## **ZESZYTY NAUKOWE**

Szkoły Głównej Gospodarstwa Wiejskiego w Warszawie

> SCIENTIFIC JOURNALS Warsaw University of Life Sciences – SGGW

# POLITYKI EUROPEJSKIE, FINANSE i MARKETING NR 25 (74) 2021

EUROPEAN POLICIES, FINANCE AND MARKETING NO 25 (74) 2021

> Wydawnictwo SGGW Warszawa 2021

Warsaw University of Life Sciences – SGGW Press Warsaw 2021

#### **RADA PROGRAMOWA**

Bogdan Klepacki (SGGW), prof. dr hab. – Szkoła Główna Gospodarstwa Wiejskiego w Warszawie, przewodniczący, Polska Mieczysław Adamowicz, prof. dr hab. – Państwowa Szkoła Wyższa im. Papieża Jana Pawła II w Białej Podlaskiej, wiceprzewodniczący, Polska Marian Podstawka, prof. dr hab. – Szkoła Główna Gospodarstwa Wiejskiego w Warszawie, Polska Janusz Żmija, prof. dr hab. dr h.c. – Uniwersytet Rolniczy w Krakowie, Polska Andrzej P. Wiatrak, prof. dr hab. – Uniwersytet Warszawski, Polska Lubica Bartova, prof. – Słowacki Uniwersytet Rolniczy w Nitrze, Słowacja Julian Briz, prof. – Uniwersytet Politechniczny w Madrycie, Hiszpania Alina Hyz, prof. – Uniwersytet Attyki Zachodniej, Francęsco Sotte, prof. – Uniwersytet Politechniczny w Marche Ancona, Włochy Harun Uçak, prof. – Uniwersytet Alanya Alaaddin Keykubat, Turcja Sandra Krtalic, Full Professor – Uniwersytet Juraj Dobrila w Puli, Chorwacja

#### KOMITET REDAKCYJNY Marian Podstawka, prof. dr hab. – Redaktor Naczelny Agnieszka Parlińska, dr inż. – Zastępca Redaktora Prowadzącego

Janina Sawicka, prof. dr hab. Agnieszka Biernat-Jarka, dr Marzena Lemanowicz, dr – redaktor tematyczny (marketing) Halina Powęska, dr hab. Eugeniusz Pudełkiewicz, prof. SGGW dr hab. Aleksandra Wicka, dr inż. – redaktor tematyczny (ubezpieczenia) Marzena Ganc, dr – redaktor tematyczny (finanse) Agata Cienkusz, mgr – redaktor językowy, język polski Jacqueline Lescott, mgr (Tranchant Consulting Group LLC – Leszczynska) – redaktor językowy, język angielski Wiesław Szczesny – prof. SGGW dr hab., redaktor statystyczny

Tomasz Jaroszewski, mgr - sekretarz redakcji

PROJEKT OKŁADKI – Tomasz Tabor REDAKCJA TECHNICZNA – Krystyna Piotrowska

#### ADRES KORESPONDENCYJNY

Szkoła Głowna Gospodarstwa Wiejskiego w Warszawie Instytut Ekonomii i Finansów ul. Nowoursynowska 166, 02-787 Warszawa tel./fax: 22 593 41 94; e-mail: ojs\_ieif-pefim@sggw.edu.pl

ISSN 2081-3430 eISSN 2544-0640

Wydawnictwo SGGW ul. Nowoursynowska 166, 02-787 Warszawa tel. (22) 593 55 20 (-22, -25 – sprzedaż) e-mail: wydawnictwo@sggw.edu.pl, www.wydawnictwosggw.pl

© Copyright by Wydawnictwo SGGW

Druk: Libra-Print, al. Legionów 114B, 18-400 Łomża

## SPIS TREŚCI

Paulina Filip         CHANGES IN SUBSTITUTION OF BANK LOANS AND EU SUBSIDIES IN         POLISH BUSINESSES         5	
<i>Małgorzata Garstka</i> LINKS BETWEEN FINANCIAL STATEMENTS AND MANAGEMENT COMMENTARY	
<i>Monika Juchniewicz, Łukasz Podstawka</i> DEVELOPMENT OPPORTUNITIES OF POLISH FARMS	
<i>Małgorzata Leszczyńska, Beata Kasprzyk</i> CHANGES IN THE INCOMES AND EXPENDITURES OF HOUSEHOLDS IN POLAND AND THEIR REGIONAL RELATIONS	
<i>Edyta Małecka-Ziembińska, Katarzyna Łukaszewska</i> A SWOT ANALYSIS OF THE INNOVATION BOX AS A TAX INSTRUMENT TO SUPPORT INNOVATION BY ENTERPRISES IN POLAND	
<i>Aleksandra Pisarska, Jarosław Karpacz</i> RESULTS OF FUNCTIONING OF PUBLIC UNIVERSITIES: ESTABLISHING A SET OF RATIOS PROVIDING RELIABLE MANAGEMENT INFORMATION BASED ON DATA DERIVED FROM AN ENTITY'S REPORTS	
<i>Dagmara Stangierska, Dawid Olewnicki, Ewa Sabała</i> FINANCIAL-ECONOMIC ANALYSIS OF FRUIT AND VEGETABLE PRODUCER GROUPS IN POLAND, AND CONDITIONS FOR THE FUNCTIONING OF PRODUCER GROUPS	
<i>Mirosław Wasilewski Marzena Ganc,</i> METHODOLOGY OF COST RECORDING AND ACCOUNTING IN DAIRY COOPERATIVES	

\* \*\* \* Pelityki Europejskie, \* Finanse i Marketing \* \* \* 25 (74) 2021

DOI 10.22630/PEFIM.2021.25.74.1

Received: 26.02.2020 Accepted: 13.01.2021

Paulina Filip University of Rzeszow

### CHANGES IN SUBSTITUTION OF BANK LOANS AND EU SUBSIDIES IN POLISH BUSINESSES

The aim of the article was to determine the degree of bank loan replacement by Polish businesses after profiting from EU help. The identification of similarities and differences was made among groups of enterprises that benefit or not from the state aid in the EU's successive financial perspectives, over the years 2007-2017. Changes in companies' assets and performance, and variables referring to the financial effectiveness, were analyzed. The logit model was used in order to define characteristics that have influence on the significance of determinants of financing with public subsidies. The cross-sectional nature of data allows for identification of a positive statistical relationship between subsidies and bank loans in medium-sized enterprises. In the course of the study it was established that companies receiving the state aid reduced their share of bank credits on balance sheet totals, as well as indebtedness in total. Over a period of time, the subsidizing has increased the importance and scope of using bank loans. State aid resources were used as a complementary source of capital for enterprises.

Key words: enterprise, bank loan, public subsidies, substitutability, complementarity JEL Code: G02, M 21.

#### Introduction

The enterprises functioning within the European Union have at their disposal various forms of external financing. The demand on a specific source of capital depends on many factors, such as a company's development phase, investment needs, type of investment project, and chosen development strategy<sup>1</sup>. Also the ways of acquiring each form of financing and their availability are diverse<sup>2</sup>. The EU's financial perspectives, especially from years 2007-2013 and 2014-2020, created great opportunities to acquire co-financing for the activities of Polish enterprises. EU funds distributed on the union, national and regional levels are becoming more available. Subsidies are the main form of support while loans, sureties and guaranties are chosen to a lesser extent. Subsidies are more attractive financial alternatives for companies, especially in relation to bank loans, which are very popular in our financial system<sup>3</sup>. The attractiveness of public subsidies is generally due to the large amounts of capital injection, the opportunity to support innovative business ideas and investment tasks, as well as the lack of fees for using them. Assuming the use of subsidies in accordance with the assumptions of a project and

<sup>&</sup>lt;sup>1</sup> K. Janasz, W. Janasz : Zarzadzanie kapitałem w przedsiębiorstwie. Difin, Warszawa 2007, p.43.

<sup>&</sup>lt;sup>2</sup> J. Kubiak H: Hierarchia źródeł krótkoterminowego finansowania przedsiębiorstwa. Wydawnictwo Akademii Ekonomicznej w Poznaniu, Poznań 2005, p.35.

<sup>&</sup>lt;sup>3</sup> M. Sołtysiak, P. Filip: Empirical analysis of the availability and changes in the use of bank loans by enterprises in selected countries of European Union. CEFE Technical University, Kosice 2018, p.69.

an agreement concluded with the entity which awarded the grant, subsidies become a non-returnable source of funding, which is a huge advantage in the area of financing. An important advantage of the EU subsidies is that they support investment activities for which raising capital, e.g. through a bank loan, would be significantly more difficult. On the other hand, in order to obtain public subsidies, certain requirements must be met, such as having the right qualifications and skills to submit applications, making own contributions, and taking the risk of losing time, strength and resources in the application process, often at the expense of ongoing operations and units' development. The capital structure of the companies may vary; however, the type of funding sources does not matter for investment decisions<sup>4</sup>.

#### Substitutability and complementarity of forms of funding

Changes in the attitudes and behavior of entrepreneurs towards forms of financing are subject to constant fluctuations, taking into account their openness, readiness to change, the effect of imitation, the need, willingness to adapt to the market and other factors. A closer analysis of these attitudes shows that changes in one area of the financial market (product), e.g. conditions for using bank loans, can cause changes in the approach to other financial products<sup>5</sup>. Bank loans and EU subsidies are currently popular forms of external financing, which may have a volatile contribution in the financing structure and funding of the needs reported by enterprises<sup>6</sup>. Changes may have a different nature of substitution, complementarity, and omission<sup>7</sup>. In economics, substitution products are goods and services that, thanks to similar features, functions or properties are replaced by each other in satisfying a specific need. Substitution goods compete with a given good and can replace it.<sup>8</sup> In turn, complementary relationships are relationships based on mutual complementarity of products/services used to achieve the same goals<sup>9</sup>. Complementarity and substitutability may also occur between various forms of financing<sup>10</sup>.

Studies of a chosen trend of research focus on determining the role of each form of funding, the cost and availability of external financing, and development strategies of companies through their diversification<sup>11</sup>. Although there are differences between

<sup>&</sup>lt;sup>4</sup> F. Modigliani, M.H. Miller : The Cost of capital, corporate finance and the theory of investment. American Economic Review 48/1958, p. 265, D.J, Denis,V. Mihov T: The choice among bank debt, non-bank private debt, and public debt: Evidence from new corporate borrowings. Journal of Financial Economics, 70(1)/2013, p. 28.

p. 28.
 <sup>5</sup> L.Jinhyuk, P.Jeaok: Pricing of complementary goods as implicit financial arrangement. Journal of Economics 55/2014, p.131.

<sup>&</sup>lt;sup>6</sup>A. Białek-Jaworska, A. Dzik-Walczak, N. Nehrebecka: Determinanty finansowania działalności przedsiębiorstw kredytem bankowym: Metaanaliza. Bank i Kredyt 46(3), 2015, p. 253-298.

<sup>&</sup>lt;sup>7</sup>J. Marzec, M. Pawłowska: Substytucja między kredytem kupieckim i bankowym w polskich przedsiębiorstwach– wyniki empiryczne na podstawie danych panelowych. Bank i Kredyt 43 (6), 2012, p. 31.
<sup>8</sup>Z. Dach: Mikroekonomia. Uniwersytet Ekonomiczny w Krakowie, Kraków 2012, p. 101.

<sup>&</sup>lt;sup>9</sup>A.N. Berger, A .Cowan, W.S. Frame: The surprising use of credit scoring in small business lending by community banks and the attendant effects on credit availability, risk, and profitability. Journal of Financial Services Research 39(1–2) /2011, p. 1–17.

<sup>&</sup>lt;sup>10</sup> M. Lett : Structural models of complementary choices. Springer Science Business, New York 2014, p.210.

<sup>&</sup>lt;sup>11</sup> Y. Altunbas, D.Marques, B. Zhussupova : Capital market frictions and bank lending in the EU. In: Frontiers of banks in a global economy. Palgrave Macmillan, Studies in Banking and Financial Institutions, London 2010, p.186.

subsidies and a bank loan, their economic interactions can be complex in business practice. The nature of the influence of grant and loan instruments can be considered in relation to the institution providing capital, i.e. a public institution (EU, government) and a private institution (credit institution, bank). The National Bank of Poland (NBP) analyses indicate that the sector of non-credit financial institutions does not create significant threats to commercial banks, as it is not a significant source of financing the economy in Poland.<sup>12</sup> However, in crisis situations there may be restrictions in supply on the credit market resulting in a reduction in lending, mainly for smaller companies and market shortages<sup>13</sup>.

There is evidence indicating the importance of state programs in the development of entrepreneurship in the economies of Eastern Europe and Central Asia<sup>14</sup>. Evaluations of the influence of public subsidies in developed economies focus on their role in strengthening research and development activity.<sup>15</sup> Other studies indicate that the inclusion of public subsidies increases the scope for launching start-ups<sup>16</sup>. Since public interventions have become a common practice aimed at supporting the development of individual entrepreneurships, it is necessary to check whether public subsidies have measurable effects and additional effects, or just replace paid and repayable financing. Numerous analyses modeling the interactions between public and private instruments financing a company's development show that higher costs of external financing increase the optimal subsidy rate with an intensive interaction<sup>17</sup>. Some emphasize that the intensity of state aid (contribution of the financial value of the project), and not the absolute amount, significantly affects the development of companies and their potential<sup>18</sup>. In addition, emphasis is placed on the interaction between public subsidies and other forms, and the financial constraints of companies. Public funds combined with national institutional financing can help stimulate innovation in enterprises<sup>19</sup>. While reviewing the literature and previous studies, the following thesis was put forward that public intervention of decisionmakers, focused on the policy of supporting enterprises, can help accelerate the development of these enterprises. Research was conducted to examine this thesis.

The aim of the study was to analyze and evaluate the use of non-returnable EU public aid in the financing of Polish enterprises over the years 2007-2017, in the context of identifying whether this was a change indicating the substitutability of application, or complementarity with bank loans. It was important to determine whether the state of

<sup>&</sup>lt;sup>12</sup> NBP. Raport o stabilności systemu finansowego, Departament Stabilności Finansowej, Warszawa, 2018.

<sup>&</sup>lt;sup>13</sup> C. Masiak ,A.Moritz, F.Lang : European SME financing: an empirical taxonomy. In: Moritz A., Block J., Golla S., Werner A. (eds) Contemporary developments in entrepreneurial finance. FGF Studies in Small Business and Entrepreneurship, Springer, Berlin 2019, p. 175.

<sup>&</sup>lt;sup>14</sup> He Y, Li B: Government financial subsidies in the influence of public housing under the PPP Financing Model. In: Wang J., Ding Z., Zou L., Zuo J. (eds) Proceedings of the 17th International Symposium on Advancement of Construction Management and Real Estate. Springer, Berlin -Heidelberg 2014, p. 295.

<sup>&</sup>lt;sup>15</sup> S. Mateut: Subsidies, financial constraints and firm innovative activities in emerging economies. Small Business Economics. Volume 50, Issue 1/2018, p. 131–162.

<sup>&</sup>lt;sup>16</sup> A.Kałowski, J.Wysocki : Start-up a uwarunkowania sukcesu, Oficyna Wyd. SGH, Warszawa 2017, p. 43.

<sup>&</sup>lt;sup>17</sup> L. Becchetti, A. Castelli : Investment—cash flow sensitivities, credit rationing and financing constraints in small and medium-sized firms. Small Business Economics 35/2010, p. 477.

<sup>&</sup>lt;sup>18</sup> Raport o pomocy publicznej w Polsce udzielonej przedsiębiorcom w 2017roku. Departament Monitorowania Pomocy Publicznej UOKIK, Warszawa 2018, p. 23.

<sup>&</sup>lt;sup>19</sup> R. Cole: Bank credit, trade credit or no credit: evidence from the surveys of small business finances. MPRA Paper, 24689/2010, http://mpra.ub.uni-muenchen.de/24689.

change could be determined and the nature of the relationships and interactions of these forms of funding could be predicted based on the characteristics of the chosen sample under study and the scope of the study<sup>20</sup>. The analysis was based on financial data obtained from the Info-Credit database for Polish companies active on the market since 2007. The reporting years 2007-2017 were taken as a period of analysis. The sample was selected using the targeted method while maintaining the representativeness of the Polish economy, determined on the basis of the structure of non-financial entities of the Central Statistical Office of Poland (GUS) in terms of size, location for macro regions and type of activity existing in the initial year of the undertaken research. After the elimination of incomplete financial data from the annual separate reports, the study covered 3435 enterprises.

#### Forms of external financing - results

At the stage of identifying the research problem, an important initial goal was to answer the question of which companies use financing methods and what is the scope of that use. By using information about the forms of capital obtained from outside, it was possible to determine decision preferences in the area of foreign capital allocation, assess the popularity of forms of funding, and define to what extent companies benefit from the support of EU funds. The changes may indicate some trends in the business enterprise sector.

			Research interval						
Number of ente	rprises	2007-2009		2010-2013		2014	-2017	2017/2007 (%)	
		N	%	N	%	Ν	%	()	
Acquired projects with EU support	0	3089	89,4	2710	78,4	2900	84,4	-5,0	
	1-2	351	10,1	660	19,1	432	12,6	8,6	
	3 and more	15	0,5	85	2,3	103	3,0	2,4	
Long-term loan	S	1374	40,0	1317	38,4	1351	39,3	-0,7	
Short-term loan	IS	1847	53,8	1996	58,1	1995	58,1	4,3	
Trade credit		3150	91,7	3217	93,7	3222	93,8	2,1	
Leasing		0	0	156	4,5	199	5,8	5,8	
Other forms		249	7,2	455	13,3	609	17,8	10,6	

Table 1. Scope of enterprise use by forms of financing and their changes

Source: Author's own calculations.

Enterprises use many sources at the same time. Their volatility in time confirms adjustment to new financing options (Table 1). There was less interest in long-term loans and more interest in leasing and other modern forms of financing. High growth was noted in a group of other forms of funding (increase by 10.6%). A second significant growth was recorded in the group of enterprises benefiting from EU support. An increase

<sup>&</sup>lt;sup>20</sup> EU subsidies will be used in the description interchangeably with the terms non-repayable state aid, subsidies, grants, public aid.

in enterprises benefiting from two and three EU support projects was found: 8.6% and 2.4%, respectively. In the group of companies benefiting from community funds, the largest number of enterprises benefited from the support at the end of the first financial perspective. Research in European countries during this period showed that, on average, the beneficiary received co-financing most often from two projects. However, higher quotas for public funding are found in the new member states<sup>21</sup>. Statistics determining the number of obtained EU projects in the studied group reveal statistically significantly higher average values of individual projects in the last financial perspective. Projects with the highest expenditures were usually carried out by small and medium-sized companies in education, public administration as well as in professional, scientific and technical activities. The number of enterprises implementing three or more projects accounted for only 3% of the total. The rate of change in the scale of such financing was similar to using a trade credit. A change in a short-term bank loan with a 4.3% growth rate indicates constant and stable loan financing, especially in the latest study interval.

The size of the company, related to an increase in the scale of operations, may determine the choice of funding sources (Table 2). The values of Chi-squared test and probability value (p<0,05) allow to state that in each of the three time intervals there is a statistically significant differentiation of types of external financing depending on the size of the company.

				Type of external financing								
Interval	Size of company	Not found	Bank loans	EU subsidies	Bank loans and EU subsidies	Bank loans, EU subsidies, leasing	More sources (> 4)	χ <sup>2</sup> [p]				
		The values										
2007-	Small	26,7	49,9	-13,9	-76,0	25,5	-12,1					
2008	Medium	-24,2	-43,5	6,4	66,4	-13,3	8,2	125,33 [0.000]				
	Large	-2,5	-6,4	7,5	9,6	-12,2	3,9	[.,]				
2010-	Small	24,4	74,4	58,1	-14,3	-105,1	-37,5					
2013	Medium	-20,4	-74,9	-47,8	15,0	91,9	36,2	265,90 [0.000]				
	Large	-4,0	0,5	-10,3	-0,7	13,3	1,3	[.,]				
2014-	Small	27,1	86,3	48,5	-2,2	-107,8	-51,9					
2017	Medium	-23,1	-81,6	-43,8	3,4	95,7	49,4	293,68 [0.000]				
	Large	-4,0	-4,7	-4,6	-1,2	12,1	2,4					

Table 2. Diversification of financing methods, depending on the size of the company, including the use of bank loans and EU subsidies - the results of the test $\chi^2$ 

Source: Author's own calculations.

<sup>&</sup>lt;sup>21</sup> In the EU, 17% of beneficiaries implement more than one project, 3% have more than five and only 1% more than ten (since 2007). The entrepreneurs from Spain and Italy are beneficiaries of the largest number of projects, J. Bachtrögler, C. Hammer, W. Heinrich, R.F. Schwendinger: Guide to the galaxy of EU regional funds recipients: evidence from new data. Empirica, Volume 46, Issue 1 /2019, p. 107.

The residuary numbers indicate that in small enterprises no source was used to a greater extent than in the others, or only one source was used, mainly from bank loans. This observation applies to the entire period under investigation. The increase in the use of EU budget funds in small companies took place only in the second financial perspective<sup>22</sup>. Among small companies, the number of those companies that used loans, subsidies and possibly a third source, e.g. leasing, decreased significantly during the second and third time intervals. This is demonstrated by the size of this segment of companies (-107,8). Empirical numbers in these cases are higher than those resulting from the theoretical distribution.

In the years 2007–2008, medium-sized companies used the combination and support of bank loans with available EU subsidies to a greater extent than in other companies. Medium-sized enterprises, more than the large-sized, were prepared to compete on the financial market for non-returnable state aid funds from the EU, which, given their activity, gave grounds for their stable development. In the opinion of the banks, state aid significantly limited the demand for loans on the part of enterprises<sup>23</sup>. In the second and third time intervals, these companies also increased interest in new forms of external financing characterized by quantitative and structural diversification (three and more, including leasing, as well as other forms, mainly long-term). The number of small companies that used many sources also decreased significantly.

In the years 2014-2017, large companies experienced a phenomenon of higherthan-expected interest in combining various external forms of financial supply, generally in terms of increasing the scope and forms of capital supply. The empirical numerical amount for this group was higher than resulting from theoretical distribution. Research shows that business experience, knowledge and skills allow managers of large companies to choose other, more appropriate ways of financing their business<sup>24</sup>. Large enterprises, due to their resources, can more easily afford financing with more difficult external capital. For creditors, the resources of these companies are the guarantee for the return of funds. Repayable and payable external financing has a higher maturity requirement.

The next stage of the study analyzed companies that combined bank loans and EU public funding in financing methods. Changes in enterprises benefiting or not from EU public aid are presented against the background of changes in basic financial parameters recognized as average in the annual financial statements.

The used statistics indicate differences in the obtained results if these two opposing groups are compared (Table 3). Enterprises benefiting from state aid had large amounts of this source of funding. This is indicated by the average value of EU co-financing, which in this group was over 50% higher than the average total bank loans taken. Companies with higher revenues implement projects with a higher total value. The average value of a single

<sup>&</sup>lt;sup>22</sup> A. Jaworska: Porównanie perspektyw finansowych 2007-2013 i 2014-2020 w Unii Europejskiej na przykładzie Polski, wyd. Uniwersytet Warmińsko-Mazurski w Olsztynie, Olsztyn 2016, p. 19.
<sup>23</sup> Sytuacja na rynku kredytowym -wyniki ankiety do przewodniczących komitetów kredytowych, Departament

Sytuacja na rynku kredytowym -wyniki ankiety do przewodniczących komitetów kredytowych, Departamen Stabilności Finansowej Warszawa, NBP 2020

<sup>&</sup>lt;sup>24</sup> G. Hernandez-Canovas, P. Martinez-Solano: Relationship lending and SME financing in the continental European bank-based system. Small Business Economics 34/2010, p. 46.

project for large companies is only about twice as high as for small entities<sup>25</sup>. The share of non-returnable EU funding in the foreign capital structure was 22%, but only 7% in the entire capital structure. The average value of financing through bank loans was, in relation to enterprises that did not benefit from EU projects in the period, only by 5% lower, expressed as the average value. The ratio of short-term and long-term loans to the total of balance sheet of capital fluctuated around 19% and was slightly lower than in the group without funding. Companies from Section C - Industrial processing, and Section E - Water Supply, have taken more often the advantages of co-financing; then Sewage and Waste Management and Recultivation activities, and much less frequently, Section G - Wholesale and Retail Trade, Repair of Motor Vehicles, including motorcycles. This is probably due to the nature of EU assistance.

Financial positions	Possession EU projects		T-value	Df	Significance	Valid	Standard deviation	F-ratio	
	Yes	No			(P)		(SD)		
Value of EU projects	11184	0,0	7,33957	2478	0,00000	561	66784	0,000	
Loans (total)	7253	7686,5	-0,28850	1388	0,77300	396	19383	1,981	
Assets (total)	175773	87358,0	4,32870	2478	0,00016	561	713529	5,967	
Net revenues from sale of goods and materials	149350	71465,9	1,86335	2194	0,06256	511	163505	32,28	
Net revenues from sale of products	111055	80241,7	2,03426	2285	0,04201	543	330848	1,209	
Net profit (loss)	9383	5868,9	2,41448	2478	0,01583	561	50096	5,509	
Loans /Liabilities	0,19	0,21	-2,04498	866	0,04115	303	0,1	1,488	
EU subsidies/ /Liabilities	0,07	0,00	23,24377	2478	0,00000	561	0,1	0,000	
Loans /Debt	0,35	0,40	-3,43862	866	0,00061	303	0,2	1,492	
EU subsidies /Debt	0,22	0,00	14,32599	2478	0,00000	561	0,7	0,000	

 Table 3. Selected statistics for the resource and results of the companies benefiting and not benefiting from EU subsidies - average results (thousand PLN)

Source: Author's own calculations.

<sup>&</sup>lt;sup>25</sup> J. Bachtrögler, C.Hammer, W.H.Reuter : Guide to the galaxy of EU regional funds recipients: evidence from new data. Empirica Volume 46, Issue 1/2019, p.13. ,doi.org/10.1007/s10663-018-9427-5.

Indicators	Possession EU projects		T-value	Df	Significance	Valid	SD	F-ratio	
	Yes	No			(p)				
ROA indicator	6,34	7,45	2,46467	2415	0,013783	554	7,4	1,782	
ROE indicator	14,99	21,80	-0,37299	2415	0,709189	554	36,3	139,234	
ROS indicator	4,80	5,04	-0,46965	2415	0,638650	554	15,5	3,366	
Business profitability rate	5,78	5,92	-0,25917	2415	0,795525	554	16,0	2,919	
Current liquidity ratio	2,76	3,30	-2,64070	2415	0,008327	554	3,5	1,626	
Quick liquidity ratio	1,84	2,22	-2,50083	2415	0,012456	554	2,5	1,662	
Inventory turnover rate [days]	60,50	87,68	-0,46517	2296	0,641857	543	313,0	18,600	
Receivables turnover ratio [days]	52,26	57,81	0,65278	2415	0,513963	554	38,8	1,519	
Liabilities turnover ratio [days]	83,60	74,20	2,06462	2415	0,039066	554	67,3	2,240	
Debt level indicator	0,39	0,40	-1,10980	2415	0,267195	554	0,2	1,055	
Solvency ratio	0,53	0,55	-1,82942	2415	0,067460	554	0,2	1,156	

Table 4. Summary of selected financial indicators of enterprises using and not using EU subsidies - average results (%)

Source: Author's own calculations.

The group of enterprises benefiting from state aid in the form of submitted and implemented EU projects was also characterized by high value of assets, high revenues from basic operating activities, mainly from product sales, as well as a high level of generated net profit. These values turned out to be statically significant. Estimates of the average population from the sample distribution of average samples with the T-value test – the levels of significance are indicated by these relationships. The standard deviation of the studied populations defines narrow values around the mean of these parameters. Enterprises not using EU funds had a slightly higher burden on the capital structure and total repayable debt and bank loans. Loans accounted for 40% of the total debt of these companies.

Financing development with external capital can improve the efficiency of owned resources, but it also involves certain risks. Financial results and their relationships reflect the financial benefits obtained for enterprises and indicate potential threats. The key is to choose the right indicators for one's business. In analytical terms, enterprises benefiting from financing through projects from EU funds were characterized by better indicators for inventory turnover, trade receivables and payables as well as solvency ratios, although the nominal differences were not large. In average annual terms these units achieved paradoxically less favorable assessment parameters in the area of measuring profitability as

well as current and quick ratio. Significant relationships between the examined groups have been confirmed for the indicators of return on assets, current and quick ratio as well as total liabilities rotation. The components of these indicators were closely related to the use of non-returnable public aid in funding business operations, which is why statistical modeling was used to determine the final results.

## Analysis of enterprises benefiting from co-financing from EU programs – a probit model

The presented analysis of descriptive statistics indicates a significant difference between companies reaching for co-financing from EU programs as compared to enterprises not doing so. The question arises how to synthetically characterize both groups of enterprises. To this end, a probit model was built to determine whether the company uses funding. In statistics, the probit model is a type of regression in which the dependent variable can have only two values. The model was estimated using the standard highest probability procedure<sup>26</sup>. Data from the financial statements and financial indicators constituted a set of variables from which explanatory variables were selected. The sample consisted of all enterprises, of which exactly half benefited from EU funding. Such balancing of the sample was implemented to improve the assessment of model parameters.

