

# INVESTMENTS AND THE STATUS OF IMPLEMENTATION OF QUALITY MANAGEMENT SYSTEMS IN FOOD INDUSTRY ENTERPRISES IN POLAND

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## Abstract

*The past decade was a period of intense development of the Polish food industry, which was primarily involved with Poland's accession to the European Union. There has been a large investment boom, and right after it a rise in the value of fixed assets of food industry enterprises. In addition, the value of sold production has increased and work productivity has increased. These were common phenomena and covered virtually all sectors of the food industry. The total investment value in the entire food industry in 2001-2014 amounted to approx. PLN 100.0 billion, and Polish food companies have become some of the most modern among the countries of the community. Companies in the food industry, that they can sell their products on the expanded EU market had to meet specific production standards, which was associated with the introduction of quality management systems and the safety of produced food. This process mainly involved obligatory quality management systems.*

## Keywords

*food industry, investments, quality systems*

## Introduction

Investment, and in fact their level, are one of the key factors determining the company development. Thanks to them, the company has the ability to upgrade its fixed assets (machinery, equipment, production lines), improve production efficiency by lowering unit costs, and thus become more competitive on the market.

Survey conducted by Z. Gołaś [Gołaś 2010] showed that progress in labor productivity in the Polish food industry that occurred in the first years of our membership in the European Union, was due to the growth of technical work equipment. While, in a relatively small extent it resulted from the improvement of the efficiency of the total assets, as well as an increase in the capacity to produce added value in relation to the obtaining income. to the revenue generated. Moreover, Z. Gołaś points out that without further investment to increase the effectiveness of the fixed assets and human capital development, progress in productivity in this sector will slow down significantly.

The increase of investment in the food industry in Poland visible over the last decade, resulted in an increase in the number of companies with implemented obligatory quality management systems on average two years after the start of the implementation process

This is due to the fact that the implementation of quality management systems is a complex and the long-term process. The strongest correlation between the increase in the value of investment and the number of companies with implemented obligatory quality management systems was evident in the group of medium and large size enterprises of food industry. At the same time this phenomenon was related mainly to the HACCP system [Morkis 2009].

## 1. Study purpose and methodology

The purpose of the article was to analyse the level and the pace of investment in the food industry (and its individual sectors) in Poland in the last 14 years, i.e. 2001-2014 and evaluate the implementation and application of mandatory and non-mandatory quality management systems and the safety of produced food in the companies of this sector. An assessment of the phenomenon has been carried out on the basis of published and unpublished data of the Central Statistical Office (GUS) and unpublished data of the State Sanitary Inspection and Veterinary Inspection. Relevant indicators have been used to assess changes over time.

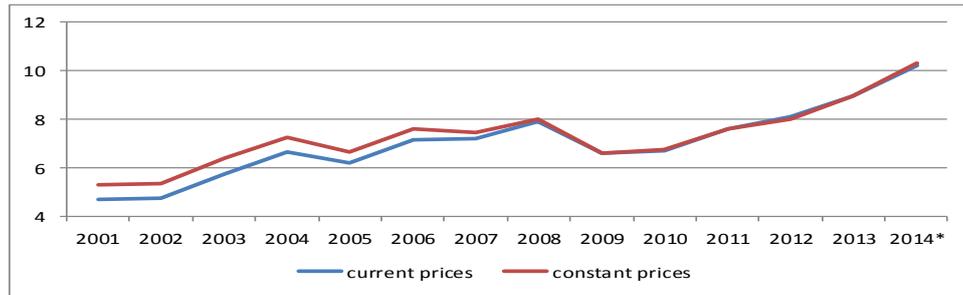
## **2. The level of investment in the food industry**

In the years 2001-2014, investment in food industry companies in Poland had a rising trend. During this period, investment increased twice, from PLN 4.7 to approx. 10.2 billion (at current prices), i.e. it rose at a rate of 6.7% per year, and a bit lower at constant prices, i.e. 5.2% per year. A particularly dynamic investment growth in the food industry took place in the pre-accession period, when it increased by approx. 43%, from PLN 4.7 billion in 2001 to PLN 6.7 billion in 2004 and in the last four years, when it increased from PLN 6.7 billion in 2010 to approx. 10.2 billion in 2014, i.e. by more than a half (Fig. 1).

