential branch of the economy, affecting economic growth. Global agricultural markets reflect the growing complexity of the modern consumer demand for safe, high quality food. This leads to changes in the food industry that apply to greater possibilities of diversifying products. The greater diversification and thus greater value-added change the dispersion between the value of agricultural products sold by the agricultural producer and the value of these products in retail trade and catering services. This shift of creating value in the food chain (its adding at the subsequent links of the chain) is measured by the level of the marketing margin.

Looking from the perspective of the past decades, the agribusiness sector was a production-oriented sector with a strong emphasis on the maximum productivity, homogeneous products and economies of scale. Agri-food markets were effective in converting raw materials into homogeneous products. However, the evolution of the consumer demand towards safe, high quality products, technological progress and increased competition (larger share of the free market) change the agribusiness sector. Currently, agribusiness promotes economic entities which focus on creating value--added, thus allowing to meet the expectations of consumers. The viability of companies is based on their ability to meet the demand of end consumers by means of differentiated value-added products while achieving high profits. Economic operators capture benefits of the value creation process. The creation of value-added has become a motto for modern business.

The economic development is characterised by the continuous development in which the importance and share of agriculture in creating value-added are decreasing while the difference between the value of agricultural products (at the farm level) and the value of their added processing services (food retail prices at the end consumer level) is increasing. The growing share of processing services attests to modernisation and stronger connection of agribusiness to the external environment.

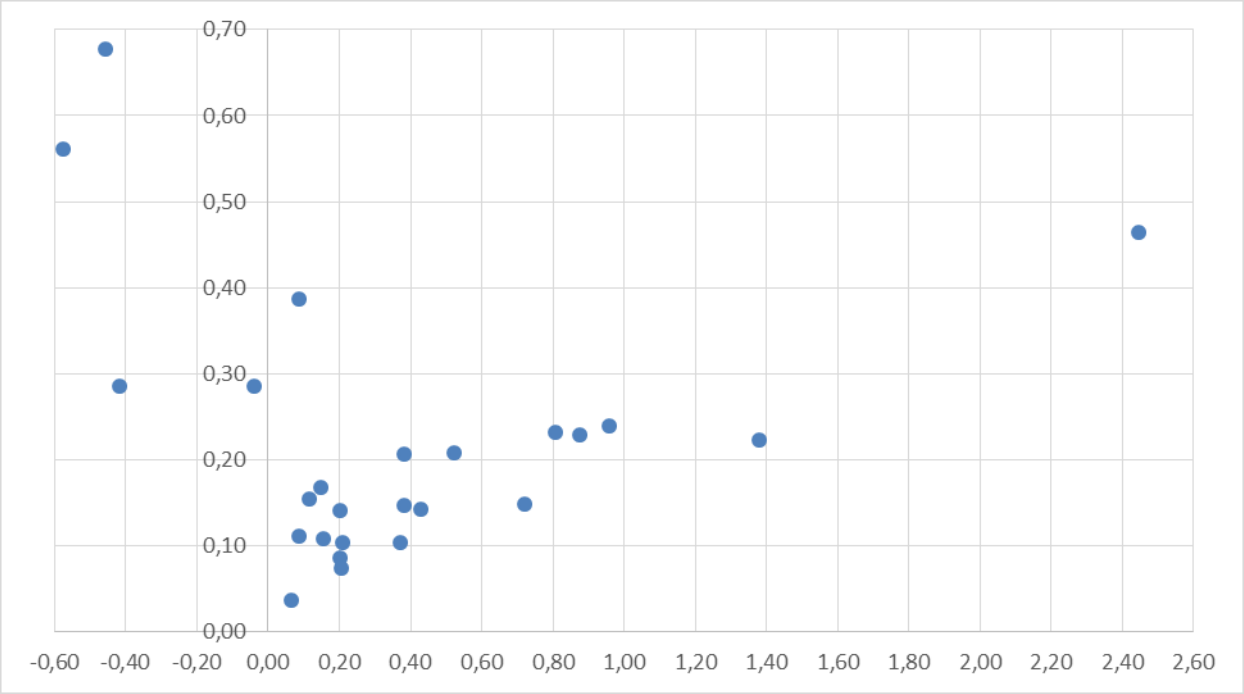
[11] http://www.wiod.org/home.