The prediction includes previously calculated variables and co-financing amounts. In the first step, all variables were taken into the model. The number of 'correct predictions' was 69.2%, and Akaike's information criterion was 1224.67. In this way, the upper limit of achievable 'correct predictions' was obtained. Of course, only some of the variables were statistically significant, so using the parsimony principle, the variables contributing least to the model were rejected, trying to maintain a high number of correct predictions and obtaining statistical significance of the variables. In addition to statistical criteria, the interpretation of variables: nominal values, financial ratios and correlation coefficients of explanatory variables with the explanatory variable had a significant impact on the model's construction.

For the financial indicators for each of the groups (profitability, financial liquidity, debt, activity), the indicator that had the highest p-value in the probit model, based on indicators from a given group, was searched for. The indicators that best served the prediction were asset profitability (with a plus sign), quick ratio (with a plus sign), debt level indicator (with a minus sign) and receivables turnover ratio (with a plus sign). Nominal variables from the financial statements were treated similarly. After taking into account the previously mentioned criteria, a probit model was built, for which the number of 'correct predictions' was 56.3%, and the Akaike information criterion was 1424.78. The marginal effect was determined for average variable values. The model results are summarized in Table 5.

<sup>&</sup>lt;sup>26</sup> M. Gruszczyński: Modele i prognozy zmiennych jakościowych w finansach i bankowości. Monografie i Opracowania nr 490, Oficyna Wydawnicza Szkoły Głównej Handlowej, Warszawa 2001, p.89.

Description	Coefficient	Standard error	Marginal effect	Ζ	p-value	
Constant	-0,0593454	0,0441103		-1,3454	0,17850	
Assets	1,059e-06	4,98935e-07	4,21528e-07	2,1225	0,03379	**
Liabilities and reserves	-2,19735e-06	8,15248e-07	-8,74638e-07	-2,6953	0,00703	***
Net profit/ net loss	8,61794e-06	2,92603e-06	3,4303e-06	2,9453	0,00323	***
Net revenues from the sale of products	1,17183e-06	3,6756e-07	4,66439e-07	3,1881	0,00143	***

Table 5. Results of the enterprise probit model

Source: Author's own calculations.

The results of model estimation are consistent with descriptive statistics of enterprises benefiting from EU funding. On average, these enterprises have more than twice as many assets, over 70% more revenue from the sale of products, goods and materials, and nearly 60% more profits, with these differences being statistically significant. The overall debt ratio is on average statistically significantly lower in this group of enterprises. This is reflected in the parameter assessment marks, because replacing debt with equity and expanding the sources of funding with equity increases the likelihood of receiving funding. If we relate these two strategies to the interpretation of marginal effects calculated in relation to average values, it turns out that the probability of receiving funding increases 1.27 times faster when the first strategy is used and it results from the quotient of marginal effects. An indicator of return on equity and return on assets can be created from the model variables. In both cases, these indicators had a lower level among companies that received funding, so that only the second indicator was significantly lower. This certain lack of consistency results from the fact that the nominal values, which testify to the size of the company, were much more important for the prediction of the fact of receiving funding.

The second step in modeling the enterprise benefiting from the assistance of EU programs is the prediction of the amount of funding. For this purpose a classic multiple regression model was built. It was largely expected that the variables that served to assess the likelihood of obtaining funding would serve just as well when estimating the amount of funding. The results turn out to be very interesting in terms of assessing whether EU funds are substitutionary or complementary to a bank loan. The adjusted coefficient of determination was 0.632894. The results of the estimation are presented in Table 6.

	0				
Description	Coefficient	Standard error	t-Student	p-value	
Constant	-6675,4	3489,52	-1,9130	0,05671	*
Long-term loans	0,998899	0,345341	2,8925	0,00410	***
Short-term loans	1,17736	0,098816	11,9146	<0,00001	***
Assets	0,247694	0,0194571	12,7303	<0,00001	***
Liabilities and reserves	-0,491969	0,0325157	-15,1302	<0,00001	***

Table 6.	Results	of the	multiple	Regression	model
	10000100	01 m	mempre	reegreebbion	1110 0001

Dependent variable (Y): Volume co-financed from EU programs in thousands of PLN. Estimation (Classical Least Squares )

Source: Author's own calculations.

It turned out that the key variables for assessing the amount of EU aid are the value of short- and long-term loans. No other system of variables without these two variables allows to estimate the amount of co-financing as well as the above-mentioned model. Note that, similarly to the probit model, replacing foreign capital with equity capital and increasing the sources of financing with equity capital leads to an increase in the amount of funding. While interpreting the assessment of parameters, we get that with the first strategy, the replacement of 1,000 PLN debt through equity increases the level of funding by 0.49 thousand PLN; whereas with the second strategy, increase in equity by 1,000 PLN increases the level of co-financing by 0.25 thousand PLN at ceteris paribus. The amount of co-financing increases almost twice as fast when the first strategy is used and it results from the quotient of assessments of parameters. An interesting conclusion arises when we juxtapose model results with the results of statistical tests. The emergence of EU assistance significantly reduced the relative share of loans in the balance sheet total and foreign capital, which means substitutability between EU funds and loans. On the other hand, assessments of the model parameters indicate that as soon as the company receives funding, it goes hand in hand with almost a zloty-to-a-zloty (assessment of parameters close to one) with a bank loan. Enterprises benefiting from the aid are on the one hand less dependent on a bank loan (smaller share of loans in foreign capital), but on the other hand they take larger loans on average, if it is possible to co-finance with EU funds, which in turn allows for carrying out investments that would have been too heavy a burden if they had been implemented only with the help of a bank loan.

#### **Summary**

The research found that changes in bank loan substitution and subsidies in enterprises result from changes in the socio-economic environment related to the possibilities of obtaining financing from EU assistance funds in subsequent financial perspectives. The emergence of EU assistance in enterprises reduced the share of loans on the balance sheet total and foreign capital. This indicates substitutability between EU funds and a bank loan. Public aid funds for small enterprises as the main source of funding were significant, especially immediately after the period of the first financial perspective, after 2014.

Complementarity between lending and public financing was found in large and mediumsized enterprises that use state aid. Replacing payable forms of financing with nonreturnable funds increases the likelihood of receiving more funding, as does expanding funding sources. The assessment of the parameters of the employed econometric models indicates that if the possibility of co-financing with EU funds existed in enterprises, the level of credit level increased simultaneously. Thus, a phenomenon of supplementation between the examined forms of financing was found in enterprises that had used EU funding at least once. On average, companies take out larger loans. The phenomenon of complementarity between subsidies and bank loans took place to a greater extent in medium-sized companies. EU funds have in no way rendered banking products superfluous to the financial needs of enterprises, and it can be said that they have even led to an increase in lending. This can be a good omen for the development of Polish enterprises and strengthening their market position. External assistance from EU grants strengthens the Polish financial system on a complementary basis. The thesis that public intervention focused on the policy of intentional support of enterprises may help accelerate the development of these enterprises has been positively verified.

#### References

Altunbas Y., Marques D., Zhussupova B.:Capital market frictions and bank lending in the EU. In: Frontiers of banks in a global economy, Palgrave Macmillan, Studies in Banking and Financial Institutions, London 2010.

Bachtrögler J., Hammer C., Heinrich W., Schwendinger R.F.:Guide to the galaxy of EU regional funds recipients: evidence from new data, Empirica, Volume 46, Issue 1 /2019.

Bachtrögler J., Hammer C., Reuter W.H.:Guide to the galaxy of EU regional funds recipients: evidence from new data .Empirica Volume 46, Issue 1/2019.

Becchetti L., Castelli A. Investment—cash flow sensitivities, credit rationing and financing constraints in small and medium-sized firms, Small Business Economics 35/2010.

Berger A.N., Cowan A, Frame. W.S. :The surprising use of credit scoring in small business lending by community banks and the attendant effects on credit availability, risk, and profitability, Journal of Financial Services Research 39 (1-2)/2011.

Białek-Jaworska A., Dzik-Walczak A., Nehrebecka N. Determinanty finansowania działalności przedsiębiorstw kredytem bankowym: Metaanaliza, Bank i Kredyt 46(3)/ 2015.

Cole R.:Bank credit, trade credit or no credit: evidence from the surveys of small business finances, MPRA Paper, 24689/2010, http://mpra.ub.uni-muenchen.de/24689.

Dach Z.:Mikroekonomia, Uniwersytet Ekonomiczny w Krakowie, Kraków 2012.

Denis D.J, Mihov V.: The choice among bank debt, non-bank private debt, and public debt: Evidence from new corporate borrowings, Journal of Financial Economics 70(1)/2013.

Gruszczyński M.::Modele i prognozy zmiennych jakościowych w finansach i bankowości. Monografie i Opracowania nr 490, Oficyna Wydawnicza Szkoły Głównej Handlowej, Warszawa 2001.

He Y, Li B.: Government financial subsidies in the influence of public housing under the PPP Financing Model. In: Wang J., Ding Z., Zou L., Zuo J. (eds) Proceedings of the 17th International Symposium on Advancement of Construction Management and Real Estate. Springer, Berlin - Heidelberg 2014.

Hernandez-Canovas G., Martunez-Solano.P. Relationship lending and SME financing in the continental European bank-based system, Small Business Economics 34/2010.

Janasz K., Janasz W.: Zarządzanie kapitałem w przedsiębiorstwie, Difin, Warszawa 2007.

Jaworska A.: Porównanie perspektyw finansowych 2007-2013 i 2014-2020 w Unii Europejskiej na przykładzie Polski, wyd. Uniwersytet Warmińsko-Mazurski w Olsztynie, Olsztyn 2016.

Jinhyuk L.,Jeaok.P.: Pricing of complementary goods as implicit financial arrangement, Journal of Economics 55/2014.

Kałowski A., Wysocki J.: Start-up a uwarunkowania sukcesu, Oficyna Wydawnicza SGH, Warszawa 2017.

Kubiak J.: Hierarchia źródeł krótkoterminowego finansowania przedsiębiorstwa, Wydawnictwo Akademii Ekonomicznej w Poznaniu, Poznań 2005.

Lett M.: Structural models of complementary choices, Springer Science Business Media, New York 2014.

Marzec J., Pawłowska M.: Substytucja między kredytem kupieckim i bankowym w polskich przedsiębiorstwach– wyniki empiryczne na podstawie danych panelowych, Bank i Kredyt 43 (6), 2012.

Masiak C ., Moritz A., Lang.F,: European SME financing: an empirical taxonomy. In: Moritz A., Block J., Golla S., Werner A. (eds) Contemporary developments in entrepreneurial finance. FGF Studies in Small Business and Entrepreneurship, Springer, Berlin 2019.

Mateut S.: Subsidies, financial constraints and firm innovative activities in emerging economies, Small Business Economics. Volume 50, Issue 1/2018.

Modigliani F., Miller H.M.: The Cost of capital, corporate finance and the theory of investment, American Economic Review 48/1958.

Raport o pomocy publicznej w Polsce udzielonej przedsiębiorcom w 2017roku, Departament Monitorowania Pomocy Publicznej UOKIK, Warszawa 2018.

Raport o stabilności systemu finansowego, NBP Departament Stabilności Finansowej, Warszawa, 2018.

Sytuacja na rynku kredytowym -wyniki ankiety do przewodniczących komitetów kredytowych, IV kwartał 2020 r, Departament Stabilności Finansowej Warszawa, NBP 2020.

Sołtysiak M., Filip P.: Empirical analysis of the availability and changes in the use of bank loans by enterprises in selected countries of European Union ,CEFE Technical University, Kosice 2018.

### Zmiany w substytucji kredytu bankowego i dotacji UE w polskich przedsiębiorstwach

#### Streszczenie

Celem artykułu było określenie stopnia zastępowania kredytu bankowego przez polskie przedsiębiorstwa w sytuacji korzystania z pomocy unijnej. Identyfikacja podobieństw i różnic została przeprowadzona w grupach przedsiębiorstwa korzystających i nie korzystających z pomocy publicznej, w następujących po sobie perspektywach finansowych UE tj. w latach 2007-2017. Analizie poddano zmiany w zasobach majątkowych i wynikowych przedsiębiorstw oraz zmienne dotyczące efektywności finansowej. Wykorzystano model logitowy w celu określenia cech wpływających na istotność determinant finansowania dotacjami publicznymi. Przekrojowy charakter danych pozwala zidentyfikować pozytywny statyczny związek między dotacjami a kredytami bankowymi w średnich przedsiębiorstwach. W toku badań ustalono, że uzyskanie pomocy publicznej w przedsiębiorstwach obniżyło udział kredytów bankowych w sumie bilansowej jak i zadłużeniu ogółem. W dłuższym okresie otrzymane dofinansowanie spowodowało wzrost znaczenie i zakresu korzystania z kredytów bankowych. Środki pomocy publicznej były komplementarnym źródłem zasilenia kapitałów przedsiębiorstw.

Słowa kluczowe: przedsiębiorstwo, pomoc publiczna, kredyt bankowy, komplementarność. JEL Code: G02,M 21.

Information about the author:

#### Dr Paulina Filip Uniwersytet Rzeszowski Kolegium Nauk Społecznych, Instytut Ekonomii i Finansów Katedra Finansów i Rachunkowości 35-959 Rzeszów ul. M. Ćwiklińskiej 2a e-mail: paola@ur.edu.pl ORCID: 0000-0003-1786-318X

\* \*\* \* Polityki Europejskie, \* Finanse i Marketing \* \* \* 25 (74) 202

DOI 10.22630/PEFIM.2021.25.74.2

Received: 22.04.2020 Accepted: 21.04.2021

Małgorzata Garstka Jan Kochanowski University in Kielce

### LINKS BETWEEN FINANCIAL STATEMENTS AND MANAGEMENT COMMENTARY

The author's aim is to identify the links between two reporting systems: financial and nonfinancial. In this article, the connection between the financial statements and the management report will be shown. The work concerns the management report after the introduction of the obligation of non-financial reporting in the form of additional information in this report, or by means of a separate statement on non-financial information.

The objective was achieved by means of literature studies in the field of accounting, as well as the analysis of legal acts, based on which the relations between the two reports should be determined. Deductive and inductive reasoning and the method of critical, comparative and descriptive analysis and synthesis were used to formulate conclusions. The existence of links between the management report and the financial statement has been demonstrated. These links may pose a risk of repetition and non-compliance. It is desirable that these links should be made clear to people responsible for drawing up both reports. Particular attention should be paid to the presentation of this information and steps should be taken in the accounting internal control procedures and internal audit, perhaps to confirm that the relevant information has been reconciled and to avoid unnecessary repetition.

The results of the research show that there are so many connections, including non-financial information, that it is worthwhile to provide them and their verification as a conscious and organized activity. This will build the image of the company in the eyes of the report readers.

Key words: financial statements, management report, quality of information JEL Code: M14,

#### Introduction

There is an approach to business reporting which asserts that 'A fundamental element of the information policy of a company operating in a global environment is its reporting - both financial and non-financial'<sup>1</sup>. This concept raises several considerations. First, the idea that reporting is a "fundamental element" would mean that there are other elements which are not considered "fundamental." Second, the idea that non-financial reporting should also be combined with financial reporting as part of a company's information policy. Perhaps this is only the case for companies operating in a global environment, and is not applicable to companies operating locally.

Corporate reporting can be divided into financial and non-financial information, but this is only one area of corporate reporting; there are many others, including non-

<sup>&</sup>lt;sup>1</sup> E. Walińska, J. Gad: The key corporate reporting tools in the practice of the Polish capital market – case study, 'Theoretical Journal of Accounting', Accountants Association in Poland, 92 (148), 2017, pp. 207-226, p. 207.



financial information, corporate social responsibility, sustainable and integrated reports. Contemporary accounting statements have become very comprehensive and multilayered, with broad meaning hidden in every sentence. At the same time, such reporting is expected to provide specific, clear and transparent information. This goal is certainly not supported by duplicating information, presenting the same facts in different variations and leading to different interpretations and justifications. Therefore, each time new disclosures are introduced, they should be linked to other information which has already been publicly disclosed, especially when presented as related documents. The context of these links would then need to be checked to see if previously disclosed information is being duplicated, corrected, explained, supplemented, or reinterpreted. It seems necessary to continue to identify and raise awareness of the links between the two reports, and in particular - and the goal of this article - between the financial statements and the management report. It is necessary because it is impossible to predict with certainty the reception of information by the reader, the way this reception will evolve, and how the understanding of information may change. The importance for reporters of understanding these relationships cannot be overlooked, either. Moreover, in the perspective of non-financial reporting, such analysis is a starting point for making the subsequent links with later documents more known. This identification will allow to add more links in the next step and find a systemic organizational approach to preparing related information.

The study, the conclusions of which are included in this article, concerns the indication of connections between the financial statements described in Appendix 1 to the Accounting  $Act^2$  and the management commentary, also within the meaning of the Accounting Act after the introduction of the obligation to report non-financial information. In a situation where the scope of information in the financial statements is very diverse and has recently undergone numerous changes, it is necessary to clarify this subject. The research is intended to address the assumptions of disclosure and therefore the intentions regarding the information value required for disclosure rather than the practice of disclosure. Therefore, study of the accounting literature and analysis of legal acts was conducted. This allowed the necessary disclosures and the connections between the information contained in the two reports in question to be made. The article has the following structure: gist of the management commentary, main content of the management commentary, links between the values in the financial statements and the management commentary, and conclusions. The identification of the desired links can also be used to define the requirements for the revision and control of the information so that they lead to such links and thus help to improve the quality of the information.

#### Gist of the management commentary

'For many years the management commentary has not been the subject of interest of Polish authors of works on reporting or financial accounting.'<sup>3</sup>. This is surprising, considering the notion of 'the entity's management commentary as the primary source of

<sup>&</sup>lt;sup>2</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended.

<sup>&</sup>lt;sup>3</sup> B. Bek-Gaik, J. Krasodomska: Non-financial disclosures as contemporary corporate reporting – definition, sources and proposed research directions, Cracow Review of Economics and Management, 2018; 2 (974): 25– –40, https://doi.org/10.15678/ZNUEK.2018.0974.0202, p. 30.

*non-financial information*<sup>'4</sup> and in view of the fact that integrated reporting is now being identified as a tool for communication between a company and its stakeholders<sup>5</sup> and is receiving a lot of attention. The question arises as to why the management commentary has not received such attention. After all, it remains the main source of non-financial information, at least in the sense that it concerns a much larger number of entities than integrated reporting. It allows many units to inform about something more than just financial data. Despite changes in the area of disclosure by companies, '*The key element of corporate reporting is the financial statement, which for many years was the only corporate report, but today is one of many*<sup>'6</sup>.

There are views that the management commentary is the link between the financial statements and other reports and that '*it has become a basic non-financial report accompanying the financial statements*'<sup>7</sup>. It must be said that there are no other reports accompanying it in the way that the management commentary does. While the creation of reports for many entities is a challenge in terms of their very construction, in the case of a management commentary, the Accounting Act specifies precisely what position it takes in relation to the financial statements and who is responsible for their content. It also defines its scope<sup>8</sup>. However, non-financial information is also included in the management commentary because generally it can be found in '*the following corporate documents: the annual report, namely its management commentary, the social report and the integrated report*'<sup>9</sup>.

In describing the essence of the management commentary, attention may be drawn to its goals and addressees, its scope, its preparers and the way it is made public. To achieve the aim of this article it is necessary to mention the first two. The management commentary and the financial statements have a slightly different purpose that involves defining the goals and addressee. A management commentary is not prepared by all entities that prepare financial statements. Both are, however, intended to communicate the information mainly needed by capital providers, and it is to them that the management commentary is specifically addressed. It is to be used by them to assess an entity, or more precisely its purpose - in accordance with National Accounting Standard No. 9 'Management commentary'<sup>10</sup>: 'to improve the knowledge of the entity by providing its users with relevant information in complementation to the financial

<sup>&</sup>lt;sup>4</sup> W. Skoczylas, W. Dziadul: Diagnosis of the scope of non-financial information. Disclosure by polish companies, Studies and Work of the Collegium of Management and Finance, Warsaw School of Economics, 164/2018, pp. 117–135, p. 119.

<sup>&</sup>lt;sup>5</sup> A. Krzysztofek: Integrated reporting on the example of Respect Index enterprises, Journal of Management and Finance Vol. 16, No. 2/2018.

<sup>&</sup>lt;sup>6</sup> E. Walińska, J. Gad: The key corporate reporting tools in the practice of the Polish capital market – case study, 'Theoretical Journal of Accounting', Accountants Association in Poland, 92 (148), 2017, pp. 207-226, p. 207.

<sup>&</sup>lt;sup>7</sup> E. Walińska, J. Gad: The key corporate reporting tools in the practice of the Polish capital market – case study, 'Theoretical Journal of Accounting', Accountants Association in Poland, 92 (148), 2017, pp. 207-226, p. 209.

<sup>&</sup>lt;sup>8</sup> Accounting Act of 29 September 1994, Dz.U z 2021 r. pos. 217 as amended, art. 49.

<sup>&</sup>lt;sup>9</sup> B. Bek-Gaik, J. Krasodomska: Non-financial disclosures as contemporary corporate reporting – definition, sources and proposed research directions, Cracow Review of Economics and Management, 2018; 2 (974): 25– –40, https://doi.org/10.15678/ZNUEK.2018.0974.0202, p. 28.

<sup>&</sup>lt;sup>10</sup> Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Management commentary, Dz. Urz. MRiF 2018.4.

statements (...) and additional information to facilitate the assessment of the entity - its activities, situation, intentions and prospects for development<sup>'11</sup>. As a rule, the information is intended to be complementary or additional and, most importantly, to enrich knowledge. Consequently, reading only the financial statements does not support the reader with that information.

In addition, according to the standard, there is this statement 'contains a balanced and objective presentation and analysis of information about the entity, corresponding to its specificity, size and complexity '<sup>12</sup>. According to the standard, it contributes to a better understanding of the entity and reduces risks (the standard does not specify which). Thus, the providers of capital can read both documents and complete the information from one to another. If they are dealing with the same issues, they will probably look for confirmation of information in each one, as well as for confirmation of the conclusions they have drawn. This is because both documents ultimately relate to the description of the same entity (unit) and subject (resources and activities) during the reporting period and the creation of a single assessment by a single reader. The question arises as to what informational links readers should be able to find, provided they have enough knowledge and skills.

#### Main contents of the management commentary

The scope of the management commentary is determined by the Accounting Act<sup>13</sup>, and is specified in National Accounting Standard No. 9 'Management commentary'<sup>14</sup>. The law, when it was created in 1994, required that it should include<sup>15</sup>:

"significant information about the property and financial situation, including the assessment of the effects achieved and the indication of risk factors and description of threats, and in particular information about:

- 1) events that significantly influence the entity's activity, which occurred in the financial year, as well as after its completion, until the date of approval of the financial statement,
- 2) anticipated development of the entity,
- 3) major achievements in the field of research and development,
- 4) current and anticipated financial situation.

Currently, it additionally expects information on<sup>16</sup>:

1) own shares, including:

a) the reason for the acquisition of own shares during the financial year,

<sup>&</sup>lt;sup>11</sup> Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Management commentary, Dz. Urz. MRiF 2018.4, point 4.1

<sup>&</sup>lt;sup>12</sup> Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Management commentary, Dz. Urz. MRiF 2018.4, point 4.2

<sup>&</sup>lt;sup>13</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, art. 49.

<sup>&</sup>lt;sup>14</sup> Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Management commentary, Dz. Urz. MRiF 2018.4.

<sup>&</sup>lt;sup>15</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, art. 49 ust. 2.

<sup>&</sup>lt;sup>16</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, art. 49 ust. 2.

- b) the number and nominal value of shares acquired and disposed of during the financial year, or in the absence of nominal value, their book value, as well as the part of the share capital they represent,
- c) in the case of acquisition or disposal for a consideration, the equivalent of those shares,
- d) the number and nominal value of all shares acquired and retained, or in the absence of nominal value, their book value, as well as the part of the share capital they represent,

2) branches (plants) owned by the entity,

3) financial instruments in respect to:

- a) risks: changes in prices, credit, significant disruptions of cash flows and loss of financial liquidity to which the entity is exposed,
- b) financial risk management objectives and methods adopted by the entity, including hedging methods.

In addition, where relevant for the assessment of an individual's development, performance and situation, it should also include at least<sup>17</sup>:

1) key financial performance indicators related to the entity's operations;

2) key non-financial performance indicators related to the entity's operations and information on employee and environmental issues.

However, if there is a link between the values reported in the management commentary and the information in the entity's annual financial statements, it is the entity's management commentary that should include references to and additional explanations for the amounts reported in the financial statements<sup>18</sup>.

The amount of information required by the Act has increased significantly, mainly in recent years, especially in the area of non-financial information, which occupies a relatively large part of the report. However, only the relationship between the values shown in the annual financial statements and the information in the entity's management commentary is of interest here, which should be indicated and explained.

The standard itself raises such issues as:

- purpose, nature and quality characteristics of the management commentary
- rules of preparation and presentation of the management commentary
- content of the management commentary
- characteristics of activities and resources
- objectives and risks
- results of operations and financial situation
- prospects
- statement on application of corporate governance
- statement (report) on non-financial information.

Despite its legal status, volume and detail, the Standard 'contains only a set of desirable features, content and layout of the management commentary, as well as guidelines for its preparation and presentation'<sup>19</sup>.

<sup>&</sup>lt;sup>17</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, art. 49 ust. 3.

<sup>&</sup>lt;sup>18</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, art. 49 ust. 3a.

 <sup>&</sup>lt;sup>19</sup> W. Skoczylas, W. Dziadul: Diagnosis of the scope of non-financial information. Disclosure by polish companies, Studies and Work of the Collegium of Management and Finance, Warsaw School of Economics, 164/2018, pp. 117–135, p. 122.

## Links between the values in the financial statements and the management commentary

It can be stated with certainty that the information that the Standard requires to be described in a management commentary is to some extent already present in the financial statements or even has a source or effect there. The introduction to the management commentary already indicates the name, legal form and registered office of the entity, which is understandable because it identifies the preparer, but its share of capital also appears in the same place, which is an obvious repetition<sup>20</sup>. The content of the principal part of the management commentary is described in paragraph VI of the Standard, which addresses the characteristics of operations and resources, objectives and risks, results of operations and financial position and prospects. The following content appears in this paragraph:

Concerning characteristics of activities and resources:

- description of the key areas of its activity and its effects (point 6. 4);
- information related to this in the financial statements, the volume and structure of sales revenue;
- key macroeconomic factors such as: GDP growth rate, interest rates, inflation rate, exchange rates, etc., (point 6. 12)
- these factors may be used to determine values in the financial statements and may be disclosed in the notes to the financial statements e. g. the exchange rates adopted for the valuation of financial statement items denominated in foreign currencies<sup>21</sup>;
- indication of the main items of the assortment (point 6. 14)
- the notes to the financial statements show the material structure of net revenues from sales of goods and products, to the extent that these types and markets differ significantly from each other considering the principles of organizing sales of products and providing valuation services<sup>22</sup>;
- major achievements and scope of research and development work (point 6. 18)
- in the notes to the financial statements the amount of costs of completed development work and information on costs related to research and development work which have not been classified as intangible assets is disclosed<sup>23</sup>;
- information on remuneration (point 6. 21)
- in the case of entities which prepare the profit and loss account in the calculation variant in the notes to the financial statements, information on remuneration and, in all cases in the notes to the financial statements, information on remuneration, including profit-based remuneration, paid or due to persons forming part of the bodies of the company and any liabilities arising from pensions and benefits of a similar nature for former members of those

<sup>&</sup>lt;sup>20</sup> Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Management commentary, Dz. Urz. MRiF 2018.4. point 6.1.

<sup>&</sup>lt;sup>21</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, annex 1, point 2.3.

<sup>&</sup>lt;sup>22</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, annex 1, point 2.1.

<sup>&</sup>lt;sup>23</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, annex 1, point 1.3, 2.11.

bodies or liabilities incurred in connection with those pensions, indicating the total amount for each category of body<sup>24</sup>;

- number and nominal value of own shares acquired and disposed of during the financial year (item 6. 22)
- the financial statements show information about the book value of shares held item D in assets<sup>25</sup>;

Concerning results of operations and financial situation:

- the most important information about the financial situation in the form of indicators describing profitability, liquidity, assets and financial situation (point 6.30)
- these indicators use in their formulas the items present in the financial statements;
- presentation of results of operations in areas of development (point 6. 31)
- these results are shown in the financial statements together, so they must be reconciled;
- information on unusual, one-off events (point 6. 33)
- the notes to the financial statements show the amount and nature of items of income or costs of extraordinary value or which occurred incidentally<sup>26</sup>.

No similar links were observed in the part of the management commentary: *Objectives* and *Risks and outlook*.

In point V of the Standard, concerning the principles of preparing and presenting the management commentary:

- in 5. 8. The standard requires information to be presented in a comprehensive, transparent and consistent manner, including compliance with its financial statement. This may give rise to repetition, so to ensure brevity and reduce repetition, the management commentary 'may contain internal references or markings, ensuring links with other information';
- 5. 18 describing the consistency of information indicates that it requires both internal consistency and consistency with the information in the financial statements. Then it cannot be a simple repetition of information. This is unnecessary and would probably be assessed negatively by the readers. Hence, the standard somehow indicates what it is supposed to serve and what kind of information connection it expects. It states that it is done 'in order to present the issues from the point of view of the head of unit', presents 'financial data in a different layout from the financial statements'27. This different presentation requires the data to be consolidated or restated, and therefore the reader will want to understand or check how the data has been restated by moving from individual items in the management commentary to those shown in the financial statements. All these records indicate the existence of links and, what is more important, the risk of repetition as a result of those links or incompatibilities

<sup>&</sup>lt;sup>24</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, annex 1, point 2.2, 5.4.