The years under consideration were not a uniform period in terms of investment priorities in the food industry. The level of investment in enterprises of this sector depended on many factors (external and internal), and investment priorities stemmed from the company's financial capabilities and the things that required the most urgent changes or improvements. In the assessment of the phenomenon, four periods can be distinguished, all significantly different between each other, namely:

- 1) the pre-accession period, i.e. the years 2001-2004 were characterised by a dynamic growth of investment, arising primarily from the need to adapt the processing plants to the EU production standards in terms of health, veterinary and hygienic standards; to this end different systems of production quality and safety were implemented, such as HACCP; it was a necessary condition for companies in the food industry from Poland to sell their products on the extended EU market,
- 2) in the years 2004-2008 a growing trend of investment was maintained, created by increasing the production capacity of processing firms, as Polish companies in the food industry have proved to be competitive on the extended EU market, as well as plants' further adjustment processes to EU standards (the so-called sensitive sectors, i.e. meat, poultry, fish and dairy sectors have received transitional periods),
- 3) the years 2008-2011 have seen a large turbulence on global markets, food and beverage industry companies invested more cautiously and on a smaller scale as a result of the global financial and economic crisis, which erupted in the second half of 2008, and its effects were felt over the subsequent years; in these less-favoured management conditions, processing companies paid increased attention to the improvement of production efficiency, which is one of the factors determining the competitiveness of the sector in the EU market as well as on the markets of third countries,
- 4) the last four years (2011-2014) have again witnessed a dynamic investment growth in response to the global economic recovery (although the effects of the recent global economic crisis continue to be felt in many countries), strengthening the position of the sector on the EU market (globalisation processes), the increase of production marketed, primarily for export, and maintaining and searching for new comparative advantages,

In the current financial perspective of the European Union for the years 2014-2020, investment support in the food industry will be related to innovation.



a – including the production of tobacco products,

\*- estimation,

\*\*- constant prices adjusted with investment goods index,

Source: Own study based on CSO Yearbooks 2002-2014.

**Fig. 1 Investment in the Polish food industry<sup>a</sup> (in PLN billion)**

During the pre-accession period, and as a full-fledged member of the European Union, the companies of the food industry from Poland have been a recipient of public aid co-financed from EU funds. In the period 2002-2013, the total value of EU aid programmes in support of investment in this sector of the economy amounted to approx. PLN 6.9 billion, which represented 8.2% of the total investment. These were not financial measures deciding about the total level of investment throughout the decade, but in individual cases (enterprises) they could have been decisive.

The value of investment subsidies from aid programmes was as follows: SAPARD – PLN 1.5 billion, SOP Agriculture (Sectoral Operational Programme Agriculture – PLN 1.7 billion, RDP 2007-2013 (Rural Development Programme) approx. PLN 3.7 billion. More importantly, as stressed by M. Wigier, the share of these measures in each programme has gradually diminished from approx. 34% to little above 5%. This indicates a growing (in the assessment of the agricultural policy creators) competitiveness of the food industry and increasingly smaller need for supporting it, with significant needs to fund other priorities of the agricultural policy associated with the restructuring of the agricultural sector, multi-functional development rural areas or countering environmental problems [Wigier 2011].

In the years 2001-2014, the biggest investments have been made by the meat industry (PLN 12.2 billion), which represented 14.1% of investments in the food industry<sup>3</sup>, as well as the dairy (approx. PLN 9.8 billion), brewing (approx. PLN 8.1 billion) and tobacco and sweets industries – each by approx. PLN 6.0 billion (Table 1).

**Table 1 The level of investment in food industry enterprises lodging financial statements (current prices)**

Industry sectors	in PLN million						Total 2001-2014
	2001-2003 <sup>a</sup>	2004	2005-2007 <sup>a</sup>	2008	2009-2011 <sup>a</sup>	2012-2014 <sup>a</sup>	

<sup>3</sup> Companies of the food industry employing 10 and more persons in their permanent personell, which submitted F-01/I-01 financial statements. Approx. 75% of those employed in the entire food industry work in these companies, and their share of sold production of the food industry exceeds 90%.