The analyzed examples showed stagnation of results in the PKD classes (division 10). The prime leader was class 10.51 (Milk processing and cheese making). Probably, the improving labour productivity and a technological innovation process were the causes of the beneficial changes (a growth of value-added) in this case. The presented results should be treated with caution for individual branches. Only full causal analysis of individual branches would allow for the actual assessment of their actual situation.

ANNEX.

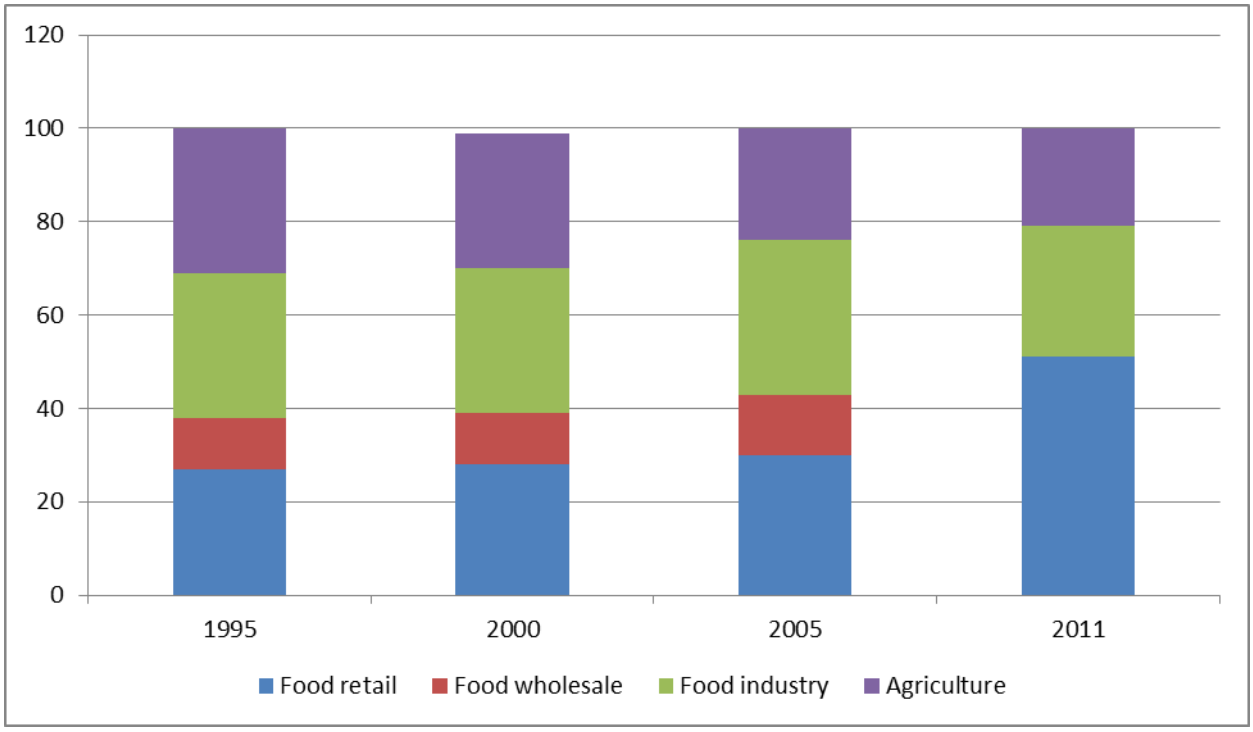
Chart A1: Correlation between the coefficient of variation and the growth rate of the analysed classes in division 10

(ordinate axis – coefficient of variation (V); abscissa axis – growth rate)



Source: Own calculations based on the unpublished CSO data.

Chart A2: Distribution of value-added in the EU food supply chain [%]



Source: http://capreform.eu/farmers-share-of-food-chain-value-added.

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