<sup>&</sup>lt;sup>25</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, annex 1, assets D.

<sup>&</sup>lt;sup>26</sup> Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended, annex 1, point 2.2.10.

<sup>&</sup>lt;sup>27</sup> Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Report on operations, Dz. Urz. MRiF 2018.4. point 5.18.

caused by a lack of reconciliation. The analysis of the management commentary carried out by the Ministry of Finance in Poland indicated that **28**:

- in 29 of the cases audited, the entity has provided references to the amounts shown in the financial statements;
- in 87 of the cases audited, the entity has not provided such references.

It is difficult to say what such absence might mean.

#### Conclusions

The existence of links between the management commentary and the financial statements has been demonstrated. These links may create a risk of repetition or inconsistency of information, both in terms of financial and non-financial information, and the latter seems more difficult to explain to the readers. Therefore, steps should be taken within the reporting entity to ensure that these links:

- are made known to the people drawing up both reports;
- lead to attention being paid to the presentation of this related information;
- provide a rationale for the possible introduction of measures into internal control procedures in the accounting system to confirm that the relevant information has been reconciled and to avoid unnecessary repetition or differences;
- are within the internal audit function to introduce this issue into the audit tasks, including those of an advisory nature, undertaken on the auditor's initiative if the risk is not so great as to devote it to the task of providing assurance.

These actions may respond to risks arising from the links between the management commentary and the financial statements.

Given that the user of financial statements will expect the content and quality of the information in both reports to be consistent, they need to be prepared to show, first and foremost, that the entity is aware of and identifies these relationships, not to create ambiguity in the meaning of the information and, in the worst case not to be misleading. This action goes beyond the framework of the preparation of each report, although it formally belongs to the management commentary (and not to the financial statements), where the amounts shown in the financial statements, as well as the additional explanations concerning those amounts, should be referred to. As a rule, the management commentary is also prepared later, or at most in parallel with the financial statements, which may be subject to an additional audit. However, the method of its preparation is consistent with maintaining the quality of information presented in both reports. The entity will also be accounted for by the users of the reports for this consistency.

In view of the above, and stressing the links also with non-financial data, it is necessary to identify those responsible within the entity for verifying compliance with these principles. This issue of the quality of information, particularly of non-financial information, is becoming increasingly important as it is assumed that *With the* systematic development of non-financial reporting, there is a growing need to make it

<sup>&</sup>lt;sup>28</sup> Reporting extended non-financial information for 2017 in accordance with the Accounting Act - First experiences and good practices, Ministry of Finance, Warsaw 2019, s. 59.

*more credible*', and the question is: what does verification of non-financial data mean?<sup>29</sup>. Statutory auditors undertake certain verification activities also in relation to the management commentary<sup>30</sup> but '*verification of non-financial data is largely voluntary*'<sup>31</sup>. Therefore, the user can rely primarily on the reliability of the entity. Further investigations should lead to find a systemic organizational approach to preparing related information and define the requirements for the revision and control of the information, which will help to improve the quality of the information.

#### **Bibliography**

Accounting Act of 29 September 1994, Dz.U. z 2021 r. pos. 217 as amended

Announcement of the Resolution of the Accounting Standards Committee on the adoption of an update of National Accounting Standard No. 9 Report on operations, Dz. Urz. MRiF 2018.4.

Bek-Gaik B., Krasodomska J.: Non-financial disclosures as contemporary corporate reporting – definition, sources and proposed research directions, Cracow Review of Economics and Management, 2018; 2 (974): 25–40, https://doi.org/10.15678/ZNUEK.2018.0974.0202.

Krzysztofek A.: Integrated reporting on the example of Respect Index enterprises, Journal of Management and Finance Vol. 16, No. 2/2018.

Kutera M., Zyznarska-Dworczak B.: Narration in Reporting – How to Verify It?, Studies and Work of the Collegium of Management and Finance, Warsaw School of Economics, 160/2018.

Reporting extended non-financial information for 2017 in accordance with the Accounting Act - First experiences and good practices, Ministry of Finance, Warsaw 2019.

Skoczylas W., Dziadul W.: Diagnosis of the scope of non-financial information. Disclosure by polish companies, Studies and Work of the Collegium of Management and Finance, Warsaw School of Economics, 164/2018.

Walińska E., Gad J.: The key corporate reporting tools in the practice of the Polish capital market – case study, 'Theoretical Journal of Accounting', Accountants Association in Poland, 92 (148)/2017.

Zyznarska-Dworczak B.: The development of non-financial reporting and the possibility of its verification, Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, Nr 285/2016.

### Powiązania między sprawozdaniem finansowym a sprawozdaniem z działalności

#### Streszczenie

Celem autora jest identyfikacja powiązań między dwoma sprawozdawczościami: finansową i niefinansową, a w tym konkretnym artykule - między sprawozdaniem finansowym a sprawozdaniem z działalności, które zawiera informacje niefinansowe, ale powiązane z finansowymi. Do realizacji celu posłużyły studia literaturowe z zakresu rachunkowości, a także analiza aktów prawnych, na bazie których określono jakie powiny być relacje między tymi dwoma sprawozdaniami. Do sformułowania wniosków wykorzystano wnioskowanie dedukcyjne

<sup>&</sup>lt;sup>29</sup> M. Kutera B. Zyznarska-Dworczak: Narration in Reporting – How to Verify It?, Studies and Work of the Collegium of Management and Finance, Warsaw School of Economics 160/2018 pp. 99–111, p. 100.

<sup>&</sup>lt;sup>30</sup> M. Kutera B. Zyznarska-Dworczak: Narration in Reporting – How to Verify It?, Studies and Work of the Collegium of Management and Finance, Warsaw School of Economics 160/2018 pp. 99–111, p. 105.

<sup>&</sup>lt;sup>31</sup> B. Zyznarska-Dworczak: The development of non-financial reporting and the possibility of its verification, Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach, Nr 285 · 2016, s. 222.

i indukcyjne oraz metodę analizy krytycznej, porównawczej i opisowej oraz syntezy. Zostało wykazane istnienie powiązań między sprawozdaniem z działalności a sprawozdaniem finansowym z działalności. Powiązania te mogą rodzić ryzyko powtórzeń i niezgodności informacji. Zostało wskazane, aby powiązania te były uświadomione osobom sporządzającym oba sprawozdania, by zachowano szczególną uwagę przy prezentowaniu tych informacji i aby wprowadzono do procedur kontroli wewnętrznej w rachunkowości, i ewentualnie audytu wewnętrznego, czynności pozwalające na potwierdzenie uzgodnienia odpowiednich informacji i uniknięcia ryzyka powtórzeń i niezgodności. Wyniki badań pokazują, że powiązań jest na tyle dużo, w tym z informacjami niefinansowymi, że warto, aby zapewnienie ich i ich weryfikacji było świadomą i zorganizowaną czynnością. Będzie to budować obraz jednostki w oczach czytelnika sprawozdań.

Słowa kluczowe: sprawozdanie finansowe, sprawozdanie z działalności, jakość informacji JEL Code: M14

Information about thr outhor

#### Małgorzata Garstka - Doctor of Economics

Jan Kochanowski University in Kielce Wydział Prawa i Nauk Społecznych Katedra Ekonomii i Finansów ul. Uniwersytecka 15, 25-406 Kielce e-mail: malgorzata.garstka@ujk.edu.pl ORCID: 0000-0002-0971-0274



DOI 10.22630/PEFIM.2021.25.74.3

Received: 19.05.2021 Accepted: 07.06.2021

Monika Juchniewicz Institute of Agricultural and Food Economics - National Research Institute Łukasz Podstawka Warsaw University of Life Sciences

### DEVELOPMENT OPPORTUNITIES OF POLISH FARMS

The main objective of the study is to identify and evaluate development opportunities among agricultural holdings in Poland according to agricultural types and economic size classes. The study refers to the period between 2015 and 2019 and concerns data regarding farms run by natural persons conducting agricultural accounting within the Polish FADN. The aim of the study was achieved by assessing the level of income from a family farm as well as accumulation and reproduction in the agricultural holdings under consideration. The research shows that there was a differentiation in the development potential of farms run by natural persons depending on the agricultural type and economic size class. The highest average accumulation in relation to family farm income, as well as the highest reproduction rate, was observed in farms producing poultry. Farms with field crops, horticulture, dairy cows and pigs also had more accumulation than depreciation and these farms provided an extended reproduction of fixed assets. On the other hand, in holdings with mixed crop and animal production, with permanent crops and specialised in grassland animal husbandry, there was a narrower reproduction of fixed assets.

The analysis of agricultural holdings run by natural persons showed that the accumulation rate and the reproduction rate increased along with the economic size of agricultural holdings. Farms with an economic size of up to EUR 25 thousand SO in the studied period recorded a negative accumulation rate and reproduction rate. In the group of farms with an economic size of EUR 25 to 50 thousand, the reproduction rate was 1. On the other hand, in the economic size classes above EUR 50 thousand SO there was an extended reproduction.

Key words: depreciation, accumulation, agricultural holding. JEL Codes: Q12, Q14, D25.

#### Introduction

A farm aims to obtain an economic surplus in the form of income, which is one of the fundamental analytical categories in agricultural economics<sup>1</sup> and is, on the one hand, a determinant of the farm's development opportunities, especially with regard to investments and related accumulation processes<sup>2</sup>; on the other hand, it provides compensation for work and determines the standard of living of farmers and their families. Therefore, an appropriate level of income covers basic social and economic

<sup>&</sup>lt;sup>2</sup> Grzelak A.: Ocena procesów reprodukcji majątku gospodarstw rolnych prowadzących rachunkowość rolną (FADN), Zagadnienia Ekonomiki Rolnej, 3 (340), Wydawnictwo IERiGŹ-PIB, Warszawa 2014, s. 45-51.



<sup>&</sup>lt;sup>1</sup>Kryszak Ł., Czyżewski B.: Determinanty dochodów rolniczych. Warszawa: Wydawnictwo CeDeWu, Warszawa 2020, s. 9.

expectations and enables the farmer's family and the farm to develop<sup>3</sup>. A low level or lack of income erodes the basic function of a farm as a place of work, and the family may start to look into other options for the future<sup>4</sup>. Referring to Ryś-Jurek's review of research on farmstead objectives<sup>5</sup>, it can be noted that of particular importance for farmers were, among others, obtaining a satisfactory level of income from the farm that would cover consumption needs and ensure financial resources to invest in the farm. There are complementary and competitive relationships within the income derivatives, that is, consumption and accumulation over time. In the short term, there is a contradiction between these quantities. Accumulation is the resultant quantity after the satisfaction of consumption needs, which is a priority for farmers and their families<sup>6</sup>. In the long term, this contradiction is not so pronounced, as the accumulation process, and thus investments, will influence the level of farm income and, consequently, consumption in the future<sup>7</sup>.

Accumulation is a part of income whose level determines the capability to survive and develop agricultural holdings. Wiatrak<sup>8</sup> rightly states that "the level of accumulation in a farm indicates the farmer's attitude towards the development of agricultural production in the existing economic conditions and can be used to determine the future development of agriculture", as well as the competitiveness of Polish agricultural holdings on the international market. On the other hand, Józwiak<sup>9</sup> notes that positive accumulation, investment and enlargement of resources testify to the development possibilities and willingness for further agricultural production.

It is therefore important to monitor the income situation and thus the distribution of income between consumption and accumulation in agricultural holdings. This justifies undertaking research in the above area.

The main objective of the study is to identify development opportunities among farms run by natural persons in 2015–2019. The objective was achieved by assessing the level of income from a family farm as well as accumulation and reproduction in individual agricultural types and economic size classes of such agricultural holdings within the Polish FADN.

<sup>&</sup>lt;sup>3</sup>Kata R.: Wewnątrzsektorowe nierówności dochodów gospodarstw rolniczych w Polsce w latach 2004–2017, Nierówności społeczne a wzrost gospodarczy, 61, Wydawnictwo Uniwersytetu Rzeszowskiego, Rzeszów 2020, s. 26-27.

<sup>&</sup>lt;sup>4</sup> Poczta W.: Instrumenty wsparcia ekonomicznego dla rodzinnych gospodarstw rolnych w polityce strukturalnej UE i w ramach interwencjonizmu państwowego oraz rola i znaczenie tych instrumentów. W: M. Podstawka (red.), Ekonomiczne i prawne mechanizmy wspierania i ochrony rolnictwa rodzinnego, KSOW, Warszawa 2015, s. 142-159.

<sup>&</sup>lt;sup>5</sup>Ryś-Jurek R.: Zachowanie finansowe gospodarstw rolnych, Handel wewnętrzny, 4 (363), 2016, s. 242-245.

<sup>&</sup>lt;sup>6</sup> Grzelak A.: Akumulacja majątku w gospodarstwach rolnych w Polsce ze względu na typy produkcyjne i kontekst paradygmatu rozwoju zrównoważonego, Zagadnienia Ekonomiki Rolnej, 3 (360), Wydawnictwo IERiGŻ-PIB, Warszawa 2019, s. 90-91.

<sup>&</sup>lt;sup>7</sup>Wiatrak A. P.: Współzależność akumulacji i spożycia w gospodarstwach i rodzinach chłopskich, Wieś i rolnictwo, 1 (22), 1979, s. 163.

<sup>&</sup>lt;sup>8</sup> Wiatrak A. P.: Uwarunkowania akumulacji w gospodarstwach rodzinnych w rolnictwie, Wieś i rolnictwo, 4 (57), 1987, s. 25.

<sup>&</sup>lt;sup>9</sup>Józwiak W.: Strategie postępowania posiadaczy gospodarstwach rolnych i ich pozarolnicze formy aktywności gospodarczej w latach 1996–2002, Roczniki Naukowe SERIA, 6 (3), 2004, s. 94-100.

#### **Research methodology**

In the study, in order to identify development opportunities, data from commodity farms run by natural persons conducting agricultural accounting within the Polish FADN were used. The analysis covers the period of 2015–2019.

For analytical purposes, consumption was defined as the level of minimum subsistence determined by the Institute of Labour and Social Affairs. The value of accumulation was determined as the difference between the income obtained from a family agricultural holding and estimated consumption. Thus, accumulation was treated as a part of income accumulated in order to maintain the continuity of production processes and carry out investments in an agricultural holding.

In order to achieve the set objective, the income from a family agricultural holding, accumulation rate and reproduction rate were characterised. The values of individual parameters are arithmetic averages from the sample of analysed farms. Income from a family farm in the accounting system used by the Polish FADN is a basic category of result and constitutes an economic surplus from the operational activity of an agricultural holding. It reflects compensation for the farmer's family's unpaid labour and for the involvement of their own capital in the operational activity of the agricultural holding<sup>10</sup>.

Accumulation was analysed by means of the accumulation rate, treated as the ratio of the estimated accumulation value to the income from the family farm. Reproduction, in turn, was determined by the reproduction rate defined as the relation of the estimated value of accumulation to the value of depreciation write-offs in a given year.

Following Sobczyński<sup>11</sup>, it was assumed that if the reproduction rate is above 1, a farm indicates a capacity for expanded reproduction. In the case of a rate equal to 1, simple reproduction occurred, while 0 - < 1 demonstrates narrowed reproduction. On the other hand, with a negative reproduction rate, there is no chance for development or even the possibility to reproduce fixed assets.

The study evaluated the listed economic categories by dividing the farms by agricultural type (TF8): field crops, horticultural crops, permanent crops, dairy cows, grass animals, pigs, poultry, mixed, and by economic size (ES6): very small ( $2 \le \epsilon \le 8$ ), small ( $8 \le \epsilon \le 25$ ), medium-small ( $25 \le \epsilon \le 50$ ), medium-large ( $50 \le \epsilon \le 100$ ), large ( $100 \le \epsilon \le 500$ ) and very large ( $\epsilon \le 500$ ).

Research hypotheses:

- 1. Accumulation and reproduction are positively correlated with the economic size of farms.
- 2. Farms specialising in poultry production have the highest development potential.

#### Findings

As mentioned in the introduction, the level of income from the family farm is particularly important for farmers and their families, as it indicates remuneration for their own work. Some of this income is allocated to accumulation, being one of the basic

<sup>&</sup>lt;sup>10</sup>Goraj L., Mańko S.: Rachunkowość i analiza ekonomiczna w indywidualnym gospodarstwie rolnym, Wydawnictwo Difin, Warszawa 2009.

<sup>&</sup>lt;sup>11</sup>Sobczyński T.: Wpływ wielkości ekonomicznej gospodarstw rolniczych UE na ich możliwości rozwojowe. Zeszyty Naukowe SGGW w Warszawie. Problemy Rolnictwa Światowego, 9 (24), Warszawa 2009, s. 161-162.

sources of investment in farms, and some to consumption, determining the standard of living enjoyed by farmers and their families.

The analysis of the research material presented in Table 1 shows that the average income from a family farm in the studied group of FADN farms at current prices in the period 2015–2019 oscillated between 74,849 and 99,159 PLN. In terms of income, the situation of farms in the studied period was improving. The exception was the year 2018, when there was a 12% decrease against 2017; nevertheless, the average income recorded in that year was higher in comparison with 2015, when it was at the lowest in the analysed period. The highest income per family farm was achieved in 2017. The aforementioned year also saw the highest increase in income, by about 24%.

reproduction id	eproduction fuice in the studied group of furnis in 2015 2017 (average per 1 furni)											
Year	Income from a family farm in PLN	Accumulation rate in %	Reproduction rate									
2015	74,849	47.7	1.0									
2016	80,067	50.6	1.1									
2017	99,159	59.1	1.6									
2018	87,239	52.7	1.3									
2019	95,186	55.6	1.5									

 Table 1. Income from family agricultural holding according to current prices, accumulation rate and reproduction rate in the studied group of farms in 2015–2019 (average per 1 farm)

Source: Own study based on FADN data.

Within the studied group of farms, relatively small changes in as regards the relation between accumulation and income from a family farm may be observed. It should be noted, however, that as the agricultural income increases, the level of accumulation rises and vice versa. This indicates that the propensity to accumulate in agricultural holdings run by natural persons is shaped by the amount of income from the family agricultural holding. Farms in the study achieved an accumulation rate ranging from 47.7 in 2015 to 59.1% in 2017.

The assessment of the development potential of farms based on the assessment of the accumulation rate is an indirect measure. The important issue is to relate the estimated accumulation to annual depreciation allowances, which makes it possible to determine whether farms are able only to reproduce worn-out fixed assets and thus have a chance to function, or whether, in addition to reproducing assets, they have a chance for further development. As Sobczyński<sup>12</sup> states, a condition for the development of an agricultural holding is not only the replacement of production assets, but also making development investments.

In 2015, in the case of the reproduction rate in the surveyed farms run by natural persons, accumulation is equal to depreciation. On the other hand, in other years, the farms achieved more accumulation than depreciation in the given period, which indicates

<sup>&</sup>lt;sup>12</sup> Sobczyński T.: Ocena możliwości rozwojowych gospodarstw rolniczych Unii Europejskiej na podstawie inwestycji netto w latach 1998-2008, Folia Pomeranae Universitatis Technologiae Stetinesis, Oeconomica, 291 (65), 2011, s. 145-156.

not only the possibility of continued operation, but also the development potential within the group of farms covered by the study.

## Agricultural type and development opportunities in agricultural holdings run by natural persons

The assessment of natural persons' farms in terms of income from a family farm, accumulation rate and reproduction rate was conducted for farms grouped by agricultural type. The analysis carried out within the agricultural types showed that the earned income from a family agricultural holding at current prices in 2015–2019 varied (Table 2) and ranged on average from PLN 48,785 to PLN 325,461. Farms oriented towards rearing grassland animals achieved the lowest income from the family agricultural holding within the period under consideration. The highest income of over PLN 325 thousand was generated by farms producing poultry. In these farms, as well as in farms with horticultural crops, dairy cows, grassland animals, pigs and farms with mixed crop and animal production, significant income growth was recorded between 2019 and 2015. Particularly high income growth per family farm occurred on farms specialising in pig rearing (income growth between 2019 and 2015 was 156%). Farms with field crops and especially with permanent crops recorded a decrease in income (by 7 and 23% respectively).

It should be added that the highest income by year for farms with field crops and permanent crops was recorded in 2015. An analogous situation occurred in 2017 among farms specialising in dairy cows, grassland animals and farms with mixed production profile. For other agricultural types of farms, i.e. horticultural crops, pigs and poultry, the highest income was recorded in 2019.

Year	Field crops	Horticultural crops	Permanent crops	Dairy cows	Grassland animals	Pigs	Poultry	Mixed
2015	90,291	112,706	69,696	86,607	46,466	79,592	315,133	45,987
2016	82,007	101,969	40,861	99,150	46,977	135,177	280,783	56,014
2017	92,530	80,736	66,420	145,152	52,224	157,763	319,177	70,247
2018	88,020	92,595	33,043	136,298	45,890	98,295	329,422	58,107
2019	84,161	117,377	53,924	139,740	51,154	204,040	390,639	67,854
Average level during the period under consideration	87,308	101,056	52,831	120,469	48,785	130,476	325,461	59,158

 Table 2. Income from a family farm according to current prices divided into agricultural types for the surveyed farms in 2015–2019 (average per 1 farm in PLN)

Source: Own study based on FADN data.

In the group of surveyed agricultural holdings a differentiation was observed in the accumulation rate between agricultural types and years covered by the analysis. The analysis of data presented in Table 3 shows that the highest average accumulation value

in relation to income from a family agricultural holding, and thus the most proinvestment, were farms specialising in poultry farming. On the other hand, the lowest ability to develop was characterised by farms with permanent crops and those specialising in grassland animal husbandry. The situation in 2018 of farms with permanent crops is worth highlighting. Income on these farms was insufficient to meet consumption needs. Thus, a negative accumulation rate was recorded on these farms.

Year	Field crops	Horticultural crops	Permanent crops	Dairy cows	Grassland animals	Pigs	Poultry	Mixed
2015	58.7	65.7	45.1	52.3	19.8	50.6	88.6	13.5
2016	54.4	61.7	6.4	57.8	20.0	70.2	86.7	27.6
2017	58.6	50.5	42.1	70.1	27.1	73.7	88.1	40.7
2018	55.7	55.6	-19.6	67.6	13.9	55.8	87.7	27.3
2019	52.7	63.8	24.5	67.4	19.9	78.3	89.7	35.9
Average level during the period under consideration	56.0	60.4	26.1	64.2	20.2	68.2	88.3	29.9

 Table 3. Accumulation rate divided into agricultural types for surveyed farms in 2015–2019 (average per 1 farm in %)

Source: Own study based on FADN data.

In the case of the surveyed farms run by natural persons, the development activity determined by the relation between accumulation and depreciation was differentiated depending on the agricultural type.

Year	Field crops	Horticultural crops	Permanent crops	Dairy cows	Grassland animals	Pigs	Poultry	Mixed
2015	1.3	1.7	0.7	1.1	0.4	0.9	3.6	0.2
2016	1.1	1.4	0.1	1.4	0.4	2.0	3.5	0.5
2017	1.4	1.0	0.6	2.5	0.6	2.4	3.8	1.0
2018	1.3	1.3	-0.2	2.3	0.3	1.2	4.3	0.6
2019	1.3	1.8	0.3	2.3	0.4	3.3	5.2	0.8
Average level during the period under consideration	1.3	1.4	0.3	1.9	0.4	1.9	4.1	0.6

 Table 4. Reproduction rate divided into agricultural types in the surveyed farms in 2015–2019 (average per 1 farm)

Source: Own study based on FADN data.

In light of the data presented in Table 4, by far the most favourable situation in this respect, in 2015–2019, was recorded in farms specialising in poultry, where accumulation was on average about 4 times higher than depreciation. In the case of farms with field crops, horticultural crops, dairy cows and pigs, there was also more accumulation than depreciation, but it was not as significant as in the case of poultry farms. Farms of the aforementioned agricultural types manifested an extended reproduction of fixed assets, which meant that in addition to the chances for further functioning, they also showed a developmental approach. On the other hand, in farms with mixed plant and animal production, with permanent crops and specialised in grassland animal husbandry, the level of accumulation is lower than the level of annual depreciation write-offs. Farms of these types were only capable of limited reproduction of fixed assets (fixed asset reproduction rates from 0.3 to 0.8). This means that these farms were not able to reproduce the value of consumed fixed assets, and even less to undertake developmental activities.

## Economic size and development potential of farms run by natural persons

Recognition of development opportunities for farms run by natural persons from the FADN sample was enriched by an assessment of income, accumulation rate and reproduction rate in farms according to economic size classes. Analysing Table 5, it may be noticed that the average income from a family farm, within the period in question, is directly proportional to the economic size of agricultural holdings. In the analysed period the average level ranged from PLN 9,466 to 917,840.

2010 2019										
Year	Very small $(2 \le \epsilon \le 8)$	Small $(8 \le \in <25)$	Medium- small (25 <= € < 50)	Medium-large (50 <= € < 100)	Large (100 <= € < 500)	Very large (€ = > 500)				
2015	8,040	27,228	61,630	109,049	251,726	828,446				
2016	8,604	27,529	65,821	123,066	282,814	775,932				
2017	9,576	33,376	84,174	160,648	343,651	802,644				
2018	8,061	30,920	78,780	148,257	311,198	822,279				
2019	11,959	34,860	83,220	163,222	371,394	1,395,053				
Average level during the period under considerati on	9,466	30,864	74,355	139,999	309,591	917,840				

 Table 5. Income from the family farm divided according to economic size classes in the surveyed farms in 2015–2019 (average per 1 farm in PLN)

Source: own study based on FADN data.

The highest incomes were achieved by the economically strongest farms, the so-called very large farms. In the researched period, the lowest income from a family agricultural holding occurred in very small farms, i.e. farms with an economic size between EUR 2 and 8 thousand SO. Among the farms distinguished by economic size classes, between 2015 and 2019 there was a significant increase in income. A particularly strong growth in family farm income at current prices occurred in farms with an economic size of more than EUR 500 thousand SO (here, income growth between 2015 and 2019 stood at 68%). It should be added that the highest current income in all analysed groups was recorded in 2019, while the lowest was in 2015, with the exception of very large farms, where 2016 saw the lowest family farm income in the analysed years.

The data presented in Table 6 show that in the studied holdings of natural persons separated by economic size class, in 2015–2019, there were significant differences in the accumulation rate. In very small and small farms, i.e. farms with an economic size of up to EUR 25 thousand SO, the accumulation rate, in all the years studied, was negative, and so accumulation did not occur. Consumption in this group of farms exceeded the obtained income from the family agricultural holding. On the other hand, in agricultural holdings over EUR 50 thousand, the accumulation rate ranged from 44.8% in medium-large agricultural holdings.

Year	Very small $(2 \le \epsilon \le 8)$	Small (8 <= € < 25)	Medium- small (25 <= € < 50)	Medium- large (50 <= € < 100)	Large (100 <= € < 500)	Very large $(\in = > 500)$
2015	-345.2	-37.3	35.8	62.0	83.7	95.8
2016	-315.8	-36.6	39.1	65.8	85.2	95.0
2017	-285.9	-15.0	51.0	73.0	87.4	94.9
2018	-371.8	-26.6	46.7	70.2	85.7	94.8
2019	-223.3	-15.8	48.5	72.1	87.6	96.9
Average level during the period under consideration	-294.3	-25.1	44.8	69.1	86.0	95.7

**Table 6.** Accumulation rate divided into economic size classes in the surveyed farms in 2015–2019 (average per 1 farm in %)

Source: own study based on FADN data.

It was observed, that as the economic size rises, so too does the reproduction rate (Table 7). Farms with an economic size of up to EUR 25 thousand SO, in the examined period, recorded a negative reproduction rate, which indicates a lack of development opportunities or even the possibility to reproduce fixed assets. It can be concluded that the functioning of these farms is possible due to the income obtained from outside the
agricultural holding<sup>13</sup> (Kambo, Juchniewicz and Michalak, 2020). In the group of medium-small farms, i.e. with an economic size of EUR 25 to 30 thousand, there was simple reproduction (1), which indicates a chance for further functioning and manifests itself in the possibility to reproduce farm assets. However, there are no development opportunities in this group of farms. In the remaining economic size classes, i.e. above EUR 50 thousand SO, there was extended reproduction (1.8 - 3.3). Definitely, the most favourable situation was observed in very large farms (above EUR 500 thousand SO), where the estimated accumulation, on average in the examined period, was more than 3 times higher than depreciation. However, in 2019, the reproduction rate here reached 5.7. Medium-large, large and especially very large holdings were not only able to reproduce fixed assets, but also showed great development potential.

Year	Very small $(2 \le \epsilon \le 8)$	Small (8 <= € < 25)	Medium- small (25 <= € < 50)	Medium- large (50 <= € < 100)	Large (100 <= € < 500)	Very large $(\in = > 500)$
2015	-3.0	-0.6	0.7	1.2	2.0	3.2
2016	-3.1	-0.6	0.8	1.5	2.3	2.7
2017	-2.7	-0.3	1.3	2.2	3.0	2.7
2018	-2.8	-0.4	1.1	1.9	2.6	2.8
2019	-2.5	-0.3	1.2	2.2	3.1	5.7
Average level in the period under consideration	-2.8	-0.4	1.0	1.8	2.6	3.3

**Table 7.** Reproduction rate divided according to economic size classes in the surveyed farms in 2015–2019 (average per 1 farm)

Source: Own study based on FADN data.