<b>Food industry (including tobacco), including:</b>	<b>4 003</b>	<b>6 688</b>	<b>6 434</b>	<b>7 324</b>	<b>6 103</b>	<b>7 473</b>	<b>86 051</b>
Meat	572	1 551	1 042	970	728	876	12 175
Dairy	455	925	846	748	711	688	9 773
Brewing	643	614	608	784	353	633	8 109
Tobacco	249	190	378	559	524	608	6 026
Sweets	176	296	412	665	504	492	5 713
Food concentrates	180	195	269	401	517	616	5 342
Fruit and vegetables	144	549	402	400	339	327	4 585
Non-alcoholic beverages	278	350	286	416	314	311	4 333
Baking	171	183	248	399	312	510	4 305
Animal feed	178	208	278	244	256	493	4 067
Sugar	135	251	328	307	268	238	3 465
Poultry	93	259	222	251	219	224	2 784
Fish	72	164	189	269	204	288	2 692
Fruit juice	134	171	230	246	144	236	2 649
Oilseed	68	77	83	117	94	247	1 670
Coffee and tea processing	55	79	58	68	151	116	1 287
Spirits	47	86	109	102	71	102	1 175

a – averagely during a year,

Source: Own compilation on the basis of F-01 financial statements submitted by food industry companies (CSO unpublished data).

The increasing level of investment in most sectors of the food industry - on the one hand provides evidence of relatively good financial health of individual industries (investing companies), on the other hand shows that we are reducing the distance that separates us from the most developed countries of the EU-15 in terms of technology and production techniques, and even are ahead of many European countries.

### 3. Fixed assets of food industry companies and its productivity

In the wake of the growing investment effort in enterprises of the food industry, its assets have increased. Its value in medium-sized and large companies <sup>4</sup> in this sector (including tobacco) increased by 78.2%, from PLN 37.6 billion in 2002 to PLN 67.0 billion in 2013 (real growth by 58.4%)<sup>5</sup>.

Productivity is a measure allowing to determine the effectiveness of the management of company assets. The higher the productivity ratio, the better it says about the management of the company [Mroczek 2011].

$$\text{Productivity ratio of fixed assets} = \frac{\text{value of sold production}}{\text{fixed assets}}$$

<sup>4</sup> employing, respectively: more than 49 people and 250 crew members and more

<sup>5</sup> in prices of 2012 the value of fixed assets adjusted by the capital goods index,

In the years 2011-2013, the highest gross productivity ratio of fixed assets among analysed sectors of the food industry has been reached in the poultry, meat and animal feed sectors, in which 1 PLN of company asset value accounted for more than 3 PLN of the value of sold production. High productivity ratios have also been reported in the fish, dairy (more than 2 PLN) and fruit-vegetable and cereal sectors (close to 2 PLN), whereas the lowest in the sugar and tobacco sectors (from 0.34 to 0.70) (Table 2). A significant improvement in productivity of company assets took place in the fish and meat sector (by over 20%). This was due to annual increment of the value of production marketed faster by 12.5-13.8 p.p. than fixed assets (Fig. 2). Somewhat slower asset productivity growth (from 8 p.p. to 14 p.p.) occurred in the poultry, non-alcoholic beverages, dairy and cereals sector.

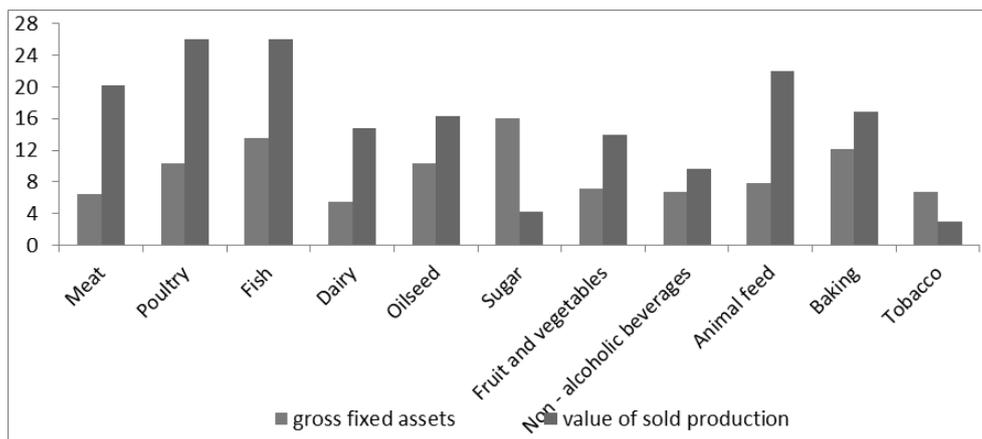
**Table 2 Gross productivity of fixed assets<sup>a</sup> in medium-sized and large enterprises of the food industry (in PLN/PLN)**