## Summary

The research reveals a differentiation in the development potential of natural persons' farms depending on the agricultural type and economic size class. With respect to agricultural types, the highest average value of accumulation in relation to income from a family farm as well as the highest reproduction rate (4.1) was recorded in farms specialising in poultry farming. Thus, hypothesis two was positively verified. In farms with field crops, horticultural crops, dairy cows and pigs, there was also more accumulation than depreciation, but it was not as significant as in the case of poultry farms. Farms of the aforementioned agricultural types provided an extended reproduction of fixed assets, which meant that in addition to the capacity for further functioning, they also demonstrated a developmental approach. On the other hand, in farms with mixed plant and animal production, with permanent crops and specialised in

<sup>&</sup>lt;sup>13</sup>Kambo K., Juchniewicz M., Michalak P.: Poziom i struktura dochodów rodzin rolników w gospodarstwach prowadzących rachunkowość w 2018 roku, Wydawnictwo IERiGŻ-PIB, Warszawa 2020.

grassland animal husbandry, there was a narrower reproduction of fixed assets, which indicates that these farms were not able to recreate the value of consumed fixed assets, and even less likely to undertake developmental activities.

The analysis of agricultural holdings of natural persons showed that the accumulation rate and the reproduction rate increased with the economic size of agricultural holdings, which means that the first hypothesis was confirmed.

Farms with an economic size of up to EUR 25 thousand SO, in the examined period, recorded a negative accumulation rate and reproduction rate, which indicates the lack of development opportunities, or even the possibility of reproducing fixed assets. In the group of farms with an economic size of EUR 25 to 50 thousand, the reproduction rate was equal to 1, which indicates a chance for further functioning, without development opportunities. On the other hand, in the economic size classes above EUR 50 thousand SO featured extended reproduction. Farms in this group were not only able to reproduce fixed assets, but they also show great development opportunities.

## References

Goraj L., Mańko S.: Rachunkowość i analiza ekonomiczna w indywidualnym gospodarstwie rolnym, Wydawnictwo Difin, Warszawa 2009.

Grzelak A.: Akumulacja majątku w gospodarstwach rolnych w Polsce ze względu na typy produkcyjne i kontekst paradygmatu rozwoju zrównoważonego, Zagadnienia Ekonomiki Rolnej / Problems of Agricultural Economics, 3 (360), Wydawnictwo IERiGŻ-PIB, Warszawa 2019, p. 90-91.

Grzelak A.: Ocena procesów reprodukcji majątku gospodarstw rolnych prowadzących rachunkowość rolną (FADN), Zagadnienia Ekonomiki Rolnej / Zagadnienia Ekonomiki Rolnej, 3 (340), Wydawnictwo IERiGŻ-PIB, Warszawa 2014, pp. 45-51.

Józwiak W.: Strategie postępowania posiadaczy gospodarstwach rolnych i ich pozarolnicze formy aktywności gospodarczej w latach 1996–2002, Roczniki Naukowe SERiA, 6 (3), 2004, pp. 94-100.

Kambo K., Juchniewicz M., Michalak P.: Poziom i struktura dochodów rodzin rolników w gospodarstwach prowadzących rachunkowość w 2018 roku, Wydawnictwo IERiGŻ-PIB, Warszawa 2020.

Kata R.: Wewnątrzsektorowe nierówności dochodów gospodarstw rolniczych w Polsce w latach 2004–2017, Nierówności społeczne a wzrost gospodarczy, 61, Wydawnictwo Uniwersytetu Rzeszowskiego, Rzeszów 2020, pp. 26-27.

Kryszak Ł., Czyżewski B.: Determinanty dochodów rolniczych. Warszawa: Wydawnictwo CeDeWu, Warszawa 2020, p. 9.

Poczta W.: Instrumenty wsparcia ekonomicznego dla rodzinnych gospodarstw rolnych w polityce strukturalnej UE i w ramach interwencjonizmu państwowego oraz rola i znaczenie tych instrumentów. In: M. Podstawka (eds.), Ekonomiczne i prawne mechanizmy wspierania i ochrony rolnictwa rodzinnego, KSOW, Warszawa 2015, pp. 142-159.

Ryś-Jurek R.: Zachowanie finansowe gospodarstw rolnych, Handel wewnętrzny, 4 (363), 2016, pp. 242-245.

Sobczyński T.: Ocena możliwości rozwojowych gospodarstw rolniczych Unii Europejskiej na podstawie inwestycji netto w latach 1998-2008, Folia Pomeranae Universitatis Technologiae Stetinesis, Oeconomica, 291 (65), 2011, pp. 145-156.

Sobczyński T.: Wpływ wielkości ekonomicznej gospodarstw rolniczych UE na ich możliwości rozwojowe. Zeszyty Naukowe SGGW w Warszawie. Problemy Rolnictwa Światowego, 9 (24), Warszawa 2009, pp. 161-162.

Wiatrak A. P.: Współzależność akumulacji i spożycia w gospodarstwach i rodzinach chłopskich, Wieś i rolnictwo, 1 (22), 1979, p. 163.

Wiatrak A. P.: Uwarunkowania akumulacji w gospodarstwach rodzinnych w rolnictwie, Wieś i rolnictwo, 4 (57), 1987, p. 25.

## Możliwości rozwojowe gospodarstw rolnych w Polsce

## Streszczenie

Głównym celem opracowania jest rozpoznanie i ocena możliwości rozwojowych wśród gospodarstw rolnych w Polsce ze względu na typy rolnicze i klasy wielkości ekonomicznej. Zakres czasowy opracowania odnosi się do lat 2015-2019 i dotyczy wyników gospodarstw rolnych osób fizycznych prowadzących rachunkowość rolną w ramach Polskiego FADN. Cel opracowania został zrealizowany poprzez ocenę poziomu dochodu z rodzinnego gospodarstwa rolnego, akumulacji i reprodukcji w badanych gospodarstwach rolnych. Z przeprowadzanych badań wynika, iż wystąpiło zróżnicowanie możliwości rozwojowych gospodarstwa osób fizycznych w zależności od typu rolniczego i klasy wielkości ekonomicznej. W gospodarstwach z drobiem odnotowano najwyższą średnią wartość akumulacji w stosunku do dochodu z rodzinnego gospodarstwa rolnego, jak również najwyższy wskaźnik reprodukcji. W gospodarstwach z uprawami polowymi, ogrodniczymi, krowami mlecznymi i trzodą chlewną również wystąpiła przewaga akumulacji nad amortyzacją i gospodarstwa te zapewniały rozszerzoną reprodukcję majątku trwałego. Z kolei w gospodarstwach z mieszaną produkcją roślinną i zwierzęcą, z uprawami trwałymi oraz wyspecjalizowanych w chowie zwierząt trawożernych miała miejsce zawężona reprodukcja majątku trwałego.

Analiza gospodarstw rolnych osób fizycznych wykazała, że stopa akumulacji i wskaźnik reprodukcji rosły wraz ze wzrostem wielkością ekonomiczną gospodarstw rolnych. Gospodarstwa o wielkości ekonomicznej do 25 tys. euro SO w badanym okresie odnotowały stopę akumulacji i wskaźnik reprodukcji mniejsze od zera. W grupie gospodarstw o wielkości ekonomicznej od 25 do 50 tys. euro, wskaźnik reprodukcji był równy 1. Natomiast w klasach wielkości ekonomicznej powyżej 50 tys. euro SO miała miejsce reprodukcja rozszerzona.

Słowa kluczowe: amortyzacja, akumulacja, gospodarstwo rolne. Kody JEL: Q12, Q14, D25.

Information about the author:

#### Mgr. Monika Juchniewicz

Institute of Agricultural and Food Economics - National Research Institute Świętokrzyska 20, 00-002 Warszawa e-mail: monika.juchniewicz@ierigz.waw.pl ORCID: 0000-0003-3016-1430

#### Mgr. Łukasz Podstawka

Warsaw University of Life Sciences Nowoursynowska 166, 02-787 Warszawa e-mail: lukasz\_podstawka@sggw.pl ORCID: 0000-0002-7394-0218



DOI 10.22630/PEFIM.2021.25.74.4

Received: 31.05.2021 Accepted: 15.06.2021

Małgorzata Leszczyńska, Beata Kasprzyk University of Rzeszow

## CHANGES IN THE INCOMES AND EXPENDITURES OF HOUSEHOLDS IN POLAND AND THEIR REGIONAL RELATIONS

The article assesses the financial situation of households in 2000-2019 in prospect of changes of incomes and expenditures in Poland. It has been assumed, as a point of reference, that dispersion of the analysed processes is dependent on geographical area– therefore regional scale was applied. To the analysis and comparison the data from the researches on households budgets performed by GUS were used. Adopting simultaneously an econometric approach (considering the time (years 2000-2019) as independent, explanatory variable) analytical trend functions were estimated. A retrospective analysis of the incomes and expenditures of the population of Poland indicates the growing trends. Regional comparative analysis of households allows to draw conclusions that level of economic condition is very diversified.

Key words: income and expenditure, households, economic standard of living, regional analysis, personal finances, social inequalities JEL codes: D12, D31, I31, R2

## Introduction

Economic prosperity of a society is a complex economic and social category<sup>1</sup>. Widely known, indirect dimensions of macroeconomic type are measures, such as<sup>2</sup>: GDP *per capita*, national income, individual income of population or inflation rate. The measures are applied as instruments for comparison of prosperity, particularly among countries or regions<sup>3</sup>. In more detailed economic analyses, in measuring life quality and its diversification among societies, in the economic dimension on a microeconomic scale, various household income variants are employed<sup>4</sup>. In that regard, a basic indicator is *household's available income*, which is gross income with the exclusion of fixed financial liabilities of tax, including all current income of a household within a specified

<sup>&</sup>lt;sup>4</sup> Comp. e.g.: W. Ostasiewicz: Dobrobyt i jakość życia: badania w Polsce i zagranicą, "Śląski Przegląd Statystyczny" 11/2017, pp. 243-258; Cz. Bywalec: Gospodarstwo domowe: ekonomika, finanse, konsumpcja, Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie, Kraków 2017.



<sup>&</sup>lt;sup>1</sup> E. Babula, T. Kamińska: Uwarunkowania dobrobytu w sferze realnej, Published by: Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2013; M. Zaremba: Dobrobyt społeczny – problemy metodologiczne i definicyjne, "Nierówności Społeczne a Wzrost Gospodarczy" 4/2016, pp. 323-331.

<sup>&</sup>lt;sup>2</sup> G. Wronowska: Dobrobyt – ujęcie teoretyczne i pomiar, Zeszyty Naukowe "Cracow Review of Economics and Management" 12 (948) /2015, pp. 5-16.

<sup>&</sup>lt;sup>3</sup> A. Blajer-Gołębiewska, L. Czerwonka (eds.): Mikro- i makroekonomiczne aspekty tworzenia dobrobytu, Published by: Uniwersytet Gdański, Gdańsk 2014; D. Kahneman: International Differences in Well-Being, Series in Positive Psychology, Oxford University Press, New York 2010.

period of time<sup>5</sup>. Such income is allocated to expenditures (consumer goods and services and other expenses), as well as savings accumulation (unrealised expenditures). As the realised expenditures are allocated to the satisfaction of household needs, together with the income they constitute an image of household economic prosperity.

Due to the above definitions, the aim of the present research is an assessment of the material situation of households in the time period  $(2000-2019 \text{ years})^6$ , in the range of the financial categories of economic prosperity of pecuniary type, *i.e.* income and expenditure on an all-Poland scale. The next cognitive aim of the article is the analysis of the scale and the level of diversification of regional prosperity of households, with particular focus on the so called eastern Poland regions. The answer to the question about an objective level of income and expenditure, as well as establishing relations between those values in particular regions of Poland is very significance. Such analysis will also allow us to establish the real level of economic prosperity of the population and its diversity, which is especially important for overall socio-economic development<sup>7</sup>.

This article is a partial contribution to the literature and empirical approach of the main determinants of households welfare. We hope that this publication will prove to be a valuable source of knowledge for many institutions and individuals interested in the presented issues.

## **Research material and methodology**

The present analysis of the living conditions of the population and the conclusions concerning the assessment of the influence of selected factors on economic prosperity on the formation of the level and diversification of households welfare was based on the data received from household budget research carried out by GUS (Polish Central Statistical Office). The analysis of incomes and expenditures of households was made in a dynamic view in the long term time (2010-2019 years).

Adopting simultaneously an econometric approach<sup>8</sup> (considering the time variable as the model clarifying variable) analytical functions of the trend for the studied variables were estimated. Based on empirical data an assessment of structural and stochastic parameters of linear function of the trend for income and expenditure per person (in real approach) was estimated.

The assumed point of reference of the article is, that the dispersion and polarisation of basic categories of economic prosperity of income and its derivatives, among which is expenditure, is mainly dependent on geographical area of residence. Verification of the authenticity of this hypothesis on the basis of empirical data, proves to concern only lower territorial units (district, size of the town), as well as province scale and most of all

<sup>&</sup>lt;sup>5</sup> Zeszyt metodologiczny. Badanie budżetów gospodarstw domowych, GUS, Warszawa 2018.

<sup>&</sup>lt;sup>6</sup> Researches in this area carried out for the years 2000-2010 can be found in the paper: M. Leszczyńska, B. Kasprzyk. Dochody i wydatki jako determinanty dobrobytu ekonomicznego gospodarstw domowych w Polsce – ujęcie regionalne, "Nierówności Społeczne A Wzrost Gospodarczy", 2012/28, pp. 263-273.

<sup>&</sup>lt;sup>7</sup> Krajowa Strategia Rozwoju Regionalnego 2010-2020: Regiony, Miasta, Obszary wiejskie, Monitor Polski 2011, no. 36, pos. 423; Uchwała nr 8 Rady Ministrów z dnia 14 lutego 2017 r. w sprawie przyjęcia Strategii na rzecz Odpowiedzialnego Rozwoju do roku 2020 (z perspektywą do 2030 r.), Monitor Polski 2017, pos. 260; Krajowa Strategia Rozwoju Regionalnego 2010-2020: Regiony, Miasta, Obszary wiejskie, Monitor Polski 2011, no. 36, pos. 423.

<sup>&</sup>lt;sup>8</sup> S.M. Kot, J. Jakubowski, A. Sokołowski: Statystyka, Difin S. A. 2011, pp. 337-339.

- regional. Therefore, the analysis included households spatially related to the macroregions of Poland. Out of 16 Polish provinces 7 regions were selected (following GUS methodology) with the following provincial composition: Central region (voivodships: łódzkie, świętokrzyskie); Southern region (voivodships: Małopolskie, Śląskie); Eastern region (voivodships: Lubelskie,Ppodkarpackie, Podlaskie); Northern-western region (voivodships: Lubuskie, Wielkopolskie, Zachodniopomorskie); Southern-western region (voivodships: Dolnośląskie, Opolskie); Northern region (voivodships: Kujawsko-pomorskie, Pomorskie, Warmińsko-mazurskie); Macroregion: voivodships: (only Mazowieckie).

The analysis was particularly focused on the eastern region and presents the discussed economic categories related to the material situation in this region in relation to the all-Poland, as well as to other regions.

#### **Results of the research**

Diverse average monthly incomes and the expenditures are strictly correlated with specific socio-economic-demographic conditions of individual households<sup>9</sup>. Some, of the main differential factors include: belonging to a socio-economic group, type of professional activity, level of education of the head of a household, biological family type, composition or the age of the household members.

However, economic standard of living is a category which considerably diversifies households, changeable in the area of their specific features, as well as in time. A significant initial element of the analysis seems to be a retrospective research, presenting a 'historic' image of the formation of the basic categories of economic prosperity, represented by incomes and expenditures of households. Fig. 1 presents the overall level of nominal income and expenditure *per person* in Poland. Tab. 1 presents ratios which indicate interpretation of the direction and the strength of the dynamics of such phenomena, and also their mutual relations.



**Figure. 1.** Nominal income and expenditure per person in households in Poland in 2000-2019 *Source:* Own study on the basis of: www.stat. gov.pl [accessed May 19, 2021].

In the first year of analysed period – year 2000, average monthly disposable income per person in Poland nominally reached 611 PLN. The nominal income was systematically increasing in the following years. In the year 2010 the income was about

<sup>&</sup>lt;sup>9</sup> D. Abramczyk: Społeczne, demograficzne, ekonomiczne i geograficzne uwarunkowania zarządzania budżetem domowym w Polsce, Uniwersytet Marii Curie-Skłodowskiej w Lublinie, "Finanse i Prawo Finansowe" 3(19)/2018, pp. 9-24.

1200 PLN and nominally nearly doubled the one of the year 2000, and to lately reached the level of 1819 PLN in the year 2019. Assessment of expenditure dynamics in the analysed period is similar. Average monthly disposable expenditure per person in Poland - in a nominal approach - was increasing from the level of 599 PLN in 2000 to 1252 PLN in 2019.

Year	Income	Expenditure	Expenditure/Income
	Dynamics 2000 = 100 (in %)		(in %)
2000	100,0	100,0	98,0
2001	104,3	102,2	95,9
2002	108,7	104,3	94,1
2003	116,5	113,2	95,1
2004	120,3	116,0	94,4
2005	124,5	115,2	90,5
2006	136,7	124,4	89,1
2007	152,0	135,2	87,1
2008	171,2	150,9	86,3
2009	182,3	159,8	85,7
2010	196,6	166,6	83,1
2011	202,1	170,5	82,7
2012	209,2	175,5	82,2
2013	212,6	177,3	81,8
2014	219,3	179,5	80,2
2015	226,8	182,1	78,8
2016	241,4	189,0	76,7
2017	261,5	196,3	73,6
2018	277,1	198,2	70,1
2019	297.7	209.0	68.8

 Table 1. Dynamics of average monthly disposable income and expenditure per person in households in Poland

 2000 – 2019

Source: Own compilation and calculation on the basis of: www.stat.gov.pl [accessed May 19, 2021].

Relation between expenditure and income should be assessed as an advantage. In a view of this ratio a significant decreasing trend can be noticed.

Considering the changes of incomes and expenditures, the appropriate approach, which is more precise and credible, should take account of real level of variables being under these researches (comp. fig. 2 and tab. 2).



**Figure. 2.** Real income and expenditure in total per person in households in Poland 2000–2019 *Source*: Own study on the basis of: www.stat. gov.pl [accessed May 19, 2021].

The values of studied variables, in this case significantly lower – in real approachindicates that over the period of studied 20 years the real income per person had been raised only by 92,8% (nominally by 198,0%), while expenditures only by 35,2%(nominally by 109,0%).

I Cal	Rea		Real experiuture		
	Dynamics	Dynamics	Dynamics	Dynamics	
	[year 2000=100	[previous year=100	[year 2000=100 (in %)]	[previous year=100 (in	
	(in %)]	(in %)]		%)]	
2000	100,0	-	100,0	-	
2001	102,6	102,6	100,4	96,8	
2002	102,8	100,2	98,6	100,2	
2003	103,9	101,1	100,9	107,6	
2004	104,7	99,8	100,8	99,0	
2005	106,4	101,4	98,2	97,2	
2006	111,5	108,5	101,3	106,8	
2007	116,7	108,6	103,7	106,0	
2008	121,6	108,0	107,0	107,1	
2009	125,9	103,0	110,1	102,3	
2010	145,7	105,0	123,6	101,6	
2011	142,9	98,6	120,5	98,0	
2012	141,7	99,9	118,9	99,4	
2013	143,0	101,7	119,3	99,4	
2014	148.0	103,2	121,0	101,6	
2015	154,8	104,3	124,3	102,1	
2016	165,8	107,0	129,7	104,3	
2017	176,1	106,3	132,2	101,9	
2018	183,6	104,3	131,2	99,3	
2019	192.8	105.0	135.2	103.1	

 Table 2. Dynamics of real\* income and expenditure per person in households in total in Poland 2000 – 2019

 Var

 Pack income

 Pack income

\* Statistics on income and expenditure in a real view has been reduced to comparability (of constant prices). The levels of nominal incomes have been corrected with inflation rate - the price index of consumer goods and services was used).

Source: Own compilation and calculation on the basis of: www.stat.gov.pl [accessed May 19, 2021].

In the analysed period the rate of the changes of real incomes was higher, than the one of real expenditures. Such tendency is indicated by rates changes in both, a nominal and a real view. Real income and expenditure tempo growth in the years 2000-2019 was 3,52% (for income) and 1,67% (for expenditure), respectively. It can be noted, that the years 2011 – 2013 characterized a slight decline in real income, and a short-term stagnation. Only thereafter the incomes generated higher internal demand, and hence the consumer goods and services consumption growth. It needs to be reflected that the child benefit ('Rodzina 500+' (Family 500+)) granted for some families and introduced on 01.04.2016, represented 16,8% of disposable income per person in the households entitled. Further, it translates into the growth of income and prosperity of households in an economic view, while the effects in the structure of income and expenditure are to be seen in the years upcoming.



Fig. 3 presents the general comparative overview of differences in value of income and expenditure in a nominal and a real view.



The next analysis is the building the time series models due to estimation of a linear functions, carried out below. Time series processes are often described by dynamic linear models:

$$Y_t = \alpha_0 + \alpha_1 t + \varphi_t$$

The empirical time series is treated as a sample on periods of the studied independent variable (t = 1, 2, ...), model is given below:

 $\hat{\mathbf{y}}_t = a_0 + a_1 t + e_t$ 

where  $y_t$  is an observed response (past observations) and t includes contemporaneous values of observable predictor. The coefficient  $\alpha_l$   $(a_l)$  represent the marginal contributions of individual predictor to the variation in  $y_l$ . The term  $\zeta_t$   $(e_t)$  is a catch-all for differences between predicted and observed values of  $y_t$ . These differences are due to process fluctuations, measurement errors and model misspecifications (for example, omitted predictors or nonlinear relationships between t and  $y_t$ . Basic stochastic parameters of models are:  $R^2$  - R-squared - coefficient of determination (normally ranges from 0 to 1) and  $s_e$ - standard error of the estimate<sup>10</sup>.

<sup>&</sup>lt;sup>10</sup> A. D. Aczel: Statystyka w zarządzaniu, PWN, Warszawa, 2000, pp. 624-627; M. Cieślak: Prognozowanie gospodarcze. Metody i zastosowania, PWN, Warszawa, 2012, pp. 76-78.

Adopting simultaneously an econometric approach (considering the time variable of 2000-2019 and in the model 'time' as the clarifying variable), analytical trend functions for the studied variables has been estimated (in real view). Based on empirical data an assessment of structural and stochastic parameters of linear trend functions *per person* (the incomes - function 1 and expenditures - function 2) was estimated. The theoretical formulas of the analytical functions and the results of stochastic parameters are listed below:

 $\hat{\mathbf{Y}}_{t \text{ (incomes)}} = 29,39 \ t + 513,31$  $(1,72) \ p=0,00 \ (20,66) \ p=0,00$  $s_e = 44,47; \ R^2 = 0,9416 \ (F=290,42; \ p=0,0000)$ (1)

$$Y_{t (expenditures)} = 12,58 t + 549,82$$

(0,92) p=0,00 (10,99) p=0,00

 $s_e = 23,66; R^2 = 0,9127 (F = 188,13; p = 0,0000)$  (2)

Due to the correct fitting of both functions to real data (high value of determination indicators  $R^2$  and statistical significance of structural parameters p=0000), we may assume, that during the analysed years, average income *per person* has been increased annually by 29,39 PLN, while the expenditure growth was considerably slower, respectively 12,58 PLN. On fig. 4. assessment of "the diversity gap" for the real disposable income and expenditure in Poland is presented. The values have been calculated as an absolute levels, the findings shows important conclusions.



Figure. 4. The diversity gap - real disposable income and expenditure, in total per person in Poland 2000–2019 (PLN)

Source: Own elaboration based on data published by Central Statistical Office of Poland www.stat.gov.pl [accessed May 19, 2019].

We observe the gradual growth in deviation between income and expenditure *per person* in the period analysed. While at the beginning, in 2000 and to 2004, income and expenditure were nearly equal and in 2004 an absolute difference was only 36 PLN. In 2010 it was already 201,38 PLN to eventually reach 567 PLN in 2019 (although real only 368 PLN).

As a consequence of mutual divergence in income and expenditure, it turns out, that the percentage participation of total expenditure in disposable income per person in households, during the last decade was decreasing systematically (tab. 1) from 98% in 2000 to 69% at the end of the analysed period. Such changes indicate not only the increasing significance of accumulation in households, but also the better incomeexpenditure situation, particularly visible in comparison 2010 and 2019. The growth of incomes allowed the growth of economic prosperity. The material situation of households has been gradually improved, and next, this positive trend allowed to increase the savings scale, drawn from the current incomes. Notably, such tendencies are convergent with the trends occurring in countries with high economic development.

The next point of analysis for the variables is a comparative analysis in the regions of Poland in 2019. The analysis is particularly focused on the Eastern region and the relations of the discussed economic categories of the material situation in that region in relation to the all-Poland data, as well as data to other regions. The values of incomes and expenditures comparison in regions in 2019 is presented on fig. 5.





Source: Own elaboration based on data published by Central Statistical Office of Poland www.stat.gov.pl [accessed May 19, 2021].

Empirical data undeniably points to the fact, that an average economic condition of households depends on the region of residence<sup>11</sup>. In the Eastern region, average income, as well as expenditure, is the lowest in comparison to the all-Poland and individual regions. The situation was the same, in 2010 and in 2019. We may still observe these variations, the average income in this region in 2019 were established on the level of 1566 PLN, while the average income in Poland levelled 1819 PLN. Such situation results in concurrent lowest total expenditure amounting barely to 830 PLN in 2010 (monthly per person in a household). In the Eastern region expenditures in 2019 were at the level of 1057 PLN, while the average national was 1252 PLN. Similarly, the lowest absolute discrepancy between income and expenditure also concerns this region, where it

<sup>&</sup>lt;sup>11</sup> Comp. e.g. M. Grzywińska-Rąpca, M. Kobylińska: Regionalne zróżnicowanie dochodów gospodarstw domowych. "Wiadomości Statystyczne", 64, 12/2019, pp. 46-57; T. Panek.: Jakość życia gospodarstw domowych w Polsce w układzie wojewódzkim. "Zeszyty Naukowe Instytutu Statystyki i Demografii SGH", 2015/46, pp.1–111; Regionalne zróżnicowanie jakości życia w Polsce, GUS, Warszawa 2017.

amounted to 159 PLN in 2010 and, in 2019, though it raised to the level of 509 PLN, it continuously indicates the lowest accumulation of savings (unrealised expenditures). While in 2010 the highest range of the analysed prosperity categories concerns the Central and Northern region (respectively 245 PLN and 239 PLN), it referred to the Northern-western region, Southern region and macroregion voivodship Mazowieckie in 2019 (respectively 605 PLN, 623 PLN and 632 PLN<sup>12</sup>. The dispersions and quantitative inter-regional relations are presented in fig. 6. It specifies absolute fluctuations within the researched categories: incomes-expenditures *per person* in 2019.



Figure 6. Average monthly disposable income and expenditure per person in households (regions of Poland) in 2019 (PLN)

Source: Own elaboration based on data published by Central Statistical Office of Poland www.stat.gov.pl [accessed May 19, 2021].

While in 2010 in the Central region (in an absolute level), income was higher than the average by about 270 PLN, with expenditure by about 220 PLN, in the Eastern region these values were lower than the average, and the difference amounts were respectively: 204 PLN for income and 162 PLN for expenditure. At the same time, income in that region was lower by as much as 474 PLN, with expenditure by 383 PLN, in comparison to parallel values reached in the Central region<sup>13</sup>. While in 2019, income and expenditure in the Eastern region were lower respectively by 253 PLN and 198 PLN concerning the national average, concerning the region Mazowieckie the income was lower by 25,7% and expenditure by 28,4%. The incomes, as well as the expenditures, in the Eastern region, were lower by 13,4% and 15,6% in comparison to parallel average national values. The decidedly 'remarkable in plus' region, in a regional comparative analysis is the region Mazowieckie. The 'in minus' rating clearly shows the Eastern region to be significantly in the lead with the highest negative material categories, in relation to the national scale (tab. 3).

Notably, on a regional scale, a significant diversification is still observed within the analysed categories of economic prosperity<sup>14</sup>. Whereas expressed in percentages the lowest average income in 2010 constituted only about 68,0% of the highest income

<sup>&</sup>lt;sup>12</sup> comp. Regiony Polski, GUS, Warszawa, years 2011, 2020; Budżety gospodarstw domowych, GUS, Warszawa, year 2011, 2020, p.122, p.138.

<sup>&</sup>lt;sup>13</sup> Budżety gospodarstw domowych, GUS, Warszawa, year 2011.

<sup>&</sup>lt;sup>14</sup> comp. W. Pizło, A. Mazurkiewicz-Pizło.: Regionalne zróżnicowanie dochodów gospodarstw domowych w Polsce, "Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu" 16 96)/2014, pp. 397-402.

achieved by households, in 2019 this relation raised up to 74,3%. It appears, identical range concerned the average expenditures in 2010 and 2019<sup>15</sup>.

	Inc	come	Expe	nditure		Populati	Av	erage
					Expenditu	on	v	alue
Regions	Poland	Position*	Poland	Position*	re/income	structure	Pers	Equival
	=100		=100		(in %)	(in %)	ons	ent
								units
								units**
Total	100	-	100	-	68,8	100	2,61	1,72
Central	96,3	6	101,8	3	72,8	9,7	2,56	1,71
Southern	101,3	3	97,4	5	66,2	20,1	2,61	1,72
Eastern	86,1	7	84,4	7	67,4	14,5	2,75	1,79
Northern-			95,7	6	66,4	15,5	2,65	1,74
western	99,1	4						
Southern-			109,4	2	72,6	10,3	2,50	1,67
western	103,8	2						
Northern	97,0	5	98,2	4	69,7	15,1	2,63	1,73
Mazowiecki			117,9	1	70,0	14,7	2,51	1,67
e	115,9	1						

 Table 3. Relation and rating of monthly disposable income and expenditure, in total, per person in households as per regions (Poland=100, in %) and basic characteristics of households in 2019

\* 1- top position; 6- lowest position

\*\* Equivalent units illustrate the influence of demographic composition of a household on its maintenance expenses (modified equivalence scale OECS was applied in the research).

*Source:* Own elaboration based on data published by Central Statistical Office of Poland www.stat.gov.pl [accessed May 29, 2018; accessed May 19, 2021].

Definitely highest income and expenditure feature in the macroregion Mazowieckie, where they were about 15,9% higher than their national average. Although in the Southern-western region income, as well as expenditure, was higher than the national average, but such dominance for both categories was much lower and was respectively 3,8% and nearly 9,4%. Incomes and expenditures similar to the national scale featured in the northern and southern regions. The last position in all compared categories belongs to the Eastern region (including voivodships: Lubelskie, Podkarpackie and Podlaskie). The span in respect to the all-Poland scale for the two analysed prosperity measures were respectively: 13,9% for income and 15,6% for expenditure. It is worth to mention, that the Podkarpackie voivodship noted the lowest income and expenditure rates. In 2010, the income in this province was by about 24% lower than the national average, and the expenditure was by 17,0% lower than an average of households. However, over the analysed period, this span expressed in percentages increased for incomes, but raised for expenditures. While the distance in respect to income in 2019 was 19,1%, the gap in regard to expenditure in comparison to all-Poland average was 18,8%<sup>16</sup>.

The highest percentage share of expenditure in income in 2010 was noted in the Southern region – nearly 86%, the lowest in the Northern region – less than 80%, with a national average equal 83%. While in 2019, the highest share of expenditure in income

<sup>&</sup>lt;sup>15</sup> comp. Regiony Polski, GUS, Warszawa, years 2011, 2020.

<sup>&</sup>lt;sup>16</sup> comp. Budzety gospodarstw domowych, GUS, Warszawa, year 2011, 2020; Regiony Polski, GUS, Warszawa, year 2011, 2020;.

was noted in the Southern-western region and Central region (nearly 73%), and the lowest in the Northern-western and Southern region (less than 66%). The differences within the scope of expenditure share in income present in Poland and their changes in the regions along the period of 2010-2019 show the significant scale of material economic situation diversification. Nevertheless, a gradual fall of such indicator shows actual progress in that respect.<sup>17</sup>

Apparently, the rating within income and expenditure for the Eastern region places it towards the end of the comparison on a national scale. Notably, about 15% of the researched population resides in that region (tab. 3).

The structure of researched households in each region did not change significantly in the years 2010-2019. However, the changes concern much more significant, regarding incomes and expenditures, characteristics of demographic type, determining an average number of people (and at the same time, consumption and equivalent units). In this respect, the Eastern region, where the number of persons constituting one household, as well as equivalent units the highest in the country, definitely features above the national average, as well as in relation to regions (2,75 and 1,79). Those significant demographic factors are important, explanatory determinants<sup>18</sup> of the level, as well as dispersion of income and expenditure in individual regions of Poland (fig. 7).



Figure 7. Average monthly expenditure in total per person (in PLN) and the average number of persons in a household per regions in Poland in 2019

Notably, the final positions of the Eastern region in the rating according to the income and expenditure level result from other characteristic findings of the composition of households in that area – the highest average number of persons receiving social benefits and relying on the support of employed persons<sup>19</sup>.

Source: Own elaboration based on data published by Central Statistical Office of Poland www.stat.gov.pl [accessed May 19, 2021].

<sup>&</sup>lt;sup>17</sup> Comp. Budżety gospodarstw domowych, GUS, Warszawa, year 2011, 2020.

<sup>&</sup>lt;sup>18</sup> Comp. K. Hanusik, U. Łangowska-Szczęśniak: Determinanty poziomu i zróżnicowania dobrobytu gospodarstw domowych w Polsce w latach 2004-2012, "Zeszyty Naukowe Uniwersytetu Szczecińskiego". Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania, 35(2)/2014, pp. 311-327.
<sup>19</sup> Comp. M. Leszczyńska, B. Kasprzyk: op.cit.s.263-273.

Therefore, basic parameters of the distribution of income and expenditure provide us with a conclusion that the households in the Eastern region: possess the lowest level of economic prosperity and weak financial welfare position these households is closely related to the demographic factor.

## Conclusions

A retrospective analysis for the years 2000-2019 within the income of the population of Poland indicates an increase of the average income in a nominal aspect (more than doubled), while decidedly lower in a real aspect (in the range of 93%). The tempo of growth of income in the analysed years in Poland may be considered as moderate. The increased incomes have been generated increased expenditures, particularly in the consumption of consumable goods and services and savings accumulation. It finally implied household economic prosperity growth and welfare, in a purely economic aspect.

On the basis of the estimated parameters of analytical functions of the trend for the researched variables, it has been established that during the analysed period monthly income per person was increasing annually by 29 PLN on average, while the expenditure growth was slower, by 13 PLN on average. A positive tendency proves to concern the increasing angle of variation of average income and expenditure per person. Increasing surplus of incomes over expenditures gives the households an excellent perspective for savings.

Regional comparative analysis of households allows to draw conclusions indicating a very diversified level of economic condition with regards to the place of residence. There still are relatively large nominal and real income and expenditure deviations in Poland. The data findings undeniably indicates, that the lowest level for the analysed categories of economic prosperity concerns the Eastern region households, while the highest level concerns the macroregion Mazowieckie. In the Eastern region disposable income is lower by about 14% in relation to an average income on the national scale. A slightly smaller, but similar variation concerns expenditures.

In eastern Poland from 2010 to 2019, the difference of expenditures increased in relation to the national average and in terms of income it has decreased. Apparently, the range between the lowest (eastern region) and the highest (voivodship Mazowieckie) incomes and expenditures per person in the regions decreased over the analysed period by 8 percentage points on average.

The final positions of 'The Eastern Poland' in the rating of regions with respect to the level of disposable income and expenditure, in total, per person prove to be mainly the result of socio-economic-demographic factors determining the characteristic features of household composition within that region – they constitute the highest number.

Although the expenditure share in disposable income still varies among regions, from 2010 to 2016, the indicator noted decreasing tendency, so in the regional regard, we can notice a positive trend. That implies, that an increasing share of the incomes in households can be saved or allocated for repayment of financial liabilities.

It is worth to add, that the period of the COVID-19 pandemic started in March 2020 goes beyond the time frame, adopted in this article. However, this pandemic situation may could have a significant impact on the presented research results, showing the

material situation in a different view. This new unexpected situation also indicates the need to look at the presented issues from the perspective of a crisis situation.

## References

Abramczyk D.: Społeczne, demograficzne, ekonomiczne i geograficzne uwarunkowania zarządzania budżetem domowym w Polsce, Uniwersytet Marii Curie-Skłodowskiej w Lublinie, "Finanse i Prawo Finansowe" 3(19)/2018, pp. 9-24.

Aczel A. D.: Statystyka w zarządzaniu, PWN, Warszawa, 2000, pp. 624-627.

Babula E., Kamińska T.: Uwarunkowania dobrobytu w sferze realnej, Published by: Wydawnictwo Uniwersytetu Gdańskiego, Gdańsk 2013.

Blajer-Gołębiewska A., Czerwonka L. (eds.): Mikro- i makroekonomiczne aspekty tworzenia dobrobytu, Published by: Uniwersytet Gdański, Gdańsk 2014.

Budżety gospodarstw domowych, GUS, Warszawa, consecutive years 2001-2020.

Bywalec Cz: Gospodarstwo domowe: ekonomika, finanse, konsumpcja, Wydawnictwo Uniwersytetu Ekonomicznego w Krakowie, Kraków 2017.

Cieślak M: Prognozowanie gospodarcze. Metody i zastosowania, PWN, Warszawa, 2012, pp. 76-78.

Grzywińska-Rąpca M., Kobylińska M.: Regionalne zróżnicowanie dochodów gospodarstw domowych. "Wiadomości Statystyczne", 64, 2019/12, pp. 46-57.

Hanusik K., Łangowska-Szczęśniak U.: Determinanty poziomu i zróżnicowania dobrobytu gospodarstw domowych w Polsce w latach 2004-2012, "Zeszyty Naukowe Uniwersytetu Szczecińskiego". Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania, 35(2)/2014, pp. 311-327.

Kahneman D.: International Differences in Well-Being, Series in Positive Psychology, Oxford University Press, New York 2010.

Kot S. M., Jakubowski J., Sokołowski A.: Statystyka, Published by: Difin S. A., Warszawa 2011, pp. 337-339.

Krajowa Strategia Rozwoju Regionalnego 2010-2020: Regiony, Miasta, Obszary wiejskie, Monitor Polski 2011, no. 36, pos. 423.

Leszczyńska M., Kasprzyk B.: Dochody i wydatki jako determinanty dobrobytu ekonomicznego gospodarstw domowych w Polsce –ujęcie regionalne, "Nierówności Społeczne a Wzrost Gospodarczy".,no. 28, 2012, pp. 263-273.

Ostasiewicz W.: Dobrobyt i jakość życia: badania w Polsce i zagranicą, "Śląski Przegląd Statystyczny" 11/2017, pp. 243-258.

Panek T.: Jakość życia gospodarstw domowych w Polsce w układzie wojewódzkim. Zeszyty Naukowe Instytutu Statystyki i Demografii SGH, 44/2015, pp.1–111.

Pizło W., Mazurkiewicz-Pizło A.: Regionalne zróżnicowanie dochodów gospodarstw domowych w Polsce, "Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu" 16 96)/2014, pp. 397-402.

Regionalne zróżnicowanie jakości życia w Polsce, GUS, Warszawa 2017.

Regiony Polski, GUS, Warszawa, consecutive years 2011-2020.

Uchwała nr 8 Rady Ministrów z dnia 14 lutego 2017 r. w sprawie przyjęcia Strategii na rzecz Odpowiedzialnego Rozwoju do roku 2020 (z perspektywą do 2030 r.), Monitor Polski 2017, pos. 260.

Wronowska G.: Dobrobyt – ujęcie teoretyczne i pomiar, Zeszyty Naukowe "Cracow Review of Economics and Management" 12 (948) /2015, pp. 5-16.

Zaremba M.: Dobrobyt społeczny – problemy metodologiczne i definicyjne, "Nierówności Społeczne a Wzrost Gospodarczy" 4/2016, pp. 323-331.

Zeszyt metodologiczny. Badanie budżetów gospodarstw domowych, GUS, Warszawa 2018.

# Zmiany w zakresie dochodów i wydatków polskich gospodarstw domowych oraz ich relacje regionalne

## Streszczenie

W artykule dokonano oceny sytuacji finansowej gospodarstw domowych w latach 2000-2019 w świetle zmian dochodów i wydatków (w ujęciu nominalnym i realnym) w skali ogólnopolskiej i regionalnej. Jako punkt odniesienia przyjęto też, że kształtowanie się analizowanych zmiennych uzależnione jest od przestrzeni regionalnej. W analizie i porównaniach wykorzystano dane z badania budżetów gospodarstw domowych prowadzonych przez GUS. Przyjmując podejście ekonometryczne (uwzględniając zmienną czasową z lat 2000-2019 jako zmienną objaśniającą modeli) dokonano wyznaczenia analitycznych funkcji trendu dla badanych zmiennych. Jak się okazuje, w badanym przedziale czasowym istotnie poziom i dynamika dochodów oraz wydatków gospodarstw domowych w Polsce była zróżnicowana z wyraźną tendencją rosnącą. Różnice w dochodach i wydatkach dotyczyły także skali regionalnej, co udowodniono. Uwzględnienie w badaniach tego wymiaru wskazuje bowiem nadal na istnienie relatywnie wysokich odchyleń analizowanych kategorii pieniężnych. Pozytywnym wymiarem jest widoczny fakt poprawy przeciętnego poziomu sytuacji finansowej przeciętnego gospodarstwa domowego w Polsce.

**Slowa kluczowe:** dochody i wydatki, gospodarstwa domowe, ekonomiczny standard życia, analiza regionalna, finanse osobiste, nierówności społeczne **JEL codes:** D12, D31, I31, R2

Information about the authors:

## Małgorzata Leszczyńska Ph.D.

Department of Economics and International Economic Relation Institute of Economics and Finance College of Social Sciences University of Rzeszow 35-601 Rzeszów, ul. Ćwiklińskiej 2 e-mail: leszczynska.malgorzata@wp.pl ORCID: 0000-0002-8117-8788

#### Beata Kasprzyk Ph.D.

Department of Quantitative Methods and Economic Informatics Institute of Economics and Finance College of Social Sciences University of Rzeszow 35-601 Rzeszów, ul. Ćwiklińskiej 2 e-mail: bkasprzy@ur.edu.pl ORCID: 0000-0003-4612-794X \* \* \* \* Pelityki Europejskie, \* Finanse i Marksting \* \* \* 25 (74) 2021

DOI 10.22630/PEFIM.2021.25.74.5

Received: 17.04.2020 Accepted: 11.04.2021

Edyta Małecka-Ziembińska Katarzyna Łukaszewska Poznan University of Economics and Business

## A SWOT ANALYSIS OF THE INNOVATION BOX AS A TAX INSTRUMENT TO SUPPORT INNOVATION BY ENTERPRISES IN POLAND

The Innovation Box - a tax relief introduced in Poland in 2019, serves as a complementary element of fiscal support and the final link in the chain of innovation support. This preference is not applied at the stage of creating new solutions (as was the case with the tax relief for purchasing new technologies and has been the case with tax relief for research and development activity since 2016), but at the stage of their commercialisation. It may, thus, contribute to a greater interest and scale of application of the relief for research and development activity. The aim of this article is to present the essence of the Innovation Box, as well as to conduct a SWOT analysis of this tax relief as an instrument of support for innovation by enterprises. A SWOT analysis has corroborated the remarks – previously made by industry practitioners – concerning the ambiguous and complicated mechanism of the Innovation Box. However, along with the consolidation of the practice of applying this tax relief, interest in it may increase, which in turn might be conducive to Polish enterprises.

Key words: commercialization, Innovation Box, IP Box, Patent Box, SWOT analysis JEL codes: H20, H21, O31

## Introduction, research material and methodology

The need for fiscal support of innovation by Polish enterprises was noticed as early as 2006, i.e. when tax relief for purchasing new technologies was introduced to the income tax structure. System failures, and consequently the marginal application of this relief, resulted in its replacement with tax relief for research and development in 2016. The scope of the latter relief was considerably modified between 2016 and 2018 – the catalogue of eligible costs was extended, and the limit on deductions of eligible costs on taxable income was increased. Although the mechanism of this relief has generally been assessed positively, and the changes introduced are said to be clearly beneficial for tax payers, the level of application of the relief still remains relatively low.

The Innovation Box - a tax relief introduced in 2019, serves as a complementary element of fiscal support and the final link in the chain of innovation support. This preference is not applied at the stage of creating new solutions (as was the case with the tax relief for purchasing new technologies and as has been the case with tax relief for research and development activity since 2016), but at the stage of their commercialisation.



The aim of this article is to present the essence of the Innovation Box, as well as to conduct a SWOT analysis of this tax relief as an instrument of support for innovation by enterprises. The analysis contains data from the Ministry of Finance (data concerning income taxes) and the Patent Office of the Republic of Poland (data concerning the number of exclusive rights for industrial property objects in force in Poland). Theoretical and normative basis

Today, innovation is a key determinant of the competitiveness of enterprises and the country's economic development (Janiszewska M., Janiszewski J.M., 2020, pp. 51–73; Misztal A., pp. 28–29). It translates, among other things, into such business parameters as: increase in efficiency, increase in production capacity or increase in the quality of products and services offered by the innovator on the market (Sikora J., Uziębło A., 2013, pp. 351–352). Recognizing the essence of creating added value through innovation, state authorities develop and implement a number of forms of support and incentives for enterprises to undertake research and development projects. Tax solutions are one such form (Arginelli P., 2017, pp. 91–132; Nowak P., 2014, p. 177).

As of January 1, 2019, a new tax relief was introduced to the Corporate Income Tax Act (CIT Act) and the Personal Income Tax Act (PIT Act), allowing taxation of income derived from intellectual property rights (IPR) by a preferential tax rate of 5%. In economic journalism, this relief is referred to as the Innovation Box, Patent Box or IP Box.

The idea of introducing a new pro-innovative instrument supporting the innovative activity of enterprises to the Polish tax system is assessed positively by both economists (macroeconomic approach) and taxpayers (microeconomic approach) (Uzasadnienie do projektu ustawy o zmianie [Justification to the draft amendment act], p. 30).

The relief in question assumes that it will be beneficial both in microeconomic and macroeconomic terms. The original benefit of using the relief in the form of a lower amount of tax due will be recorded by taxpayers, while reducing the state budget's tax revenues. However, in the long term, the relief in question is a kind of 'investment' in public finances. It is assumed that the beneficiaries of the relief will achieve higher revenues by increasing the level of innovation and commercialization of intellectual property rights, which will ultimately translate into an increase in revenues to the state budget (Ibid, p. 17). The increase in budget revenues may also occur as a result of the so-called "retention function" of the IP Box, which consists in preventing the transfer of intellectual property rights acquired by Polish taxpayers to countries where preferential taxation of income derived from these rights is already applied (Ibid, p. 2–3).

Despite the positive attitude towards the implementation of the Innovation Box, industry practitioners and taxpayers themselves identify many important barriers to its application, which can reduce the hypothetically high potential of the relief, adopted only on the basis of theoretical assumptions regarding the introduced instrument (Żagun K., 2019, pp. 19–24). The barriers, among which are weaknesses and threats to the application of the IP Box, are the source of a risk of recognizing the IP Box as an ineffective, and even unapplied instrument of tax support for business innovation.

It cannot be considered as an effective instrument if it is not applied at all or is applied at a level much lower than assumed. At the same time, the concept of effectiveness should be defined for the purposes of this study as the ability to achieve the objectives set. Hence, some reflections have been made concerning the actual potential of applying the IP Box by taxpayers, including a SWOT analysis of the tax instrument in question.

## **Results and discussion**

The results of the SWOT analysis conducted are presented in Table 1.

Table 1. The Innovation Box SWOT analysis

Strengths	Weaknesses
<ul> <li>a relatively high level of tax benefit possible to be achieved by taxpayers from the application of the IP Box,</li> <li>the possibility of using the IP Box relief for the entire duration of the qualified IPR,</li> <li>a tax instrument complementary to the applicable R&amp;D tax credit,</li> <li>direct listing in the form of a catalogue of qualified intellectual property rights, the income of which is subject to preferential taxation,</li> <li>the right to apply the IP Box relief already at the stage of submitting the application for a qualified intellectual property right.</li> </ul>	<ul> <li>imprecise and unclear regulations governing the use of the IP Box relief,</li> <li>complex mechanism of using the IP Box,</li> <li>high tax risk of applying the relief,</li> <li>only qualified income is subject to preferential taxation, not total income derived from intellectual property rights,</li> <li>limited possibilities of securing the taxpayer against any different stance of the tax authorities regarding the law and the correct application of the relief.</li> </ul>
Opportunities	Threats
<ul> <li>functioning of the relief for research and development activity since 2016,</li> <li>numerous European Union programs providing financial support for the innovative activity of enterprises under the 2014–2020 financial framework,</li> <li>increase in the application of the R&amp;D relief in 2017 compared to 2016</li> <li>reporting by taxpayers the need to support innovative activities in the form of tax reliefs,</li> <li>attempting to clarify the unclear provisions governing the IP Box by issuing tax explanations,</li> <li>increase in the number of qualified intellectual property rights obtained by Polish entities in recent years.</li> </ul>	<ul> <li>intensive changes in tax legislation in recent years,</li> <li>weakening the importance of individual tax interpretations as an instrument to protect the taxpayer.</li> </ul>

Source: the author's own analysis.

#### The strengths of the IP Box

One of the key strengths of the IP Box is the relatively high level of tax benefit that taxpayers can achieve from its application. The difference between the standard tax rate and the preferential IP Box rate for corporate income tax is about 14 percentage points (p.p.), whereas in the case of personal income tax this range may be (depending on the form of taxation and the level of achieved income):

- 14 p.p. in the case of a flat tax (19%),
- 13 p.p. in the case of taxation according to the tax scale and income below or equal to the amount for the first tax threshold, i.e. PLN 85,528 (18%),

- 13-27 p.p. in the case of taxation according to the tax scale and income, the amount of which exceeds the amount of income of the first tax threshold (18% to the amount of PLN 85,528 and 32% for the surplus over this amount).

The preferential tax rate in Poland is one of the lowest rates used in Europe under the IP Box and has a relatively wide range of IPRs eligible for the relief. Lower rates are generally only used in Cyprus 2.5%, Belgium 4.5% and Hungary 4.5%. However, it is worth pointing out that in the case of Cyprus and Hungary the difference between the effective tax rate under the IP Box and the standard CIT rate is 10 and 4.5 p.p. respectively (CRIDO, 2018, pp. 16–17).

Another strength of the IP Box should be the complementarity of this relief in relation to the R&D relief. These reliefs can be used together, which increases their attractiveness. Together, they form a somewhat pro-innovative tax strategy for conducting innovative activities. The relief for research and development is a preference that is used at a lower stage of creating innovation than the Innovation Box. Positive results of research and development activities may constitute the basis for a taxpayer to obtain one of the qualified intellectual property rights from which qualified income can be taxed at a preferential rate under the IP Box. This stage of support is referred to as "closing" the chain of innovation creation (Uzasadnienie do projektu ustawy o zmianie [Justification to the draft amendment act], pp. 2-3). Tables 2 and 3 present an example of the tax calculation taking into account the benefits of applying the Innovation Box and the R&D relief.

Specification		Variant I	Variant II	Variant III	Variant IV
		Without using pro- innovative tax reliefs	Only R&D relief	Only IP Box	Using both reliefs
Eligible R&D c	osts	30,000,000	30,000,000 30,000,000		30,000,000
Tax base		80,000,000	80,000,000	80,000,000	80,000,000
Deduction from R&D relief		None	30,000,000	None	30,000,000
Taxable amount after deduction		80,000,000	50,000,000	80,000,000	50,000,000
CIT rate		19%	19%	5%	5%
Amount of tax		15,200,000	9,500,000	4,000,000	2,500,000
Tax benefit	PLN	0	5,700,000	11,200,000	12,700,000
	%	0.00	37.50	73.68	83.55

Table 2. An example of CIT calculation using pro-innovative tax reliefs

Source: the author's own analysis on the basis of: KPMG.

Significant simplifications have been adopted in the presented calculation variants assuming that:

- a) all taxpayer's income comes from qualified IPRs,
- b) all tax costs incurred are related to business research and development,
- c) the taxpayer has met the other requirements necessary for applying both reliefs,
- d) the taxpayer uses the option of settling the R&D tax relief within 6 years, which makes it possible to combine the R&D tax relief and the IP Box in one year.

The simplifications were adopted in order to preserve the transparency of calculations of the tax benefit and its difference between the standard rate in CIT and taxation according to the progressive tax scale in PIT.

As can be seen from the analysis of the data contained in Tables 2 and 3, the most advantageous tax settlement option for the taxpayer is to take advantage of both reliefs. This conclusion will be true for any assumed numerical output data which make it possible to show the taxable amount enabling the application of the preferential IP Box rate.

When analyzing the calculation variants for applying only one of the reliefs, it should be noted that the most preferred option in both CIT and PIT is variant III, i.e. the application of the IP Box. However, this conclusion is true for the simplifications adopted. In economic reality, a wider scope of application of the R&D tax relief in relation to the IP Box, which applies only to qualified IPR revenues, should also be taken into account. In practice, there are rarely cases in which entrepreneurs obtain income only from qualified IPRs.

Specification		Variant I	Variant II	Variant III	Variant IV
		Without using pro- innovative tax reliefs	Only R&D relief	Only IP Box	Using both reliefs
Eligible R&D	costs	30,000,000	30,000,000	30,000,000 30,000,000	
Tax base		80,000,000	80,000,000	80,000,000	80,000,000
Deduction from R&D relief		None	30,000,000	None	30,000,000
Taxable amount after deduction		80,000,000	50,000,000	80,000,000	50,000,000
PIT rate		85,528.00 – 18% surplus over 85,528.00 – 32%	85,528.00 – 18% surplus over 85,528.00 – 32%	5%	5%
Amount of tax		25,588,026	15,988,026	4,000,000	2,500,000
T hfit	PLN	0	9,600,000	21,588,026	23,088,026
Tax benefit	%	0.00	37.52	84.37	90.23

Table 3. An example of PIT calculation using pro-innovative tax reliefs

Source: the author's own analysis.

In addition to achieving a measurable nominal tax benefit from the application of both pro-innovative reliefs, one should also indicate the advantage of having the accounting records of taxpayers who already use the tax relief for research and development activities and are considering using the IP Box. The records kept for the R&D relief allow for the identification of costs incurred for research and development activity in the field of IPR. A taxpayer who uses the tax relief for research and development activities is required to have the necessary records and documents confirming the eligible costs incurred for this activity.

Creating cost records for the needs of the IP Box *ex post* from scratch is very time consuming and subject to the risk of error, and in most cases even impossible. The taxpayer who has conducted research and development activities and has not applied the R&D relief is highly unlikely to have keep detailed records that would allow the use of

the IP Box after completion of the research and development works and obtaining a qualified IPR.

Another strength of the IP Box is a direct reference to the catalogue of qualified intellectual property rights. This catalogue directly indicates which intellectual property right is considered qualified, which reduces the tax risk of undermining the right to apply the relief in question. In addition, the taxpayer has the option of preferential taxation based on the application for an intellectual property right, prior to obtaining this right. Moreover, if the taxpayer's application is rejected, the taxpayer will only be obliged to refund the tax amount calculated according to the standard tax rate without interest.

Considering that the procedure for qualified intellectual property rights may be treated even for several years, it should be pointed out that when it comes to the tax office one should take advantage of the offer in the form of an interest-free package including the exercise of tax rights. The waiting time for the decision to obtain a patent is on average (naukawpolsce, 2017):

- 3.6 years at the Patent Office of the Republic of Poland,
- 5.5 years at the European Patent Office,
- 3.5 years at the US Patent Office.

The amount of the taxpayer's benefit from deferred tax will depend on how the deferred amount is managed. The taxpayer may use the funds to cover current liabilities, for which in the event of a deficit of funds they would have to obtain external financing and bear the cost of it. On the other hand, in the case of a surplus of the taxpayer's funds and the benefits of deferment of tax payment, an example of placing funds on a deposit is often indicated in literature, a deposit from which the taxpayer will obtain financial profits in the form of interest.

#### The opportunities of the IP Box

In terms of the opportunities of the IP Box, we should take into consideration the existence of the R&D tax relief since 2016 and numerous European Union programs supporting the innovation activity of enterprises, especially under the 2014–2020 financial framework, whose priority is to support research, technological development and innovation (ec.europa.eu, 2014). Research and development activities were also supported in the previous perspective of 2007–2013, although to a lesser extent compared to the currently implemented framework (PARP).

The research and development works initiated in previous years, despite the initially negative results, may in the following years be completed with a positive result, which will enable taxpayers to apply for one or even several qualified intellectual property rights. Eligible income, which takes into account the Nexus indicator, allows for including the costs of research and development activities of IPRs incurred since January 2013.

In addition, what shall be emphasized here is the motivational aspect of both the financial support for the EU programs and the R&D relief, as well as increasing entrepreneurs' awareness of the tools and forms of support for starting and running innovative activities.

Specification		Number of taxpayers	Amount of deduction (in thou. PLN)	Average deduction (in thou. PLN)
		2016		
CIT		264	198,334	751
	tax scale	96	390	4,06
PIT	flat tax	168	7,332	43,64
	together	264	7,722	29,25
Total		528	206,056	390,26
2017				
CIT		565	543,329	962
	tax scale	116	797	6,87
PIT	flat tax	408	39,809	97,57
	together	524	40,606	77,49
Total		1,089	583,935	536,21

 Table 4. The number of taxpayers benefiting from the R&D relief and the amount of deduction in 2016–2017

Source: the author's own analysis on the basis of: (Łukaszewska K., 2018, p. 194; MF, 2018a and MF, 2018b).

Another aspect which may be considered in terms of the opportunities of the IP Box is the increase in the application of the R&D relief in 2017 compared to 2016. Table 4 indicates the number of taxpayers benefiting from the R&D relief and the amount of deductions made in 2016–2017.

Based on the analysis of the data presented in Table 4, it may be concluded that in 2017, the R&D relief was applied by 106.25% more entities in total than in the previous year, and the amount of eligible cost deductions was higher by nearly 183.39%. The disproportion between the use of the relief by PIT taxpayers taxed according to the tax scale and the flat tax is also noticeable. A slight reduction of the disproportion (by 3.43 p.p.) was noted between the amount of deductions made by CIT taxpayers and the amount of deductions made by PIT taxpayers in total.

The increase in the application of the relief means that the interest in using support in the form of tax instruments increased among entities conducting innovative activity. Taxpayers themselves also declare that obtaining tax reliefs and support from public funds is an important factor for them to conduct innovative activity (Kamińska A., 2016, p. 84). It may be assumed that the identified disproportions in the application of the tax relief for research and development activities will also be reflected in the application of the IP Box.

An opportunity of the IP Box is also an increase in the number of exclusive rights for industrial property items in force in Poland, observed in recent years (see Figure 1).