Industry sector	2002-2004 <sup>b,c</sup>	2011-2013 <sup>a,d</sup>	Dynamics (percent) 2011-13/2002-04
<b>Food industry (including tobacco), including:</b>	1.92	2.23	116.1
Meat	2.75	3.39	123.3
Poultry	3.48	3.76	108.0
Fish	2.25	2.85	126.7
Fruit and vegetables	2.37	1.82	76.8
Oilseed	2.37	1.71	72.2
Dairy	2.11	2.32	110.0
Cereals	1.62	1.85	114.2
Baking	1.85	1.50	81.1
Sugar	1.06	0.34	32.1
Sweets	1.94	1.47	75.8
Processing of coffee/tea	2.05	1.52	74.1
Animal feed	3.57	3.45	96.6
Non-alcoholic beverages	1.20	1.30	108.3
Tobacco	1.24	0.70	56.5

a - i.e. without taking into account consumption, b – on average a year, c - according to PKD 2004 classification, d - according to PKD 2007 classification

Source: Own compilation based on unpublished CSO data.

The productivity of fixed assets in various branches of the food industry is significantly varied. The gross increment rate of fixed assets in the sugar and tobacco sectors was higher by 3.7-11.7 p.p. than the increase of the value of production marketed, hence the drop in productivity rate in this sectors, from 43.5% to 67.9% (Table 2, Fig. 2).



a – in medium-sized and large enterprises, b – averages for the years 2002-2004 and 2011-2013

Source: Own compilation based on unpublished CSO data.

**Fig. 2 The increase of gross fixed assets and the value of sold production at current prices in selected sectors of the food industry<sup>a</sup> in the years 2002-2013<sup>b</sup> (percentage per annum)**

#### 4. Quality management systems in enterprises of the food industry in Poland

Polish accession to the European Union had a significant impact on the increase in the level of implementation of quality management systems in the enterprises of the food industry. The growing interest of producers in food quality issues stemmed first from the growing awareness, expectations and needs of consumers, secondly it was dictated by the increase in legal requirements and an increasingly larger responsibility of manufacturers for manufactured products. Quality and safety of food offered by manufacturers have become one of the basic factors determining the competitiveness of the enterprises of food industry both on the European and global levels.

In Poland, as in the other countries of the European Union, there are certain legal provisions imposing the obligation to implement and use food quality and safety management systems by producers. Obligatory quality management systems include<sup>6</sup>:

- Good Hygienic Practice (GHP) – specifying actions that must be taken and sanitary conditions which must be satisfied and controlled at all stages of production or marketing in order to ensure health security of food.
- Good Manufacturing Practice (GPM) – designating the measures and conditions that must be met in order for the production of food (including used materials) to provide proper health security of food, in accordance with its intended purpose.
- Hazard Analysis and Critical Control Point (HACCP) – which regulates conduct aiming at ensuring food safety through the identification and estimation of the scale of threats in terms of food quality and risk of these hazards at all stages of food production and marketing cycle.

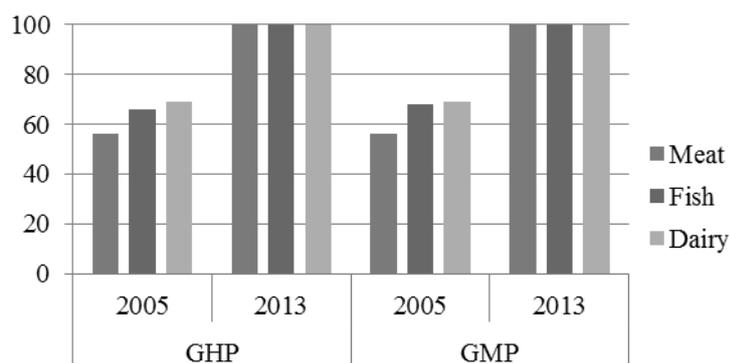
Supervision over the compliance with the obligation to implement and enforce mandatory food quality assurance systems is exercised in Poland by two state institutions: Veterinary

<sup>6</sup> In Poland, the obligation to implement GHP and GMP systems in companies manufacturing food products is in force since 20 July 2000, and since 1 May 2004 it also includes the HACCP system [Act of 27 September 2006 on food safety and security, OJ of 2001, no 31, item 265].

Inspection controlling companies that manufacture products of animal origin and the State Sanitary Inspection supervising companies that process products of non-animal origin.

Since Polish accession to the EU, the number of companies that have implemented and apply mandatory quality management systems is steadily increasing. The process was the fastest in large and medium-sized companies, while relatively slower and late in micro enterprises. The group of food companies that have not undertaken any steps aimed at implementing mandatory quality management systems included the smallest entities of the food industry (small and micro companies) with a local market reach, belonging to the group conducting "marginal, limited and local" operation [Morkis 2012].

The study showed wide variation in the level of implementation and application of mandatory quality management systems both between the groups of companies processing products of animal origin and enterprises offering products of non-animal origin, as well as between different sectors of the food industry. As is clear from unpublished data of the Veterinary Inspection, in 2013 all companies processing products of animal origin have had implemented and used GHP and GMP systems (Fig. 3).

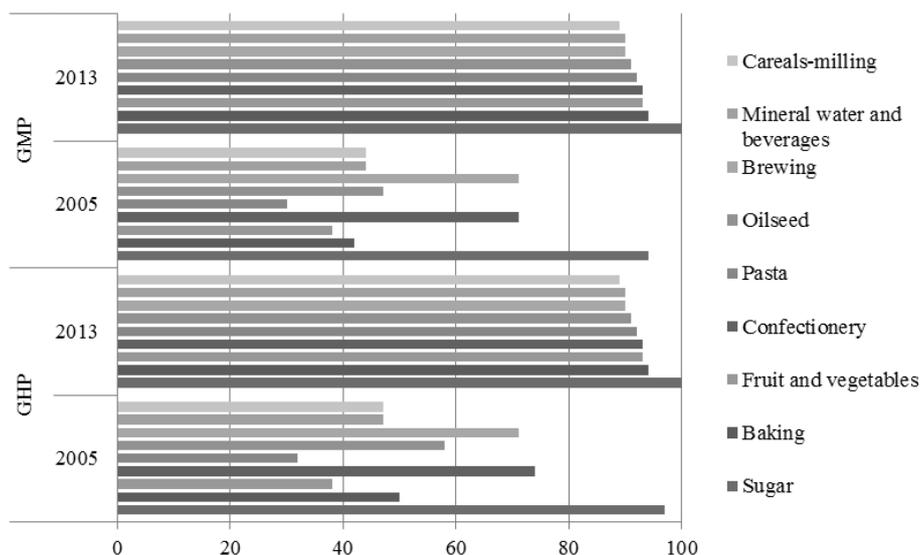


Source: Own compilation based on unpublished data of the State Sanitary Inspection and Veterinary Inspection.

**Fig. 3 The state of implementation of GHP and GMP systems in companies of the food industry processing food of animal origin**

In comparison, in 2005 this percentage was between 56% in the meat sector up to almost 70% in the dairy sector. It should be added that some animal processing companies have undertaken a number of investment measures aiming at adjusting to EU sanitary and veterinary requirements already in the '90s.

The situation in terms of the application of obligatory quality management systems in companies producing food of non-animal origin was a little less positive. In 2013, in this group of companies the average GHP and GMP implementation state amounted to almost 90%, in comparison to 57% in 2005. Of all non-animal production sectors, both quality management systems have been fully implemented only by companies of the sugar sector. A high level of implementation and maintenance of GHP and GMP has been noted in the bakery, fruit and vegetable and confectionery sectors, whereas the lowest in companies of the cereal-milling sector and other food products (Fig. 4). In the period under consideration, the GMP and GHP implementation process was the fastest in the pasta and fruit-vegetable sectors, whereas the value of this indicator grew the slowest in brewing and sugar companies, i.e. enterprises that have largely introduced both quality management systems even before Polish accession to the EU.



Source: Own compilation based on unpublished data of the State Sanitary Inspection and Veterinary Inspection.