**Figure 1.** The number of exclusive rights for industrial property items in force in Poland on the last day of a given year in the years 2014–2018

Source: the author's own analysis on the basis of: (UPRP).

In general, in the years 2014–2018 the number of exclusive rights for industrial property items remaining in force in Poland increased from year to year. The exception was 2016, which saw a decrease of 2,584 rights. That was a decrease of only 0.84% compared to the previous year. The growing number of exclusive rights in force for industrial property items, assuming that taxpayers have incurred the costs of research and development work associated with it, may indicate an increase in the number of IPRs entitling their holders to apply the IP Box.

As an opportunity for the IP Box relief, we may also indicate an attempt to clarify the unclear provisions governing this relief by issuing tax explanations in this regard. However, the final version of the tax explanations is not yet known. These explanations, depending on their final wording, may significantly reduce the weakest side of the IP Box, which should be considered to be imprecise tax regulations constituting a tax risk for the taxpayer.

#### The weaknesses of the IP Box

As already mentioned, the most important weaknesses of the IP Box are primarily imprecise and unclear provisions regulating its use, as well as a complex mechanism for its application, which results in high tax risk. As an example, a definition of research and development activities may be cited, according to which IPRs must be created, developed or improved for the taxpayer to take advantage of the relief. The problematic interpretation of this definition may be demonstrated by the existence of numerous tax interpretations, the subject of which are questions about meeting the definition of research and development activity in practice. On the other hand, the positions expressed in the interpretations do not constitute solutions to the problematic issue. The tax authorities may take a positive position in the interpretations they issue, citing the taxpayer's argumentation and declaration of their opinion on meeting the definition of research and development activity in their business practice, or they may exercise the right to depart from the legal justification of the assessment of the applicant's position (for example, DKIS individual interpretation of August 1, 2018 and DKIS Individual Interpretation of December 13, 2018).

Similar issues regarding the problem of securing the taxpayer by issuing a tax interpretation occur in terms of the approach to meeting the requirement of keeping accounting records which make it possible to determine the income from a qualified IPR. The design of the provision is imprecise and may lead to divergent interpretations, as is the case with records kept for the purposes of the R&D relief. There is a risk of undermining the completeness of the records kept by the taxpayer, and thus undermining the right to the relief during an audit performed by the tax authorities (for example, DKIS individual interpretation of February 7, 2018).

Interpretative ambiguities also occur in the construction of the mechanism of applying the IP Box relief, i.e. the calculation of qualified income, which is assessed as very complicated. The process of determining eligible income can be divided into three stages:

Stage I – determining the amount of income from a qualified IPR,

Stage II - determining the Nexus indicator,

Stage III – determining the qualified taxable income at a preferential rate of 5%, calculated as the product of the result of Stage I and Stage II.

The first stage requires the taxpayer to specify and keep records separately for each qualified IPR. This stage is the most difficult in the case of obtaining "income from a qualified IPR included in the sale price of the product or service" (Article 24d (7) of the CIT Act; Article 30ca (7) of the PIT Act). The income from qualified IPRs from total sales revenue is in practice based on certain assumptions used by the taxpayer (Uzasadnienie do projektu ustawy o zmianie [Justification to the draft amendment act], p. 2). There is currently no way to secure the correctness of the calculation of income from a qualified IPR or the calculation of eligible income. Tax interpretations are issued within the scope of tax law, and the calculations concern strictly controlling issues.

The second stage consists in calculating the Nexus indicator, expressed by the formula (Article 24 (4) of the CIT Act; Article 30ca (4) of the PIT Act):

(a + b) x 1,3	
(a+b+c+d)	

where:

a – costs incurred for research and development activities connected with intellectual property law,

b and c – costs incurred to acquire the results of research and development works connected with intellectual property right from an unrelated entity (b) and a related entity (c),

d – costs incurred for the acquisition of qualified intellectual property rights.

## The threats of the IP Box

The threats of the IP Box relate primarily to the intense changes in tax law that have taken place in recent years. Undoubtedly, the period of the last few years should be considered as the most intensive in terms of the number and scope of introduced tax changes. This intensity leads to excessive burdens on enterprises, especially the HR and accounting departments, and determines the uncertainty of tax law among entrepreneurs, which in turn leads to slowing down their development (NBP, 2019, p. 33).

The changes in tax law introduced in recent years not only burden the taxpayers' administrative and accounting departments, but also influence the decision-making processes of enterprises. An example of such changes may be, among others, provisions regarding the clause against tax avoidance and reporting of tax schemes. The first of these changes is also a determinant of weakening the importance of tax interpretations as an instrument to protect the taxpayer. The tax authorities which issue tax interpretations have the right to refuse to issue an opinion, citing the possibility of applying the clause against tax avoidance as to the facts presented by the taxpayer in the submitted application. At the same time, the mere supposition that the elements of the application for an interpretation may be subject to the clause may justify refusing to issue the interpretation (Judgment of the Supreme Administrative Court of March 21, 2019).

The second of these regulations is the mandatory reporting of tax schemes to the Ministry of Finance. The definition of tax schemes is very broad and imprecise, and reporting obligations lie on three entities – tax scheme promoters, beneficiaries and supporting entities. The fine for failure to report the tax scheme is 720 daily rates, which may amount to PLN 21.6 million. In addition, the schemes were also subject to reporting in a retrospective manner, i.e. occurring after the 2018 cut-off date, which entailed additional tax burdens for taxpayers in the form of an analysis of transactions and economic events from the cut-off date.

These changes, along with other tax changes, resulted in additional obligations, the non-fulfilment of which is threatened with high fines. These circumstances could have led to the abandonment or postponement of the decision to apply the advantageous yet optional IP Box.

## Summary

The Innovation Box tax relief consists in preferential taxation at a rate of 5% of qualified income, which is obtained from qualified intellectual property rights. The amount of qualified income subject to preferential taxation is calculated as the product of the income from qualified intellectual property rights and an indicator evaluating the level of costs incurred by the taxpayer in connection with the creation or acquisition of qualified intellectual property rights. However, the mechanism of this relief is assessed as complex, which may contribute to lowering its attractiveness and application by taxpayers.

A SWOT analysis confirmed the comments previously formulated by industry practitioners concerning the unclear regulations and complicated mechanism of the IP Box. However, along with the consolidation of the practice of applying this tax relief, interest in it may increase, which in turn might be conducive to Polish enterprises.

#### References

Arginelli P., 2017: The Interaction between IP Box Regimes and Compensatory Tax Measures: A Plea for a Coherent and Balanced Approach. In D. Weber (Ed.), EU Law and the Building of Global Supranational Tax Law, pp. 91–132.

CRIDO, 2018: Innovation Box. Mechanizm działania. Przegląd aktualnych rozwiązań w Europie. Warszawa, pp. 16–17.

ec.europa.eu, 2014, Priorytety na lata 2014–2020. Retrieved: https://ec.europa.eu/regional\_policy/pl/policy/how/priorities. Access: 20.06.2019. Interpretacja indywidualna DKIS z dnia 1 sierpnia 2018 r., sygn. 0111-KDIB1-3.4010.306.

2018.1.AN.

Interpretacja indywidualna DKIS z dnia 13 grudnia 2018 r., sygn. 0111-KDIB1-3.4010.483. 2018.1.MST.

Interpretacja indywidualna DKIS z dnia 7 lutego 2018 r., sygn. 0111-KDIB1-2.4010.481. 2017.1.BG.

Janiszewska M., Janiszewski, J.M., 2020: Wykorzystanie regulacji podatkowych w działalności innowacyjnej polskich przedsiębiorców, Studia BAS, Biuro Analiz Sejmowych, Nr 1, pp. 51–73.

Kamińska A., 2016: Uwarunkowania aktywności innowacyjnej przedsiębiorstw przemysłowych. Nauki o Zarządzaniu, NR 1(26)/2016 Uniwersytet Ekonomiczny we Wrocławiu, pp. 77–90.

KPMG, Innovation Box. Innowacje, Ulgi i Dotacje. Retrieved: www.kpmg.pl. Access: 17.06.2019.

Łukaszewska K., 2018: Ulga na działalność badawczo-rozwojową jako szansa poprawy pozycji innowacyjnej polskich przedsiębiorstw. *Ruch Prawniczy, Ekonomiczny i Socjologiczny, Nr 3, pp. 181–197.* 

*MF, 2018a: Informacja dotycząca rozliczenia podatku dochodowego od osób prawnych w 2017 r.* Retrieved: www.finanse.mf.gov.pl. Access: 20.06.2019.

*MF*, 2018b: Informacja dotycząca rozliczenia podatku dochodowego od osób fizycznych w 2017 r. Retrieved: www.finanse.mf.gov.pl. Access: 20.06.2019.

Misztal A., Otwarte innowacje w polskich przedsiębiorstwach – ewolucja, pp. 28–29. Retrieved: yadda.icm.edu.pl/yadda/element/bwmeta1.element.desklight.../27-37\_Misztal.pdf. Access: 9.06.2018.

naukawPolsce, 2017: Wiceprezes UP RP wyjaśnia, dlaczego na patent czeka się średnio 3,6 roku. Retrieved: http://naukawpolsce.pap.pl/aktualnosci/news%2C412791%2Cwiceprezes-up-rpwyjasnia-dlaczego-na-patent-czeka-sie-srednio-36-roku.html. Access: 20.06.2019.

NBP, 2019: Szybki Monitoring NBP. Analiza sytuacji sektora przedsiębiorstw Nr 01/19, Departament Analiz Ekonomicznych, Warszawa, s. 33.

Nowak P., 2014: Preferencje podatkowe dla innowacyjnych przedsiębiorstw. Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego, nr 28, p. 177.

PARP, 2014: Nowa Perspektywa UE 2014–2020 – nowe możliwości dofinansowania dla przedsiębiorstw i samorządów. Retrieved:

https://www.pi.gov.pl/PARP/chapter\_86197.asp?soid=82834FB47ED741F29CDE89FDA2D842B 1. Access: 20.06.2019.

Sikora J., Uziębło A., 2013: Innowacja w przedsiębiorstwie – próba zdefiniowania. Zarządzanie i Finanse, Wydział Zarządzania – Uniwersytet Gdański, pp. 351–352.

UPRP, Raporty roczne Urzędu Patentowego Rzeczypospolitej Polskiej za lata 2014–2018. Retrieved: www.uprp.pl. Access: 20.06.2019.

Ustawa z dnia 15 lutego 1992 r. o podatku dochodowym od osób prawnych (tekst jedn. Dz.U. z 2019 r. poz. 865).

Ustawa z dnia 26 lipca 1991 r. o podatku dochodowym od osób fizycznych(tekst jedn. Dz.U. z 2018 r. poz. 1509).

Uzasadnienie do projektu ustawy o zmianie ustawy o podatku dochodowym od osób fizycznych, ustawy o podatku dochodowym od osób prawnych, ustawy – Ordynacja podatkowa oraz niektórych innych ustaw (Druk nr 2860 cz. I).

Wyrok Naczelnego Sądu Administracyjnego z dnia 21 marca 2019 r., II FSK 3819-3820/17.

Żagun K., 2019: Innovation Box – domknięcie łańcucha zachęt fiskalnych na działalność rozwojową. Przegląd Podatkowy, Nr 3, pp. 19–24.

## Analiza SWOT innovation box jako podatkowego instrumentu wsparcia innowacyjności przedsiębiorstw w Polsce

## Streszczenie

Wprowadzona od 2019 r. ulga Innovation Box stanowi komplementarny element wsparcia podatkowego i "zamknięcie" łańcucha wspierania innowacji. Stanowi bowiem preferencję nie na etapie tworzenia nowych rozwiązań (jak to było w przypadku ulgi na zakup nowych technologii i jest od 2016 r. w przypadku ulgi na działalność badawczo-rozwojową), lecz na etapie ich komercjalizacji. Może zatem przyczynić się ona także do większego zainteresowania i skali wykorzystania ulgi na działalność badawczo-rozwojową. Celem artykułu jest przedstawienie istoty, a także przeprowadzenie analizy SWOT ulgi Innovation Box jako podatkowego instrumentu wsparcia innowacyjności przedsiębiorstw. Analiza SWOT potwierdziła – już wcześniej formułowane przez praktyków branżowych – uwagi dotyczące niejasnych przepisów i skomplikowanego mechanizmu Innovation Box. Jednak wraz z utrwaleniem praktyki stosowania tej ulgi, zainteresowanie nią może wzrosnąć, sprzyjając innowacyjności polskich przedsiębiorstw.

Slowa kluczowe: komercjalizacja, Innovation Box, IP Box, Patent Box, analiza SWOT JEL codes: H20, H21, O31

Information about the authors:

Edyta Małecka-Ziembińska, dr hab. prof. UEP Poznan University of Economics and Business Institute of Finance Department of Public Finance Al. Niepodległości 10, Poznań, Polska e-mail: edyta.małecka-ziembinska@ue.poznan.pl ORCID: 0000-0002-3398-809X

## Katarzyna Łukaszewska, Msc

Poznań University of Economics and Business Institute of Finance Department of Monetary Policy and Financial Markets Al. Niepodległości 10, Poznań, Polska e-mail:katarzyna.lukaszewska@phd.ue.poznan.pl ORCID: 0000-0002-3986-7731 \* \* \* \* Pelityki Europejskie, \* Finanse i Marksting \* \* \* 25 (74) 2021

DOI 10.22630/PEFIM.2021.25.74.6

Received: 01.06.2021 Accepted: 24.06.2021

Aleksandra Pisarska Jarosław Karpacz Jan Kochanowski University of Kielce

## RESULTS OF FUNCTIONING OF PUBLIC UNIVERSITIES: ESTABLISHING A SET OF RATIOS PROVIDING RELIABLE MANAGEMENT INFORMATION BASED ON DATA DERIVED FROM AN ENTITY'S REPORTS

The aim of the study is to define a set of ratios, enabling multidimensional assessment of the activity of public universities as units of the public finance sector, in order to improve the efficiency of their management. The selection of appropriate ratios, which are also highly reliable in relation to occurring phenomena and processes, becomes a useful management tool. Hence, the content of the study includes a comprehensive measurement of a university's results. Empirical research was conducted at a deliberately selected multi-disciplinary university, i.e. an entity conducting research and didactic activities in many fields of science. The empirical material was collected using information derived from financial statements and analytical information from the accounting books of the analyzed entity. The study covered the years from 2015 to 2019. The conducted empirical research provided evidence in the light of which the developed set of ratios has a high management usefulness, as it allowed to assess the state of processes taking place in the examined unit.

Key words: efficiency of universities, entrepreneurship, education, research, reporting, public sector

JEL Classification: I23; M41; M49

## Introduction

Many public sector entities do not function in order to generate a financial surplus but, as in the case with public universities, in order to deliver intrinsically complex social goods. It is the social aspect that plays the main role in all implemented undertakings of the public sector, not the financial (commercial) one. The specificity of such an approach as compared to the commercial approach is visible in the assessment of actions undertaken by public entities<sup>1</sup>. However, this does not mean the marginalization of the importance of financial data in the assessment of their activities, which, if properly used, may enable the measurement and evaluation of actions undertaken by these entities. Moreover, one must not forget that the phenomena and processes taking place in the financial areas of these entities are often much more complex than in private sector entities. At the same time, the purpose (and therefore the main goal) of their activity is to

<sup>&</sup>lt;sup>1</sup>S. Kasiewicz, W. Rogowski: Ocena opłacalności inwestycji społecznych. Bank i Kredyt, 2006, No. 1, 3-18.



provide educational services at the highest possible level and to conduct scientific research. Nevertheless, it is required that, if possible, they cover the costs of their activity from the revenues they themselves generate<sup>2</sup>. However, practice shows that it is not easy to do so, and low flexibility of managing the revenue area in such public sector organizations constitutes a real challenge<sup>3</sup>. Therefore, obtaining reliable (useful for the management) information about the activities of public universities requires the use of ratios which are adequately adjusted to the specificity of their activities. This specificity results mainly from financing primarily from public funds – which is expanded in terms of its structure and complexity. This statement is supported by the literature, which draws attention to different goals of activity (compared to entities in the commercial sector), funds used to achieve these goals, and thus the method of their acquisition, spending and allocation within a given unit<sup>4</sup>.

The use of traditional financial measures (ratios) is possible because, in the light of the literature, the ratio analysis is one of the basic methods of assessing the financial condition, dedicated to public finance sector units<sup>5</sup>. However, it may turn out to be insufficient from the perspective of information needs of managers of these organizationally and legally complex entities. Moreover, focus should be put on a certain important group of these ratios, as their excess may blur the actual image of the potential of analyzed units, thus hindering making strategic and operational management decisions<sup>6</sup>. At the same time, the review of the literature revealed a significant shortage of useful managerial knowledge about the possibility of assessing the activity of public universities. In order to fill this gap, an attempt was made to develop and define a set of ratios which would be useful from a managerial perspective, based on financial data and enabling a reliable assessment of activities of a public university. Hence, the fundamental research question that the authors have attempted to answer relates to this. The aim of this study is to answer this question, and therefore to present the results of the research work. The original set of ratios proposed by the authors is complemented by empirical verification of their measurement capacity by performing it in a specific, intentionally (due to the complexity of the analyzed data contained in many reports prepared by public universities) selected entity. The surveyed public university is a unit in which research activity and education are conducted in several separate fields of knowledge. Moreover, when making financial analyzes, comparisons in time are most often used, whereas plan comparisons and comparisons in space are the ones that are used less frequently<sup>7</sup>. On the other hand, the wider the scope of comparisons, the more complete and rich the conclusions get, becoming more capable of improving the activity

<sup>&</sup>lt;sup>2</sup> J. Chluska: Wynik finansowy szpitala–aspekty informacyjne i decyzyjne. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 2017, nr 471, 94-101.

<sup>&</sup>lt;sup>3</sup> J. Chluska, A. Szewieczek: The use of cost information in the reports and financial analyzes of hospital. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. 2018, No. 524, 22-34.

<sup>&</sup>lt;sup>4</sup> L. Satoła: Ocena sytuacji finansowej gmin wiejskich w Polsce w latach 2006–2008. Acta Scientiarum Polonorum, Series Oeconomia, 2010, nr 9(2),199–210.

<sup>&</sup>lt;sup>5</sup> A. Becker, J. Becker: Zasto sowanie metody granicznej analizy danych do oceny gospodarowania województw Polski, [in:] J. Wątróbski (ed.), Studia i materiały Polskiego Stowarzyszenia Zarządzania Wiedzą, PSZW, Bydgoszcz 2009, 1–12.

<sup>&</sup>lt;sup>6</sup> E. Mączyńska: Ocena kondycji przedsiębiorstwa, Życie Gospodarcze. 1994, No. 38.

<sup>&</sup>lt;sup>7</sup> E. Mioduchowska-Jaroszewicz: Wskaźniki do oceny sytuacji finansowej ubezpieczycieli a porównania sektorowe, Zeszyty Teoretyczne Rachunkowości. 2012, No. 65 (121), 19-44.

of the analyzed unit. All the more so because without comparisons, each analysis is very poor in its conclusion. For this reason, it was decided to present the results of the abovementioned test, i.e. the developed set of ratios, comparing them for the analyzed entity for the years from 2015 to 2019. The entity was selected mainly due to the possibility of obtaining complete information contained in its statements, reports and accounting books.

## **Research methodology**

The research activities were focused on filling the lack of knowledge, identified as a result of the literature review, regarding the existence of ratios which are reliable from the managerial point of view, and which in fact express the dynamics of economic measures of an entity, by comparing the ratios (in the case of this study) in time, creating their own set. The existing ratios commonly used to assess the financial condition of an entity were the basis of the research works directed to their development. First of all, ratios were selected which, due to the specificity of their components, can be used in the public sector (taking into account the specificity of the functioning of public universities). Then, on the basis of the results of qualitative research (a series of nonstandardized interviews with the staff managing the financial area of multi-disciplinary universities) and the experience obtained on the basis of participant observation of the authors, a set of ratios - dedicated to the assessment of the effectiveness of tasks carried out by university managers - was developed.

The developed set of ratios was defined in the areas of research, education and academic entrepreneurship. The empirical material was obtained through the use of the participant observation method taking into account direct involvement of the researcher in the activities of the studied unit. In this case, researchers interfere to some extent with the interactions between group members they are observing and their behavior<sup>8</sup>. Therefore, they enter a specific social environment, which allows them to understand the structure of the studied group better.

The use of the developed set of ratios (in the opinion of the authors, built on the basis of the results of the literature review supported by their management experience) will significantly complement the database of information on the functioning of public universities. Their construction is based on available but scattered sources of information, such as financial statements and other reports prepared by public universities. Data was also obtained from analytical records, most often coming from the university's accounting books. In the next stage of research, the authors presented examples of calculations of their set of ratios in order to evaluate a purposefully selected entity for the years from 2015 to 2019. It was established that the period of 5 years was justified for the assessment of the economic and financial position of a university, because this timeframe is indicated by legislators (LoHEaS)<sup>9</sup> as the reference for determining the possible need for remedial actions. Constant 5-year monitoring of a university's situation is therefore necessary (also for this reason) to maintain the safe functioning of a public university.

<sup>&</sup>lt;sup>8</sup> E. Babbie: Badania społeczne w praktyce. PWN, Warszawa 2004.

<sup>&</sup>lt;sup>9</sup> Ustawa prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r. Dz. U. 2018, poz. 1668.

When developing the set of ratios, the aim was to make it of a useful nature, which means that it will be possible to successfully use the set to evaluate any public university. Due to the availability of reporting documents and detailed accounting records kept at universities, this evaluation, if necessary, will also be feasible for managers of public universities, as well as external stakeholders (obtaining information in the statutory mode of access to public information<sup>10</sup>).

The empirical study, with the use of the developed set of ratios, included a deliberately selected multi-disciplinary university. The criteria for its selection included the possibility of an in-depth insight into the financial and accounting areas, including financial statements and other reports prepared by public universities, as well as the fact that (as had been noticed on the basis of practical experience) the types of funding sources and the structure of tasks performed by those entities may differ to a small extent from other entities of this type and size class.

## The need to assess the financial condition of units in the public higher education sector

The public higher education sector is considered complex, fragmented and turbulent. Managers of public units (including those operating within the higher education system) have to deal with many financial problems of these entities. In practice, this means that they increasingly use tools that can provide reliable information about financial processes occurring within them<sup>11</sup>. At the same time, the importance of this information is reinforced by the increase in operating costs and difficulties in obtaining the necessary resources which constitutes an unprecedented phenomenon in the functioning of public units. As a result, universities have been intensely experiencing shortages of staff, and decreases in the effectiveness of incentive systems, which, instead of resulting in the expected benefits (increased effects), only result in increasing expenditures<sup>12</sup>.

The calculation of effectiveness of all undertakings in the public sector includes the social aspect, as by definition these activities are not intended to bring financial benefits, in the meaning of commercial activities. However, all expenditures related to activities in the public sector are analyzed in terms of costs incurred and benefits obtained from their implementation<sup>13</sup>. Therefore, managers of these units are required to have more and more skills in financial management<sup>14</sup>, owing to which it will be possible to properly shape the financial phenomena occurring in them. This approach is based on the measurement and assessment of financial phenomena, which, due to their complexity,

<sup>&</sup>lt;sup>10</sup> Pursuant to Polish legislation, in order to obtain information from a unit belonging to the public finance sector, an appropriate application must be submitted in this respect to the unit from which we want to obtain information from the resources of the public unit. Act of 6 September 2001 on access to public information (Journal of Laws of 2016, item 1764; Journal of Laws of 2017, item 933).

 <sup>&</sup>lt;sup>11</sup> K. Opolski, P. Modzelewski: Pomiar skuteczności i efektywności w urzędach administracji samorządowej – podejście metodologiczne. Mazowsze Studia regionalne. Analizy i Studia, 2009, No. 2/I.
 <sup>12</sup> D. Jung, C. Chow, A. Wu: The role of transformational leadership in enhancing organizational innovation:

 <sup>&</sup>lt;sup>12</sup> D. Jung, C. Chow, A. Wu: The role of transformational leadership in enhancing organizational innovation Hypotheses and some preliminary findings. The Leadership Quarterly, 2003, Vol. 14(4-5), 525- 544.
 <sup>13</sup> S. Kasiewicz, W. Rogowski: Ocena opłacalności inwestycji społecznych. Bank i Kredyt, 2006, No. 1, 3-18.

<sup>&</sup>lt;sup>14</sup> T. Swanwick, J. McKimm: What is clinical leadership...and why is it important? The Clinical Teacher, 2011, Vol. 5(1), 22-26.

require separate analytic tools, not used in the private sector - ratios informing about important phenomena and processes.

Measuring the financial condition of public sector entities is not simple. Researchers<sup>15</sup> even indicate that measuring financial performance of these entities is a challenge for those who work with financial information on a daily basis, and this difficulty is amplified for people who do not deal with finances<sup>16</sup>. Therefore, in order to assess the economic condition of a public university, in addition to the ratios built with the use of financial statements (prepared on the basis of legal regulations relating to the accounting of organizational units), one should obtain data from the material and financial schedule (MFS) prepared by the assessed units (in this case, public universities).

## The use of ratio analysis in the assessment of the financial condition of a public university sector unit - the specificity of measurement

The ratio analysis enables a quick insight into the economic condition of a unit<sup>17</sup>. This type of analysis can be used to examine both the data contained in financial statements, other reports obligatorily prepared in public universities, as well as reports prepared optionally in these units. First of all, the analysis is the most effective one when assessing differences in relation to changes occurring in entities, presented in financial statements, and above all in the profit and loss accounts, due to the greater cause and effect relationships resulting from them<sup>18</sup>.

Traditionally, the ratio analysis was performed in order to highlight risks by comparing the relative efficiency of a client against an auditor's expectations based on the industry and/or the client's performance in previous years<sup>19</sup>.

The main problem with the traditional ratio analysis is the use of subjective weights, which are often indeterminate, as well as the auditors' choice of specific ratios to compare and assess the client's overall condition<sup>20</sup>.

Considering the assessment of the effectiveness of universities (through a specific assessment of a unit), appropriate for the sector of public universities, one should indicate products specific for the tasks they carry out (research, higher education and projects, the results of which are implemented into the economy), which go to those who value them most and are best prepared to use them. Moreover, the high effectiveness of a university's operation means that these units are able to achieve high results in all their assigned areas, i.e. in the field of education, research and economic activity. It has been

<sup>&</sup>lt;sup>15</sup> J.H. Burkhardt, J.R.C. Wheeler: Examining Financial Performance Indicators for Acute Care Hospitals. Journal of Health Care Finance, 2013, Vol. 39, No. 3, 1-13.

 <sup>&</sup>lt;sup>16</sup> A. Crosby, H. J. Knepper, H. Levine: Predicting hospital closure using popular financial indicators: An exploratory study of Muhlenberg Hospital. Public Administration Quarterly, 2020, Vol. 44, no. 1, 104-130.
 <sup>17</sup> B. Kotowska, A. Uziębło, O. Wyszkowska-Kaniewska: Analiza finansowa w przedsiębiorstwie. CeDeWu 2021.

<sup>&</sup>lt;sup>18</sup> L.B. Sawyer, M.A. Dittenhofer, J.H. Scheiner: Sawyers' internal auditing. The Institute of Internal Auditors, Altamonte Springs, FL, 2005, 492-503.

<sup>&</sup>lt;sup>19</sup> A. Arens, R. Elder, M. Beasley: Auditing: An Integrated Approach. Ninth edition Englewood Cliffs, Prentice Hall, 2003.

<sup>&</sup>lt;sup>20</sup> E.H. Feroz, S. Kim, R.L. Raab: Analytical procedures: A data envelopment analysis approach. Journal of Emerging Technologies in Accounting, 2, 2005, 17-31.

a common fact for a long time - as indicated in the literature - that if an entity (in this case, a university) has more than one objective, then the assessment of their implementation may also be carried out from the perspective of the objectives in general (jointly), as well as from the perspective of some specific objective. In this case, what is assessed is the production of goods (provision of services) that correspond to social and economic needs. Therefore, in the light of scientific findings, it is justified to jointly assess the effectiveness of public units, taking both the cost (economic) approach and the non-cost (non-economic) approach, relating, for example, to the satisfaction of recipients of these services<sup>21</sup>. This, in turn, prompts the perception of the results of the undertakings implemented by these entities by the use of the cost approach.

## The reporting system of public universities as a source of information about their achievements/the effects of their activities

Public universities are subject to the regime of reporting the results of activities in three areas of their operation: scientific activity, education and economic activity (mainly commercialization of results of conducted research and development works). Reports prepared by public universities include those made within the scope of external and internal financing<sup>22</sup>.

A financial statement (FS) and a statement on the implementation of the material and financial schedule (MFS)<sup>23</sup> are the main source of information for assessing the financial condition of a public university. These statements are prepared by public universities on the basis of separate legal regulations. The analysis of financial statements, followed by their assessment, informs about the financial condition of the analyzed entity<sup>24</sup>.

The group of supplementary reports include those which (in accordance with the applicable legal regulations) inform their recipients about the effects of activities carried out in public universities, identified and conducted in three areas: research, education and entrepreneurial university activities. They are an important source of information about the position of a given university in relation to other public universities.

Table 1 contains a collection of reports that are prepared compulsorily in accordance with the areas of operation of public universities carrying out specific tasks<sup>25</sup>, taking into account activities falling within the area of economic activity that directly implements a university's entrepreneurship<sup>26</sup>. This activity<sup>27</sup> is carried out in

<sup>&</sup>lt;sup>21</sup> K. Opolski, P. Modzelewski: Pomiar skuteczności i efektywności w urzędach administracji samorządowej – podejście metodologiczne. Mazowsze Studia regionalne. Analizy i Studia. 2009, nr 2.