**Fig. 4 Status of implementation of GHP and GMP systems in enterprises of the food industry processing food of non-animal origin**

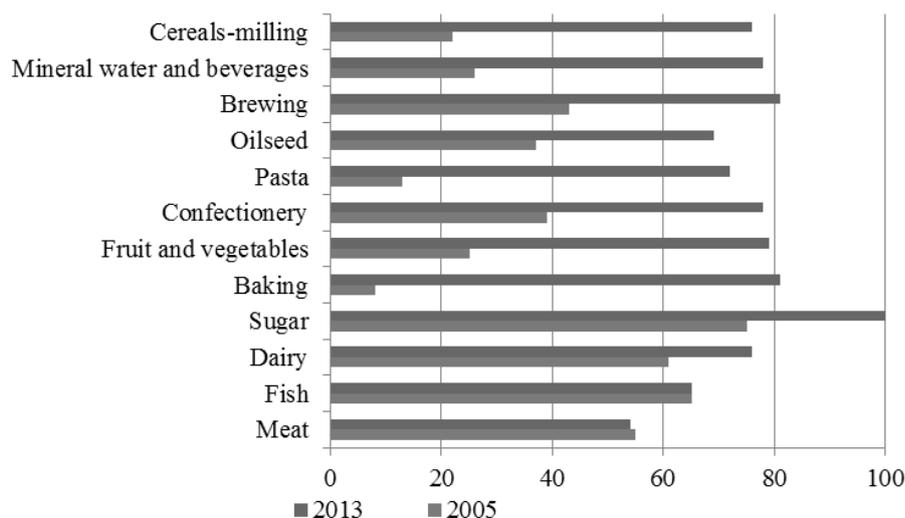
In the case of the HACCP system, unlike the case with GHP and GMP systems, companies processing products of non-animal origin had a larger percentage of implementations than those processing products of animal origin. In 2013, the level of implementation of this system in the first group of companies amounted to 75% on average, whereas in the second group it was lower by 10 p.p. on average. Of all sectors of the food industry, the largest implementation and maintenance level of HACCP could be found in companies of the sugar sector. A high percentage of implementations could also be found in companies of the bakery, brewing and fruit-vegetable sectors. The values of this indicator have been lower by far in the meat and fish sector companies (Fig. 5).

It is worrying that while all industries related to the processing of products of non-animal origin during the analysed year had the HACCP system implementation ratio systematically increasing (the fastest in the bakery and pasta sector), in the group of companies manufacturing product of animal origin, the level of HACCP has decreased or remained at a similar level. This adverse effect was firstly caused by the emergence of new companies on the market (mainly micro-enterprises), as well as the entry into force of Ordinances of the Minister of Agriculture and Rural Development (of 2006 and 2010), concerning specific conditions for the recognition of marginal, local and limited operation, which relieved some companies from the obligation to implement the HACCP system [Morkis 2014]. As a result of these changes, over the years 2009-2013 the percentage of companies having the HACCP system implemented decreased from 93% to 54% in the meat industry and, respectively, from 90% to 76% in the dairy industry.

The strive towards continuous improvement in management effectiveness and efficiency causes that the food industry companies are more willing to invest also in the implementation of non-obligatory quality management systems. The use of these systems is voluntary.

Companies implement them of their own volition or because of the demands made by domestic and foreign recipients (mainly retail). Non-obligatory quality management systems implemented most often by the Polish food industry companies include most of all: ISO 9000-series (ISO 9001) quality management system, ISO 22000 quality management system, integrated quality management systems (ZSZJ), quality assurance control points, as well as own company quality management systems, as well as British Retail Consortium (BRC) and International Food Standard (IFS) audit and certification standards.

The possession of certificates of the implementation of non-compulsory quality management systems is associated with many benefits, including: raising the quality of offered food, a greater guarantee to meet the needs of customers, changing the organisational culture of the company, improving the image and increasing the reliability of the company, as well as increasing the level of competitiveness of the company and increasing the opportunities to gain new customers [Morkis 2014].



Source: Own compilation based on unpublished data of the State Sanitary Inspection and Veterinary Inspection.

**Fig. 5 HACCP implementation status in enterprises of the food industry**

The time needed to implement voluntary systems, their considerable financial costs and numerous barriers cause that the number of food industry enterprises applying these quality management systems is relatively small, although steadily growing. The data provided by the Polish Centre for Testing and Certification and the Polish Register of Shipping indicates that over the years not only the number, but also the structure of non-compulsory quality management systems used in companies has changed. In 2006, ISO 9001 certificates (94 companies) and ISO 22000 (8 companies) had the greatest interest among entrepreneurs. In 2013, only 48 food companies possessed valid certificates for the ISO 9001 system. However, the number of companies that have implemented and certified the ISO 22000 system has significantly increased (Table 3).

**Table 3 The number of food industry companies possessing certificates of non-obligatory quality management systems**

Industry sector	ISO 22000		ISO 9001		BRC	
	2006	2013	2006	2013	2006	2013
<b>Food industry in total (including:)</b>	<b>8</b>	<b>67</b>	<b>94</b>	<b>48</b>	<b>11</b>	<b>464</b>
Meat	1	6	17	5	1	132
Fish	0	1	2	1	1	39
Dairy	1	7	14	5	0	43
Fruit and vegetables	1	13	14	11	2	112
Cereals-milling	2	4	8	3	0	10
Baking	0	9	7	7	0	50
Pasta	0	2	4	2	0	2
Confectionery	1	5	10	3	1	32
Brewing	0	1	0	0	0	2
Mineral water and beverages	0	1	3	0	1	8
Other	3	16	11	8	1	12

Source: Own study based on the data of certification bodies.

Aside from non-mandatory quality management systems compliant with ISO standards, food companies are increasingly willing to implement and use standards developed and required by foreign retail chains, mainly the BRC (*British Retail Consortium*) and IFS (International Food Standard) systems. Their primary goal is to ensure the safety of food available in a given retail chain through strict evaluation of the degree of safety and compliance with the applicable legal standards. In 2006-2013, the number of companies holding valid BRC certificates has increased from 11 to almost 470. This group was dominated by companies from the fruit, vegetable and meat sectors. Companies of the bakery, dairy and fish sectors took further spots.

### Conclusions

1. In the years 2001-2014, investment in the food industry in Poland increased two times, from 4.7 to approx. PLN 10.2 billion (at current prices), i.e. growing at a rate of 6.7% annually and slightly slower in constant prices – by 5.2% per year. A particularly robust growth of investment in the food industry occurred in the pre-accession period, when it increased by approx. 43%, from PLN 4.7 billion in 2001 to 6.7 billion in 2004, and in the last four years, when it increased from PLN 6.7 billion in 2010 to approx. 10.2 billion in 2014, i.e. by more than a half. Throughout the analysed period, the sectors with the largest capital expenditures (based on F-01 financial statements) included: meat (14.1%), dairy (11.4%) and beer (9.4%) and tobacco (7.0 %) sectors.
2. The highest productivity rate of fixed assets could be found in the poultry, meat and animal feed sectors, where PLN 1 of assets accounted for more than PLN 3 of production sold, whereas the sugar and tobacco sector reached the lowest productivity. In the years 2002-2013, the highest productivity growth (by more than 20%) was reached by the meat and fish sector, whereas its largest decline occurred in the sugar and tobacco industry.
3. In the group of companies processing food of animal origin implementation processes of obligatory quality management systems in the vast majority have been completed. Whereas in the group of companies producing non-animal origin food the level of implementation of those systems remains significantly lower. Although the average level of implementation of GHP is 88% and GMP is 85% that in the case of HACCP

system average value of this indicator is only 43%. This means that the remaining gap of companies are still at the stage of implementation or not yet begun the implementation process;

4. Non-obligatory quality management systems were introduced in relatively small number of food companies (less than 5%), mainly by the leaders of particular sectors;
5. The study shows that the amount of investment necessary for the implementation of quality management systems was primarily driven by degree of equipment of a company, its hygienic and sanitary conditions, as well as the order in which the company implemented different systems. In most companies, the implementation of mandatory quality management systems mainly related to the modernisation of plants, including in particular the reconstruction of halls, sanitary facilities, the construction of new production lines and technology updates. In the case of the implementation of non-compulsory quality management systems, only a part of the companies of the food sector incurred investment expenditure. In a large group of plants, the needed renovations have been carried out earlier, i.e. during the implementation of GHP, GMP and HACCP systems;
6. Today, the use of obligatory quality management system has become so common that it is no longer an essential element of competition on the domestic or foreign markets. It is rather a necessary condition that allows companies to operate on the food market. Currently, maintaining the company's competitive position, increase access to foreign markets and attract new buyers will increasingly depend on possession by food producers valid certificates of non-obligatory quality management systems.

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