<sup>&</sup>lt;sup>22</sup> A. Pisarska: Sources of financing tasks for public higher education institutions: findings in light of their reporting. Zeszty Naukowe SGGW w Warszawie, Polityki europejskie, finanse i marketing, 2020, nr 24(73), 155-176.

 <sup>&</sup>lt;sup>23</sup> Art. 408. Ustawa prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r. Dz. U. 2018, poz. 1668.
 <sup>24</sup> K. Bauer, M. Macuda: Sprawozdanie finansowe jako źródło informacji dla interesariuszy restrukturyzowanego szpitala. Prace naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 2018, nr 503.
 <sup>25</sup> Art. 350. Ustawa prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r. Dz. U. 2018, poz. 1668.

<sup>&</sup>lt;sup>26</sup> C. Barrow: The entrepreneurial University. Where it all went Wrong [in:] Transformative researchers and educators for democracy. J.M. Paraskeva, T. LaVallee (eds.), Sense Publisher, 2015, pp. 47-56; B. Dolan, J. Cunningham, M. Menter, C. McGregor: The role and function of cooperative research centers in entrepreneurial universities: A micro level perspective. Management Decision, 2019, Vol. 57, no 12, pp. 3406-3425.

order to commercialize research results, and the reports that are prepared in its scope result from separate regulations relating to the entities which implement them.

An important element of the reporting system of public universities is the reports presenting their financial condition, usually covering one fiscal year (Table 1), and they include: the statement on the implementation of the material and financial plan (MFS), F-01s, the financial statement (FS), as well as the statement on the use of subsidy obtained for a public university's operation - implemented in 2019 and reported for the first time in 2020. Public universities also provide information on the status of the settlements (receivables and liabilities), Rb-N (quarterly report on receivables and selected financial assets) and Rb-Z (quarterly statement of liabilities by title of debt), entered in their accounting books. On the other hand, the F-03 report is the report informing about the condition and changes in fixed assets of public universities.

An important group of reports are those that provide in-depth information on the value of remuneration charged in public universities (RB-70) shaping the knowledge about the position constituting the largest cost component of public universities (Table 1). Universities also prepare tax reports, e.g. PiT, CiT, VAT (Table 1).

Table 1. List of reports on the functioning of public universities

	Financial statement (FS)
a of: hip	Statement on the implementation of the material and financial schedule (MFS)
	Report on income, costs and financial result of universities F-01s
area	Report on the movement in fixed assets F-03
he ; ene	Statements and reports on the use of funds received under one subsidy for the maintenance and
n tl epr	development of didactic potential and development of research potential
ta i ntre	Report on employment and remuneration RB-70
da 1, e	Report on the status of settlements (receivables and liabilities) - Rb-N, Rb-Z
tior	The Integrated System of Information on Science and Higher Education POL-on
nch	Public Information Bulletin (BIP – Biuletyn Informacji Publicznej)
s ir edt	Tax reports - incl. PiT (report on income tax from natural persons), CiT (report on direct tax from
but h,	enterprises), VAT
rep	Reports on students and scholarships S-10, S-11, S-12
he ese	Report on the number of candidates and admissions to studies (full-time and part-time course of
гт	study) EN-1
	Report on research and development activities PNT-01

Source: authors' own study.

In the last few years their preparation has been undergoing constant changes, which especially concern the philosophy of building information on the basis of which data contained in the reports relating to the financial condition of the analyzed units are presented. These changes cause difficulties in interpretation and force a number of modifications, inter alia in financial and accounting IT systems. Such activities are

<sup>&</sup>lt;sup>27</sup> Art. 149. Ustawa prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r. Dz. U. 2018, poz. 1668: A university, for the purpose of indirect commercialization, consisting in taking up or acquiring shares or stocks in companies or acquiring subscription warrants entitling to subscribe or to take up shares in companies, in order to implement or prepare for implementation the results of scientific activity or know-how related to these results, may create only one-person capital companies, subject to Art. 150 sec. 1, hereinafter referred to as "special purpose entities". To cover the share capital of a special purpose entity, a university may make a contribution in kind in the form of results of scientific activity and know-how related to these results, in whole or in part. The special purpose entity is created by the Rector with the consent of the senate.
associated with a large amount of workload and high additional, often unforeseen, costs incurred by universities, which further aggravates their difficult economic situation.

Public universities constantly record changes taking place in the economy of a given unit in the POL-on system, which is the most comprehensive repository of data on Polish science and higher education. Nearly 40 modules have been distinguished in it, and it is the largest operating public system in terms of the scope of collected data<sup>28</sup>. Data in the POL-on system is processed for the purpose of performing tasks related to determination and implementation of the state's scientific policy, evaluation of the quality of education, evaluation of doctoral schools and evaluation of the quality of scientific activity, conducting proceedings for the award of the doctoral degree, postdoctoral degree (doctor habilitated) and the title of a full professor, determining the amount of subsidies and subventions, supervision over the higher education and science system, implementation of tasks by the National Agency for Academic Exchange (NAWA), the National Centre for Research and Development (NCBiR) and the National Science Centre (NCN).

The group of reports prepared by universities for the Statistics Poland (Table 1) also includes those containing information about students and scholarships paid to them (S-10, S-11, S-12). They are a source of information made available to the public and contain important knowledge for a researcher: on the one hand, about the condition of Polish families of students (social scholarships), and on the other hand, about the scientific potential of future generations (scientific scholarships). The EN-1 report is prepared obligatory by public universities and it refers to the number of candidates applying for students enrolled in this university, divided into full-time and part-time students. On the other hand, reports on research and development activities (PNT-01) contain information on the sources of financing for all activities implementing research and development works. They inform about the amounts of expenditure incurred on various undertakings that lead to obtaining research results and their possible implementation into the economy. They are carried out with the involvement of specialized equipment and appropriate staff.

# Verification of the usefulness of ratios to assess the financial condition of a public university

Table 2 contains the ratios determined as relations of selected economic categories. Sets of economic ratios, very similar in terms of content, are used in entities carrying out various, often different tasks. They may be useful for assessing the economic and financial condition of public universities<sup>29</sup>. All of them are designed to support the knowledge of the general economic condition according to established standards (developed mainly by the private sector). They are an extremely important element providing knowledge in this field.

<sup>&</sup>lt;sup>28</sup> https://polon.nauka.gov.pl/siec-polon

<sup>&</sup>lt;sup>29</sup> M. Sierpińska, T. Jachna: Ocena przedsiębiorstwa według standardów światowych. PWN, Warszawa 2004, 144-213.

Economic condition ratio		Potio structure	Years					
		Katio su ucture	2015	2016	2017	2018	2019	
sis	Fixed assets and current assets ratio % Fixed assets/Current assets*100%			10.3	9.2	6.3	9.3	
eet analy.	Ratio of equity capital (funds) to liabilities and provisions for liabilities %	Equity (funds)/ Liabilities and provisions for liabilities *100%	2.17	2.42	2.53	1.94	2.80	
ce sh	The golden financing rule %	Equity (funds)/Fixed assets*100%	0.74	0.78	0.80	0.76	0.82	
Balan	The silver financing rule %	Equity (funds) + Provisions for liabilities + Long-term liabilities/Fixed assets*100%	0.97	0.99	0.99	1.00	1.03	
	Current liquidity	Current assets/Short-term liabilities	0.7	0.95	0.91	0.98	1.43	
uidity	Quick liquidity	Current assets - Inventory – Short-term prepayments/Short-term liabilities	0.68	0.89	0.84	0.88	1.28	
Lig	Cash liquidity	Short-term investments/Short-term liabilities	0.55	0.69	0.62	0.72	1.01	
	Inventory cycle in days	Average inventory/Net sales revenue*365	0.4	0.2	0.2	0.4	0.3	
	Receivables cycle in days	Average receivables/Net sales revenue *365	15.0	18.3	23.0	25.5	21.1	
	Liabilities cycle in days	Average liabilities/Net sales revenue *365	133.5	117.3	109.7	130.2	112.8	
ncy	Cash cycle	Inventory cycle in days + Receivables cycle in days + Liabilities cycle in days	-118	-99	-86	-104	-91	
ĥcie	Assets rotation	Net sales revenue /Average assets	0.3	0.3	0.3	0.3	0.4	
vity ef	Rotation/productivity of fixed assets	Net sales revenue /Average fixed assets	0.3	0.3	0.4	0.4	0.4	
Acti	Rotation of current assets	Net sales revenue /Average current assets	4.3	4.0	3.6	3.0	3.0	
	Rotation of liquid assets	Net sales revenue /Average short-term receivables + Average short-term investments	4.5	4.2	3.3	3.5	4.3	
	Productivity of fixed assets	Net sales revenue /Average balance of fixed assets	0.46	0.52	0.54	0.58	0.61	
	Total debt %	Liabilities and provisions for liabilities /Total assets*100%	0.32	0.29	0.28	0.34	0.26	
ess	Equity debt %	Liabilities and provisions for liabilities /Equity (funds)*100%	0.46	0.41	0.40	0.51	0.36	
tedn	Long-term debt	Long-term liabilities/ Equity (funds)*	0.02	0.01	0.01	0.01	0.05	
lab	Coverage of debt service I	Gross result + Interest/Interest	8.6	11.0	19.5	2.1	79.7	
Ir	Coverage of debt service II	Net result/Interest	7.6	9.9	18.5	0.8	78.7	
	Coverage of interest liabilities	Gross result + Interest/Interest	8.6	11.0	19.5	2.1	79.7	

|--|

Source: authors' own study.

It can be stated that the economic and financial situation of this entity changed in many areas disclosed in its financial statements in the years from 2015 to 2019. The basic ratio of the balance sheet structure decreased gradually, which in the case of this entity means increasing the share of current assets (or decreasing the value of fixed assets) in the total assets. The basic ratio of the liabilities structure of this university was, in turn, relatively constant and it meant a relatively high (characteristically for public universities) but decreasing share of liabilities and provisions in relation to its funds. The ratio of the fund to liabilities and provisions in the analyzed period was from 2.18% in 2015, and in 2019 it equaled 2.80%. The golden and silver financing rule must also be

considered by taking into account the specificity of financing and depreciation of buildings and structures of public universities<sup>30</sup>.

In light of the literature on the subject, the key aspect of financial management of an entity is its financial liquidity. It affects the financial comfort of a unit's functioning, its credibility towards other people and entities cooperating with it.

Financial liquidity ratios determined using the data contained in the financial statements of the examined university for the years from 2015 to 2019 allowed to state that the entity had periodic financial problems demonstrated by the determined liquidity ratios. Their low levels (below 1) in the period of 2015-2018 indicate the risk loss of financial balance, while their excessively high ratios established for 2019 inform about undeveloped surplus cash. Keeping the financial liquidity ratios too high or too low creates an unfavorable situation for them and requires an in-depth analysis of this process in each single case.

The group of ratios informing about the efficiency of an analyzed unit provides its managers with knowledge about the activity of using the unit's resources, and this in turn determines the effectiveness related to the use of a given group of the unit's assets. Cycles of various assets depend on their size and the impact they have on revenues of an analyzed unit, in relation to inventories. Universities usually maintain only small amounts of inventories, which mostly result from their research and education in specific fields of science. They mainly consist of reagents, books or other – characteristic for a given field of science – ingredients purchased as inventory (stored).

With regard to receivables, their amount results primarily from unpaid amounts due for rendered services or tuition fees. Tuition fees are charged periodically, their amount is determined by calculation, which is part of contracts concluded with students and participants of postgraduate studies or other forms of education provided by universities. The size of liabilities and their relation to revenues depends on the owned cash resources, i.e. directly on the level of the cash liquidity ratio of an entity.

Debt assessment is an extremely important problem, especially crucial for the effective management of any organizational unit. In recent years, it has become an important and actively observed area of university financial management for universities as well, mainly due to the fact that these units, when implementing investment projects (their external financing was usually insufficient or it was realized in a previously strictly defined part), require funding from other sectors, including e.g. the banking sector (Table 2). As a result, managers of universities, when trying to carry out a given investment task, are forced to indebt these units or sell (dispose of) other real estate unused at a given time. From this point of view, it becomes extremely important to observe the degree of their debt and the ability to service loans taken out in different terms of office. The group of debt ratios was determined in the audited entity by taking

<sup>&</sup>lt;sup>30</sup> Obligatorily in all these units, fixed assets classified as land and objects of museum value and buildings are not subject to depreciation. Buildings in public higher education institutions are subject only to accumulated depreciation and parallel reduction of the value of the basic fund. At the same time, it is worth adding that the justification for just such a solution does not find full substantive support in the literature on the subject. Therefore, it can only be assumed that the adoption of this type of records was dictated by the fact that their acquisition is financed by targeted subsidies from public funds; Pisarska A: Sources of financing tasks for public higher education institutions: findings in light of their reporting. Zeszty Naukowe SGGW w Warszawie, Polityki europejskie, finanse i marketing, 2020, nr 24(73).

into account its liabilities and provisions for liabilities, resulting from legal regulations applicable to public universities. Provisions for retirement benefits for employees of these units are a special group of provisions.

The debt of public universities consists of long and short-term liabilities, the largest amount of which are usually the liabilities to banks. In the studied university, the debt ratios prove high ability of universities to pay their liabilities. The total debt ratio ranged from 0.26 in 2019 to 0.32 in 2015 and it was a decreasing trend, except for 2018, when the ratio was 0.34. The equity debt ratio in 2015 was 0.46 and decreased in each of the analyzed years to 0.36 in 2019. Also in this case, in 2018 this ratio increased to 0.51. The long-term debt ratio results from the long-term debt of the studied university in 2019. The debt coverage ratios indicate the high ability of the unit in this regard. The literature accepts the level of 1.3 as the minimum level of the debt coverage ratio I, and as its optimal level - 2.5. The debt coverage ratio II should be greater than or at least equal to 1. During all the years of the analyzed public university there were no difficulties with debt coverage (Table 2) with the exception of 2018, when all debt coverage ratios were at risky levels from the point of view of this entity's finances.

Table 3 presents ratios suggested as the most useful for assessing the research potential (scientific activity) of employees of the public university under study. The ratios constructed according to the indicated rules will allow to verify the achievements of the research-didactic and research staff in the scope of the implementation of tasks facing the academic staff of the university. These ratios will make it possible to evaluate the use of the research potential the unit possesses, i.e. in fact the intensity and value of research works carried out by the research-didactic and research staff. In the case of the university under study, an insight into this area reveals the relatively constant level of research activity of its employees (working in the field of science) financed with external funds.

Saiantifia activity estica		Datia atmusture	Years				
	Scientific activity ratios	Ratio structure	2015	2016	2017	2018	2019
al	Effectiveness of obtaining research grants by academic teachers	Number of grants / Average number of research-didactic staff		0.01	0.01	0.01	0.01
h notenti	Productivity of obtaining research grants by academic teachers (in PLN)	Grant income / Average number of academic teachers	1 965.2	4 781.0	3 480.1	4 588.5	19 529.5
Researc	Technical equipment for employees who are teachers (in PLN)	Value of research equipment / Average number of academic teachers	516.36	435.40	353.76	282.85	206.67
	Productivity of research equipment (in PLN)	Grant income / Value of research equipment	5.92	17.96	16.01	27.13	157.37

**Table 3.** A set of recommended ratios for evaluating the results of the functioning of public universities in the field of scientific activity

Source: authors' own study.

The scientists carrying out their tasks at the studied university show increasing scientific activity, which is evidenced mainly by the ratio of productivity of academic teachers due to obtained grants, which increased each year. The increase in revenues from grants per 1 academic teacher should be assessed positively. The number of grants is taken into account in the subsidy distribution algorithm, positively influencing its amount. The ratio of technical equipment in the work of academic teachers informs about the value of research equipment per one employee in this area. Research equipment<sup>31</sup> is purchased primarily with the use of the sources from publicly funded projects, coming from National Science Centre (NCN) grants or funds allocated to research financed from the European Union budget. At the same time, the most important funds for university managers are those that have the greatest impact on the amount of the subsidy allocated from the Ministry of Education and Science, and therefore those that have the highest importance in the distribution algorithm.

The obtained values of ratios are characterized by high managerial utility. They can help the university authorities determine the incentives for employees to undertake more intensified scientific activity. When analyzing this area of university operation, one should take into account the influence of the examined segment of the activities of a public university (in this case, the area of science) on the distribution algorithm of the subsidy financing the activities of a public university, e.g. in the field of science.

Table 4 presents ratios useful in determining the didactic potential (didactic activity). They will make it possible to evaluate the activities carried out by universities in the field of education of, primarily, students, doctoral students and postgraduate students, which is associated with improving the quality of education. The set of these ratios includes many aspects taken into account when assessing this area of university operation. The variables taken into consideration when analyzing the area of education include, first of all, the number of academic teachers, the number of administrative employees, the number of fields of study, the number of students, revenues relating to this area, costs resulting from the implementation of tasks in this area, as well as the value of university resources used in this area (including fixed assets). The number of academic teachers per field of study conducted at the university informs about the positions within those fields taken by academic teachers employed at the university under analysis. This ratio may be important for assessing the quality of education at the university under study. It may be of interest to future students, university accreditation committees and external stakeholders.

The ratio informing about the number of administrative employees assigned to the number of fields of study realized at a given university can be treated as complementary to the previous one. It indicates the commitment of university managers to the implemented tasks and improving the quality of student service. The number of students per one field of study, per the number of academic teachers and the number of administrative employees indicates primarily the perception of the university as an organization in which students can pursue and develop their talents. The chosen university is assessed by them as the one with an attractive educational offer.

The operating costs and general and administrative costs were established in reference to one student, academic teacher and administrative employee. On the other hand, the cost of remuneration was determined in relation to the number of teachers and administrative employees.

<sup>&</sup>lt;sup>31</sup> Scientific and research equipment are sets of research, measuring or laboratory devices with a low degree of versatility and high technical parameters (usually higher by several orders of measurement accuracy than typical equipment used for production or operational purposes). Additional methodological explanations: the scientific and research equipment does not include computer equipment and other devices not used directly for the implementation of R&D works, Statistics Poland, Warsaw.

	D di da di	Years					
Didactic activity ratios	Ratio structure	2015	2016	2017	2018	2019	
Teaching staff in the fields of study implemented	Average number of academic teachers / number of fields of study	7.3	7.0	6.3	6.2	5.4	
Operational administrative staff in the field of studies implemented	Average number of administrative employees / number of fields of study	4.6	4.3	3.8	3.7	3.3	
Attractiveness of the didactic offer	Number of students / Number of fields of study	100.3	90.3	81.6	77.6	65.8	
Didactic effectiveness of academic teachers	Number of students / average number of academic teachers	13.7	12.9	13.0	12.5	12.2	
Effectiveness of administrative employees	Number of students / average number of administrative employees	22.0	21.1	21.6	20.9	19.9	
Productivity of academic teachers (in PLN)	Operating income / average number of academic teachers	161 669.1	163 441.3	170 596.4	172 720.3	215 456.1	
Productivity of administrative employees (in PLN)	Operating income / average number of administrative employees	259 034.5	266 892.9	282 377.7	289 958.8	352 086.8	
Education productivity (in PLN)	Operating income / total average	11 769.3	12 624.8	13 074.2	13 860.6	17 717.4	
Average total cost per 1 academic teacher (in PLN)	Operating costs / average number of academic teachers	183 703.3	179 436.8	182 894.1	186 536.0	208 902.4	
Average total cost per 1 administrative 9 employee (in PLN)	Operating costs / average number of administrative employees	294 338.8	293 012.9	302 733.2	313 152.2	341 377.1	
Average total cost per 1 student (in PLN)	Operating costs / average number of students	13 373.3	13 860.3	14 016.7	14 969.3	17 178.4	
Average general and administrative costs per 1 academic teacher (in PLN)	General and administrative costs / average number of academic teachers	25 074.5	26 098.9	27 098.9	30 379.7	37 551.7	
Average general and administrative costs per 1 administrative employee (in PLN)	General and administrative costs / average number of administrative employees	40 175.7	42 618.4	44 855.2	51 000.7	61 365.0	
Average general and administrative costs per 1 student (in PLN)	General and administrative costs / average number of students	1 825.4	2 016.0	2 076.8	2 437.9	3 087.9	
Average salary of an academic teacher per 1 student (in PLN)	Teachers' remuneration / average number of students	5.7	6.0	6.0	6.4	7.3	
Average salary of an administrative employee per 1 student (in PLN)	Remunerations of administrative employees / average number of students	2.0	2.0	2.1	2.3	2.7	
Technical equipment of academic teachers (in PLN)	Value of fixed assets / average number of academic teachers	375 283.5	344 253.7	326 191.7	310 853.3	347 319.8	
Technical equipment of students (in PLN)	Value of fixed assets / average total number of students	27 320.1	26 591.3	24 998.7	24 945.5	28 560.8	

Table 4. A set of recommended indicators for the evaluation of the results of the functioning of public universities in terms of didactic activity

Source: authors' own study.

Fixed assets are an important item in the entity's assets. Their value was assigned to the number of teachers, administrative employees and students. The ratios established according to this method present the value of fixed assets that is used by students and employees while studying and carrying out education, as well as conducting scientific research.

Some of these parameters already have their own standards, e.g. the number of students per one academic teacher has the SSR<sup>32</sup>, while the number of students per one field of study may indicate obligatory or optional limits set within the unit.

Table 5 contains ratios of entrepreneurial activity (academic entrepreneurship), which currently (in accordance with current legal regulations) is an important aspect of public university management. Ratios constructed according to the presented rules will allow to verify the achievements of academic teachers in the scope of their entrepreneurial activity. This is all the more important because, as researchers point out, university scientists traditionally focus on basic research, and most of them have no practical experience in the field of entrepreneurship, and therefore they may not consider critical issues related to their ventures<sup>33</sup>.

Economic activity ratios		Patio structure	Years				
	Economic activity fatios	Kano structure	2015	2016	2017	2018	2019
	Productivity of academic	Revenues from sales of					
0	teachers in terms of	implementation works /	732.5	350 /	270.7	504.6	876 /
shi	implementation works (in	Average number of	152.5	559.4	219.1	504.0	070.4
m	PLN)	teachers					
ane	Profitability of economic	Revenues from					
spr	activities carried out by	implemented projects /	0.0	0.0	0.0	0.0	-876.0
ıtre	academic teachers (in PLN)	Number of projects					
o er	Profitability of business units	Profit (loss) of business					
sit		entities / Sales revenues	0.0	0.0	0.0	0.0	0.0
ver	70	x100%					
Uni	Productivity of recearch staff	Total revenues in business					
	in husiness entities (in PLN)	units / Average number of	0.0	0.0	0.0	0.0	0.0
	in business enuties (in PLN)	research staff					

Table 5. A set of ratios to assess the performance of public universities in terms of their economic activity

Source: authors' own study.

The ratios in Table 5 revealed the problem of the studied university in terms of employee activity in relation to the commercialization of scientific research results and the dissemination of scientific achievements. This area requires special care on the part of university managers and their employees due to the fact that the effective operation of academic teachers has an impact on the financing and evaluation of public universities.

<sup>&</sup>lt;sup>32</sup> The number of students per one academic teacher at the i-th public academic university, which determines the ratio of staff to students.

<sup>&</sup>lt;sup>33</sup> K. Bischoff, C.K. Volkmann, D.B. Audretsch: Stakeholder Collaboration in Entrepreneurship Education: An Analysis of the Entrepreneurial Ecosystems of European Higher Educational Institutions. Journal of Technology Transfer, 2018, Vol. 43, No 1, pp. 20–46; C. O'kane, , V. Mangematin, W. Geoghegan, C. Fitzgerald: University Technology Transfer Offices: The Search for Identity to Build Legitimacy. Research Policy, 2015, Vol. 44, No 2, pp. 421–437; R-M. Hsieh, D. Kelley: A Study of Key Indicators of Development for University-Based Entrepreneurship Ecosystems in Taiwan, Entrepreneurship Research Journal, 2020, Vol. 10, No 2, pp. 1-17.

The activities of universities in this area influence the amount of obtained subsidies in direct and indirect ways. In this field, universities may also conduct business activities, which will affect the amount of revenues increasing the inflowing cash, or they may conduct separate economic activities (e.g. in the form of special purpose entities). However, the economic and financial effectiveness of these activities can be assessed using a standard set of ratios.

#### Conclusions

In line with the concept of an entrepreneurial university, the set of activities implemented by universities covers three coexisting areas: science, education and entrepreneurship. Hence, in order to assess the performance of a university, it is necessary to measure the effects it achieves in all of these dimensions. The obtained results play an important role, particularly in view of being able to ensure the effective functioning of a public university.

Noting the existing tool shortage in this respect, the study proposes a set of ratios which are most useful for managing a public university, which fully reflect the situation of such a unit. At the same time, an attempt was made to present their informative usefulness on a specific example. The data used was obtained from the financial statements and accounting records of the analyzed entity for the years from 2015 to 2019. It was established that the period of 5 years was justified for the assessment of the economic and financial condition of the university, as the five-year time interval is used to determine the need to carry out corrective actions. The obligation of implementing such actions results from the LoHEaS<sup>34</sup>. Constant 5-year monitoring of a university's financial situation is therefore (also for this reason) necessary to maintain a safe and developmental position of this university.

Research conducted at a deliberately selected multi-discipline university allowed for its evaluation over time. In the period of 2015-2019, this unit changed in the analyzed areas, which is indicated by the respective increase or decrease in the size of the ratios. For example, the fixed assets and current assets ratio (it decreased in the analyzed period) proves the low flexibility (possibility of liquidation) of assets, which implies a high degree of relevance to the particularities of the unit under review. On the other hand, the value of financial liquidity ratios in the audited period showed that the university had periodic problems with financial liquidity. The low levels of these ratios in the years from 2015 to 2018 indicate the risk of losing financial balance, while too high ratios determined for 2019 inform about undeveloped cash surpluses.

It should be borne in mind that an important feature of the proposed ratios is taking into account the specificity of financing, including depreciation of buildings and structures of public universities, and, above all, the tasks these units carry out in the field of research, commercialization of research results and education.

The presented concept should be treated as a voice in the discussion on the possibility of shaping the effectiveness of these characteristic units such as universities. At the same time, the authors take into account the limitations of the presented concept of measurement, which results from its versification in one entity only. Conducting

<sup>&</sup>lt;sup>34</sup> Art. 418. Ustawa prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r. Dz. U. 2018, poz. 1668.

further research on a wider group of units may confirm or contribute to the correction of the findings made in this matter.

In the perspective of further research, the relativisation of the ratio values in relation to a group of public universities, or to all of them in general, will allow to determine whether the ratio values are high or low. Moreover, their interpretation in relation to the functioning of other entities in the sector will allow to develop standards in a given scope. It should be assumed that they will differ in relation to different groups of universities (universities, universities of technology, economic universities, agricultural universities, pedagogical universities, physical education universities, music universities, medical universities etc.).

At the same time, when assessing the effectiveness of public universities on the basis of financial ratios, one should take into account their specificity resulting from the size of the activities they realize in some of their groups, which is related to the tasks they carry out, the specificity of using certain groups of assets and the origin of funds that finance them.

#### References

Arens A., Elder R., Beasley M.: Auditing: An Integrated Approach. Ninth edition Englewood Cliffs, Prentice Hall 2003.

Babbie E.: Badania społeczne w praktyce. PWN, Warszawa 2004.

Barrow C.: The entrepreneurial University. Where it all went Wrong [in:] Transformative researchers and educators for democracy. J.M. Paraskeva, T. LaVallee (eds.), Sense Publisher, 2015.

Bauer K., Macuda M.: Sprawozdanie finansowe jako źródło informacji dla interesariuszy restrukturyzowanego szpitala. Prace naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 2018, Nr. 503.

Becker A., Becker J.: Zastosowanie metody granicznej analizy danych do oceny gospodarowania województw Polski, [in:] Wątróbski J. (ed.), Studia i materiały Polskiego Stowarzyszenia Zarządzania Wiedzą, PSZW, Bydgoszcz 2009.

Bischoff K., Volkmann C.K., Audretsch D.B.: Stakeholder Collaboration in Entrepreneurship Education: An Analysis of the Entrepreneurial Ecosystems of European Higher Educational Institutions. Journal of Technology Transfer, 2018, Vol. 43, No 1.

Burkhardt J.H., Wheeler J.R.C.: Examining Financial Performance Indicators for Acute Care Hospitals. Journal of Health Care Finance, 2013, Vol. 39, No. 3.

Chluska J., Szewieczek A.: The use of cost information in the reports and financial analyzes of hospital. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu. 2018, No. 524.

Chluska J.: Wynik finansowy szpitala-aspekty informacyjne i decyzyjne. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu, 2017, nr 471.

Crosby A., Knepper H. J., Levine H.: Predicting hospital closure using popular financial indicators: An exploratory study of Muhlenberg Hospital. Public Administration Quarterly, 2020, Vol. 44, no. 1.

Dolan B., Cunningham J., Menter M., McGregor C. The role and function of cooperative research centers in entrepreneurial universities: A micro level perspective. Management Decision, 2019, Vol. 57, no 12.

Feroz E.H., Kim S., Raab R.L.: Analytical procedures: A data envelopment analysis approach. Journal of Emerging Technologies in Accounting, 2005, Vol. 2.

Hsieh R-M., Kelley D.: A Study of Key Indicators of Development for University-Based Entrepreneurship Ecosystems in Taiwan, Entrepreneurship Research Journal, 2020, Vol. 10, No 2.

Jung D., Chow C., Wu A.: The role of transformational leadership in enhancing organizational innovation: Hypotheses and some preliminary findings. The Leadership Quarterly, 2003, Vol. 14(4-5).

Kasiewicz S., Rogowski W.: Ocena opłacalności inwestycji społecznych. Bank i Kredyt, 2006, No. 1.

Kotowska B., Uziębło A., Wyszkowska-Kaniewska O.: Analiza finansowa w przedsiębiorstwie. CeDeWu 2021.

Mączyńska E.: Ocena kondycji przedsiębiorstwa, Życie Gospodarcze. 1994, No. 38.

Mioduchowska-Jaroszewicz E.: Wskaźniki do oceny sytuacji finansowej ubezpieczycieli a porównania sektorowe, Zeszyty Teoretyczne Rachunkowości. 2012, No. 65 (121).

O'kane C., Mangematin V., Geoghegan W., Fitzgerald C.: University Technology Transfer Offices: The Search for Identity to Build Legitimacy. Research Policy, 2015, Vol. 44, No 2.

Opolski K., Modzelewski P.: Pomiar skuteczności i efektywności w urzędach administracji samorządowej – podejście metodologiczne. Mazowsze Studia regionalne. Analizy i Studia, 2009, No. 2/I

Pisarska A.: Sources of financing tasks for public higher education institutions: findings in light of their reporting. Zeszty Naukowe SGGW w Warszawie, Polityki europejskie, finanse i marketing, 2020, nr 24(73).

Satoła Ł.: Ocena sytuacji finansowej gmin wiejskich w Polsce w latach 2006–2008. Acta Scientiarum Polonorum, Series Oeconomia, 2010, nr 9(2).

Sawyer L.B., Dittenhofer M.A., Scheiner J.H.: Sawyers' internal auditing. The Institute of Internal Auditors, Altamonte Springs, FL, 2005.

Sierpińska M., Jachna T.: Ocena przedsiębiorstwa według standardów światowych, PWN, Warszawa 2004.

Swanwick T., McKimm J.: What is clinical leadership...and why is it important? The Clinical Teacher, 2011, Vol. 5(1).

Ustawa prawo o szkolnictwie wyższym i nauce z dnia 20 lipca 2018 r. Dz. U. 2018, poz. 1668.

# Wyniki funkcjonowania uczelni publicznych: ustalenie zestawu wskaźników zapewniających wiarygodną informację zarządczą w oparciu o dane pochodzące ze sprawozdań jednostki

#### Streszczenie

Celem opracowania jest określenie zestawu wskaźników umożliwiających wielowymiarową ocenę działalności publicznych szkół wyższej jako jednostek sektora finansów publicznych w celu usprawnienia efektywności zarządzania nimi. Dobór właściwych, odznaczających się wysoką wiarygodnością o zachodzących w nich zjawiskach i procesach wskaźników staje się przydatnym narzędziem zarządczym. Stąd też w treści opracowania dokonano kompleksowego pomiaru wyników uczelni. Badania empiryczne przeprowadzono na celowo dobranym uniwersytecie wielodziedzinowym, czyli podmiocie prowadzącym działalność badawczą i dydaktyczną w obszarze wielu dziedzin nauki. Materiał empiryczny zgromadzono przy wykorzystaniu informacji pochodzących ze sprawozdań finansowych i informacji analitycznych pochodzących z ksiąg rachunkowych badanej jednostki. Badaniem objęto lata 20015-2019. Przeprowadzone badania empiryczne dostarczyły argumentów, w świetle których opracowany zestaw wskaźników posiada wysoką użyteczność zarządczą, gdyż pozwolił ocenić stan zachodzących w badanej jednostce zjawisk.

Słowa kluczowe: efektywność szkół wyższych, przedsiębiorczość, kształcenie, badania naukowe, sprawozdawczość, sektor publiczny JEL Codes: I23; M41; M49

Information about the authors:

Dr Aleksandra Pisarska Prof. dr hab. Jarosław Karpacz Jan Kochanowski University of Kielce ul. Uniwersytecka 15, 25-406 Kielce, Polska e-mail: aleksandra.pisarska@ujk.edu.pl ORCID: 0000-0002-8165-0691 e-mail: jaroslaw.karpacz@ujk.edu.pl ORCID: 0000-0001-7315-2855 \* \* \* \* Polityki Europejskie, \* Finanse i Marketing \* \* \* 25 (74) 202

DOI 10.22630/PEFIM.2021.25.74.7

Received: 11.05.2020 Accepted: 09.05.2021

Dagmara Stangierska Dawid Olewnicki Ewa Sabała Warsaw University of Life Sciences

# FINANCIAL-ECONOMIC ANALYSIS OF FRUIT AND VEGETABLE PRODUCER GROUPS IN POLAND, AND CONDITIONS FOR THE FUNCTIONING OF PRODUCER GROUPS

Poland occupies a high position in both global and European fruit and vegetable production. The large number of small-sized farms has been one of the problems of Polish agriculture for years. National and EU financial help has increased interest in associating producers into groups. The effective functioning of these groups is conditioned by many factors related to the specificity of horticultural production, legislation and the market situation. Organizations on the fruit and vegetable market show significant variation in functioning as well as in the production and economic results achieved.

The aim of the article is to assess the financial and economic situation and provide strategic analysis of the conditions for the operation of fruit and vegetable producer groups in Poland. Research was conducted on the basis of data contained in the financial statements from 2016-2017 and the financial liquidity and profitability ratios calculated on their basis. A general assessment of the conditions needed for the functioning of producer groups is also presented in the paper.

Low profitability and financial liquidity of producer groups were noted in the analyzed years. Key strategic factors for the functioning of producer groups included: the visible impact of financial assistance, the functioning of producer groups and economies of scale resulting from greater aggregation of competition, and the fact that farmers are still reluctant to associate and often have limited business competences to run producer groups.

Key words: producer group, producer organizations, fruit and vegetable market, financial analysis, ratio analysis.

JEL Codes: D22, D24, Q14, Q13

### Introduction

Modern fruit and vegetable producers face many challenges and difficulties, despite the fact that production technologies have changed dramatically in the last few decades. Poland is at the forefront of European and even world production of many fruit and vegetable species. Still, part of Polish fruit and vegetable production does not meet the



requirements of foreign markets due to qualitative reasons. One of the problems of Polish agriculture continues to be fragmentation, which is a major impediment to development and competitiveness. The solution to this problem may be cooperation, which usually takes the form of fruit and vegetable producer groups and organizations. Producer groups can also count on additional financial support from the European Union, thanks to which farms can be modernized. EU and national legislation governing the functioning of such entities has changed several times in recent years, which could be a source of problems in the functioning of these entities.

A pre-recognized producer group is an organizational unit that brings together farmers producing fruit and vegetables, with legal personality and the status of preliminary recognition granted by the marshal of the voivodeship competent for the seat of the group, in accordance with the provisions of national law and EU law. A group of fruit and vegetable producers must obtain pre-recognition status to meet the relevant criteria. The association of fruit and vegetable producers must be created with at least 5 members who jointly generated and sold, in the year preceding the year of application submission, products worth a minimum of 50,000 EUR. In addition, a group applying for pre-recognition status must provide a recognition plan divided into annual implementation periods. The duration of the plan implementation may not exceed a period of five years from the date of approval by the voivodeship marshal who is responsible for the seat of the group<sup>1</sup>.

Interest in creating groups among producers in recent years has been great, because such cooperation brings many benefits. It allows to collect large batches of equal quality products, thus increasing competitiveness on domestic and foreign markets. As Malinger<sup>2</sup> points out in theory, competitiveness is determined by cost measures: profitability, efficiency and effectiveness. Profitability is associated not only with production costs, but also with revenues. Profitability can be described as the difference between revenues and costs. For productivity, the European Commission defines this as the most reliable measure over a long period of time.

The aim of the article is to assess the economic and financial situation and provide strategic analysis of the conditions for the operation of fruit and vegetable producer groups in Poland. Research was conducted on the basis of data contained in the financial statements of selected groups of fruit and vegetable producers from 2016-2017, and the financial liquidity and profitability ratios calculated on their basis. The analyses took into account the current basic legislation regulating the functioning of the fruit and vegetable market. In addition, an assessment of the conditions for the functioning of producer groups was carried out, which aims to determine external and internal factors, both positive and negative, which affect the situation of producer groups.

<sup>&</sup>lt;sup>1</sup> K. Krzyżanowska: Stan zorganizowania rolników w grupy producentów owoców i warzyw w Polsce, Roczniki Naukowe SERIA, XIII(2), 2011, s. 256-260.

<sup>&</sup>lt;sup>2</sup> J. Malinger: Wyniki ekonomiczne uznanych organizacji producentów jabłek z powiatu grójeckiego. Roczniki Naukowe SERIA, XVIII(1), 2016, s. 169-173.

### Material and Methodology

To analyze the financial situation, 19 groups of fruit and vegetable producers were selected from the register kept by the President of ARMA, and then financial statements were obtained from the EMIS database. The selection criteria included: the category of activity (9 groups with fruit production, 10 groups with vegetable production) and the availability of financial statements for 2016 (R1) and 2017 (R2). Group names have been replaced by codes, where GPO - Fruit Producer Group, GPW - Vegetable Producer Group; the groups were given consecutive numbers. The main area of activity according to the NAICS classification was in most cases wholesale of fresh fruit and vegetables. All analyzed groups were limited liability companies, only GPW2 was organized in the form of a cooperative. Groups of fruit producers had a larger number of members; only two entities had less than 10 members (GPO3 and GPO5), while in 8 GPW the number of members ranged from 5 to 9 (Table 1).

D 1		Net revenue		Net profit / loss		
code	Number of members	R2 (in PLN thousand)	% change (R2/R1)	R2 (in PLN thousand)	% change (R2/R1)	
GPO1	>25	16 955,00	-4,4	-588,00	-233,3	
GPO2	10-25	9 246,00	0,4	-493,00	-15,9	
GPO3	<10	23 313,00	13,2	-832,00	-109,6	
GPO4	>25	12 318,00	35,9	994,00	942,4	
GPO5	<10	7 975,00	43,1	136,00	-73,4	
GPO6	>25	3 296,00	-27,2	-72,00	-641,4	
GPO7	10-25	8 678,00	-1,7	17,00	-90,9	
GPO8	>25	9 659,00	-24,9	57,00	-27,2	
GPO9	>25	22 024,00	42,2	441,00	210,6	
Avarage GPO	-	12 607,11	8,5%	-37,78	-185,8%	
GPW1	<10	4 687,00	4,7	-589,00	20,8	
GPW2	<10	20 764,00	7,9	802,00	214,5	
GPW3	<10	1 034,00	-28,0	-12,00	-136,4	
GPW4	<10	3 091,00	5,8	36,00	-52,0	
GPW5	<10	3 812,00	8,9	-358,00	40,1	
GPW6	>25	17 600,00	-14,0	154,00	130,0	
GPW7	<10	14 898,00	42,7%	-88,00	46,7	
GPW8	<10	65 432,00	-0,7	17,00	-91,1	
GPW9	10-25	8 867,40	-5,7	5,05	-92,2	
GPW10	<10	13 070,48	10,3	-2 729,24	-88,4	
Avarage GPW	-	15 325,59	3,2%	-589,00	20,8	

Table 1. Characteristics of selected groups of fruit and vegetable producers and their economic and financial situation

Source: authors' own study based on data from the EMIS database.

For the purpose of preliminary analysis, selected data from the balance sheet and profit and loss account were obtained from the producer groups' financial statements included in the EMIS database. The data collected in the balance sheet and profit and loss account are the basis for calculating financial indicators that allow the assessment of the past and present situation of the enterprise and are an important tool in management and planning. In order to characterize the economic and financial situation of enterprises, the value of net income and net profit / loss in 2017 was analyzed (Table 1). The article also presents the values of financial liquidity and profitability ratios.

Financial liquidity ratios:

- Current liquidity ratio percentage ratio of current liabilities to the value of current assets held,
- Fast liquidity ratio the percentage ratio of current liabilities to the value of current assets, less inventories and short-term settlements,
- Cash liquidity ratio percentage ratio of current liabilities to available Cash Profitability ratios:
- Profitability of revenues (ROS) percentage ratio of net profit / loss to sales revenues
- Return on assets (ROA) the ratio of net profit / loss to the average value of total assets
- Return on equity (ROE) the ratio of net profit / loss to equity<sup>3</sup>.

# Characteristics of the research sample - the amount of revenue and net profit / loss

Revenues are defined as economic benefits generated as a result of a company's operations, affecting the increase of equity. Net revenues are revenues from the sale of goods and services excluding VAT<sup>4</sup>. In the case of fruit producer groups, the value of revenue in 2017 ranged from PLN 3.3 million up to PLN 23.3 million, while the revenues of vegetable producer groups ranged from about PLN 1 million up to approx. PLN 65.5 million. The average revenue of vegetable producer groups was higher than the average revenue of fruit producer groups by almost PLN 3 million; however, the increase in revenues compared to the previous year was higher for fruit producer groups. The largest increase compared to 2016 was recorded for GPO5 and GPO9 (by over 40%). In the case of GPO6 and GPO8, net revenues over the analyzed years. Only GPW7 recorded a larger increase of over 40%, while GPW3's revenues decreased by nearly 30% (Table 1).

<sup>&</sup>lt;sup>3</sup> L. Bednarski: Analiza finansowa w przedsiębiorstwie. Państwowe Wydawnictwo Ekonomiczne 2007

<sup>&</sup>lt;sup>4</sup> T. Martyniuk: Przychody jako kategoria prawa bilansowego. Zeszyty Teoretyczne Rachunkowości, 54. 2010, s.117-128.

After taking into account other revenues, operating costs, revenues, financial costs, extraordinary profits and losses, the net financial result is finally obtained. Groups of fruit producers achieved an average net loss while vegetable producers obtained an average net profit which was 20% higher compared to the previous year. Among the groups of fruit producers selected for analysis, GPO4 achieved the highest net profit which was higher by approx. 950% compared to the previous year. Half of the selected groups of vegetable producers achieved a loss on sales, and the net financial result was in the range of PLN 2.7 million losses (GPW10) up to approx. PLN 800 thousand profit (GPW2). Among the groups listed below, there were major changes between the financial results obtained in 2016 and 2017 (Table 1).

#### Results

One of the first analyzed indicators was the current liquidity ratio, which indicates a company's ability to pay its current liabilities by liquidating current assets. The most favorable situation is when its value is in the range of 1.2 to 2.0. Too high a value indicates insufficient efficiency in the use of property resources. However, a value lower than 1.2 may indicate a threat to the entity's solvency<sup>5</sup>. Among the groups of fruit producers, the most optimal values were recorded for GPO6 and GPO3. For GPO1, the current liquidity in 2016-2017 was 1.25 and 1.16, respectively, so it was close to the threat threshold. All other analyzed groups of fruit producers, optimal current liquidity was recorded at GPW10 in 2017. In 2016, it also had a value above the threat threshold. GPW3 and GPW7 were also in a favorable situation. The current liquidity of other groups was below 1.2 and was a threat to timely payment of their liabilities.

When calculating the quick liquidity ratio, inventories and accruals are excluded from current assets. In the case of quick liquidity, in addition to the value of the indicator, payment terms are also taken into account<sup>6</sup>. The highest values were recorded in both analyzed years in GPO3. At the same time, this group had high current liquidity. This may indicate that the funds are amassed excessively in bank accounts. The situation of GPO6 and GPO7, with relatively high current liquidity, quick liquidity is quite low, which may mean that the group has accumulated a large amount of stocks in which funds were frozen. The quick liquidity ratio in the years 2016-2017 remained at the correct level for GPW7 and GPW10. In 2017, the GPW9 saw an increase in current and quick liquidity to 1.13, therefore the group achieved the ability to quickly cover current liabilities. In 2017, the current and quick liquidity of the GPW9 increased to 1.13, and therefore the group achieved the ability to quickly cover its current liabilities. In case of GPW3 in 2016, the indicator was 1.03, but in the following year it decreased twice. Also in the case of GPW8 there was a significant fall in the quick ratio.

<sup>&</sup>lt;sup>5</sup> J. Dyktus, M. Gaertner, B. Malik: Sprawozdawczość i analiza finansowa. Difin, 2017.

<sup>&</sup>lt;sup>6</sup> L. Bednarski: Analiza finansowa w przedsiębiorstwie. Państwowe Wydawnictwo Ekonomiczne, 2007.

Producer group	Current	liquidity	Quick 1	iquidity	Cash lic	quidity
code	R1	R2	R1	R2	R1	R2
GPO1	1,25	1,16	1,15	0,60	0,08	0,00
GPO2	0,99	0,88	0,88	0,86	0,10	0,03
GPO3	1,82	1,24	1,78	1,17	1,63	1,07
GPO4	0,69	0,98	0,31	0,37	0,01	0,01
GPO5	0,32	0,87	0,31	0,87	0,01	0,15
GPO6	1,48	1,63	0,58	0,52	0,14	0,05
GPO7	1,03	0,99	0,30	0,26	0,01	0,00
GPO8	0,36	0,55	0,35	0,38	-	-
GPO9	0,60	1,03	0,51	0,97	0,07	0,04
Avarage	0,95	1,04	0,69	0,67	0,26	0,17
GPW1	0,74	0,54	0,51	0,37	0,46	0,12
GPW2	0,89	1,10	0,51	0,59	0,07	0,02
GPW3	1,45	1,04	1,03	0,54	1,00	0,46
GPW4	0,15	0,09	0,05	0,04	-	-
GPW5	0,83	0,94	0,83	0,94	-	-
GPW6	0,81	0,67	0,81	0,66	0,06	0,01
GPW7	1,15	1,26	1,14	1,25	0,33	0,37
GPW8	0,89	0,22	0,69	0,20	0,03	0,03
GPW9	0,92	1,13	0,82	1,13	0,51	0,56
GPW10	1,29	1,57	1,03	1,03	0,38	0,22
Avarage	0,91	0,86	0,74	0,68	0,36	0,22

**Table 2.** Liquidity ratios for selected groups of fruit producers in 2016-2017

Source: authors'own study based on data from the EMIS database.

The cash liquidity indicates the amount of current liabilities that can be covered with the available cash<sup>7</sup>. GPO3 had very high cash liquidity, so it can be concluded that it had no problems with settling current liabilities. GPO1, despite its fairly good ability to settle its liabilities by liquidating current assets, did not have cash liquidity in 2017, which means that it had no cash at its disposal. However, it was solvent (Table 2).

GPW4 had a very low capacity to cover liabilities, taking into account both analyzed indicators. Cash liquidity among vegetable producer groups was very diversified. A low value was recorded in the case of GPW2, GPW6 and GPW8. For GPW4 and GPW5 there was no data on this subject in the available reports. In other cases, cash liquidity was at a good level. GPW3 was able to cover all its current liabilities with available cash in 2016, so there was no risk of its insolvency (Table 2).

Return on assets (ROA) is the ratio of net profit / loss to the average value of total assets. You can use it to determine what financial result the company is able to generate with the available assets. Return on equity (ROE) is an indicator showing the ability to generate profits or losses shown by the equity capital involved. Profitability ratios do not have the recommended values. Their values can be compared with other

<sup>&</sup>lt;sup>7</sup> L. Bednarski: Analiza finansowa... op.cit.

companies from a given sector<sup>8</sup>. In the years 2016-2017, the ROA value in fruit producer groups ranged from -4.20% (GPO2) to 6.01% (GPO4) and increased in this period only for GPO4 and GPO9. For GPO2 and GPO3, the negative value of the indicator was maintained in both examined years. Only GPO4 and GPO9 at the turn of 2016-2017 increased the profitability of their assets. In the case of vegetable producer groups, a large variation in the value of ROA can be observed. For GPW3, the highest return on assets was recorded among the groups listed in Table 3 in 2017 (approx. 65%), with the lowest value in 2017 (approx. -39%), which is related to the financial results of the entity. ROA of all of the above entities was low. In the case of GPW1 and GPW5, it remained at around -10%.

The net return on equity (ROE), also known as financial profitability, shows the percentage of net profit to equity. Its high or growing value proves the effectiveness of investment activities and the involved equity<sup>9</sup>. Among the selected groups of fruit producers, the ROE value increased in 2017 compared to the previous year; in the case of GPO4 and GPO9, it amounted to approx. 30%. The financial profitability of GPO3 was very unfavorable. In 2017, it was -445%. GPO1, GPO2 and GPO6 also had a negative value of the index. This points to ineffective management of own capital and constitutes a barrier to their development. This situation may also be related to the capital intensity of horticultural production<sup>10</sup>. The ROE of fruit producer groups deteriorated significantly in 2017. The financial profitability of vegetable producer groups was diversified. In the analyzed period, the GPW1 recorded an increase from -486.27% to 135.09%. The situation of the GPW3 was different. ROE fell significantly from 165.00% to -171.43%. The value of this ratio at the GPW10 in the analyzed years remained at a constant, high level of approx. 50%. Thus, the GPW10 managed its equity properly.

The net profitability is the ratio of the earned profit / loss to the income after tax. In the case of GPO2 and GPO3, the indicator remained at a low, negative level in the analyzed years, while in the case of GPO1 and GPO6 its value decreased significantly. The maximum value of the net return on sales was approx. 9% for GPO5 in 2016 and approx. 8% for GPO4 in 2017, which means about 0.08-0.09 PLN of profit per 1 PLN of revenue. The lowest value of this indicator in both years was recorded for GPO2 (approx. -5%). The sale generated losses or low profits and therefore was ineffective. The average net profitability of fruit producer groups slightly decreased at the turn of 2016-2017. Profitability on net sales among vegetable producer groups was low, especially at the GPW10, GPW1, GPW5, where it was below -10%, and in 2017 it was close to -30% on the GPW10. The net profitability of GPW2 in 2017 was 3.86%, which was the highest value among the groups presented in Table 3.

<sup>&</sup>lt;sup>8</sup> J. Dyktus, M. Gaertner, B. Malik: Sprawozdawczość... op.cit.

<sup>9</sup> L. Bednarski: Analiza finansowa ... op.cit.

<sup>&</sup>lt;sup>10</sup> O. Stefko: Płynność finansowa gospodarstw ogrodniczych a zmiany zachodzące na rynku międzynarodowym. Problems of World Agriculture/Problemy Rolnictwa Światowego, 16, 2016, s. 325-334.

Producer group code	Return (ROA	turn on assetsRetu(ROA) (%)(F		Return on equity (ROE) (%)		n on sales ) (%)
group code	R1	R2	R1	R2	R1	R2
GPO1	0,75	-0,93	19,82	-32,04	2,49	-3,47
GPO2	-3,30	-4,20	-25,88	-42,87	-4,62	-5,33
GPO3	-1,24	-2,62	-38,96	-444,92	-1,93	-3,57
GPO4	-0,71	6,01	-6,58	35,65	-1,30	8,07
GPO5	1,76	0,52	10,43	2,45	9,17	1,71
GPO6	0,13	-0,73	3,08	-20,06	0,29	-2,18
GPO7	0,38	0,04	3,04	0,28	2,12	0,20
GPO8	0,08	0,07	1,74	1,25	0,61	0,59
GPO9	0,63	2,26	12,00	27,16	0,92	2,00
Avarage GPO	-0,17	0,05	-2,37	-52,57	0,86	-0,22
GPW1	-10,07	-8,30	-486,27	135,09	-16,62	-12,57
GPW2	0,56	1,80	4,19	11,63	1,33	3,86
GPW3	64,71	-38,71	165,00	-171,43	2,30	-1,16
GPW4	0,45	0,26	13,11	6,38	2,57	1,16
GPW5	-11,82	-8,74	137,47	45,15	-17,08	-9,39
GPW6	0,35	1,25	6,47	12,00	0,33	0,88
GPW7	-3,39	-2,18	-13,26	-7,61	-1,58	-0,59
GPW8	0,19	0,02	9,23	0,78	0,31	0,03
GPW9	0,30	0,03	0,80	0,06	0,69	0,06
GPW10	-2,20	-4,55	49,19	48,08	-16,83	-28,51
Avarage PW	3,91	-5,91	-11,41	8,01	-4,46	-4,62

Table 3. Profitability ratios of selected groups of fruit and vegetables producers in 2016-2017

Source: authors' own study based on data from the EMIS database.

# Assessment of the conditions for the functioning of producer groups

The basis of the common organization of the fruit and vegetable market, which is so important in Polish agriculture, is the horizontal cooperation of producers. It is defined as a union of enterprises belonging to the same production and distribution phase<sup>11,12</sup>. In

<sup>&</sup>lt;sup>11</sup> K. Załuska: Grupy wstępnie uznane i organizacje producentów na rynku owoców i warzyw w Polsce, Europie i na świecie. W: ABC organizacji i funkcjonowania grup producenckich. CDR w Brwinowie oddział w Radomiu, 2010. <sup>12</sup> J. Małysz: Integracja w Agrobiznesie. W: A. Woś (red.) Encyklopedia Agrobiznesu, Fundacja Innowacja.

Warszawa, 1998 s. 389-391.

the case of the agricultural sector, this means, in simplified terms, the joint action of producers producing the same products, while maintaining their autonomy<sup>13</sup>.

According to Hardaker and co-authors<sup>14</sup>, horizontal integration of producers helps to reduce business risk, including production, price, personnel and institutional risk; and financial risk relating to the methods of financing the farm and agricultural activity. As indicated by Klepacki and Krajewski<sup>15</sup>, producer groups now put emphasis on the development of logistics activities aimed at improving production and distribution. The integration of activities has a positive effect on the modernization of farms and changes in the structure of Polish agriculture. Although the cooperation of producers on the Polish agricultural market is becoming more and more common, besides numerous advantages, they also encounter barriers. The biggest problems include the lack of preparation of farmers to operate within a larger organization, conflicts and misunderstandings between members, loss of decision-making independence and lack of trust in this form of activity<sup>16</sup>.

In order to assess the conditions of the functioning of producer groups, external and internal factors were identified with a positive and negative impact on the functioning of the enterprise in order to assess its current condition and potential. These factors are grouped into four categories<sup>17</sup>.

Associated producers have a chance to collect large batches of goods of equal quality, which increases their bargaining power and makes it easier for them to obtain favorable prices, while reducing costs. There is also access to external financing sources, thanks to which farmers have a chance to invest in newer technologies and develop their farms. The association of producers definitely facilitates the introduction of goods to the market without intermediaries and their margins, and thus obtaining higher prices for the producer while maintaining an attractive price on the store shelf<sup>18</sup>. Such entities have greater economic power and market position than individual producers. They are able to create customer networks and build lasting market links. A single producer is not able to meet the requirements of retail chains in terms of the volume of supplies, and well-functioning groups of producers can become trading partners for large customers<sup>19</sup>, and also have a better negotiating position and the chance to be more price creators. Production in the organization is planned and adjusted to the demand in terms of quantity, which can be helpful in preventing overproduction and, consequently, food

<sup>&</sup>lt;sup>13</sup> I. Lipińska: Rola integracji poziomej w ograniczaniu występowania ryzyka produkcyjnego w kontekście reformy wspólnej polityki rolnej – aspekty prawne i ekonomiczne. Roczniki Naukowe SERIA XVI (5), 2014, s.139-145.

<sup>&</sup>lt;sup>14</sup> J.B. Hardaker, R.B.M. Huirne, J.R. Anderson, G. Lien: Coping with Risk in Agriculture. CABI Publushing. Wallingford, 2004.

<sup>&</sup>lt;sup>15</sup> B. Klepacki, J. Krajewski: Wykorzystanie środków pomocowych unii europejskiej w rozwoju infrastrtury logistycznej grup producenckich w ogrodnictwie. Roczniki Naukowe SERIA XVII (5), 2015, s. 136-140.

 <sup>&</sup>lt;sup>16</sup> R. Gąsior, A. Nowak: Integracja pozioma producentów rolnych – możliwości i bariery. Acta Oeconomia (51), 2017.
 <sup>17</sup> Ł. Szałata, J. Zwoździak: Analiza SWOT jako podstawowe narzędziew zarządzaniu środowiskiem. Rocznik

<sup>&</sup>lt;sup>17</sup> Ł. Szałata, J. Zwoździak: Analiza SWOT jako podstawowe narzędziew zarządzaniu środowiskiem. Rocznik Ochrona Środowiska (Annual Set The Environment Protection), 13, 2011, s. 1105-1114.

<sup>&</sup>lt;sup>18</sup> W. Sobczak, L. Jabłońska, A. Dziedzic: Wybrane problemy funkcjonowania grup producentów owoców z regionu grójeckiego i rawskiego. Journal of Agribusiness and Rural Development, (03 [29]), 2013.

<sup>&</sup>lt;sup>19</sup> M. Domagalska-Grędys: Czynniki kształtujące zmianę dochodu współpracujących gospodarstw grup producenckich z województwa podkarpackiego. Rocz. Nauk Roln. 97, 4, 2010, s.45-53.

waste<sup>20</sup>. Groups often use measures to increase the added value of their production with the main goal of obtaining higher prices. Added value can be obtained in various ways. Groups of fruit and vegetables producers can use their products for processing, and thus expand their offer. They are able to obtain goods that meet the customer's expectations through the appropriate selection of varieties, including organic ones, preparation of fruit and vegetables directly for consumption, and appropriate packaging. Such marketing activities allow to gain consumer trust and build a recognizable brand<sup>21</sup>.

Among the threats it should be mentioned that the same mechanisms that support domestic producer groups provide support in other EU countries, and foreign affiliated and individual producers constitute significant competition for domestic producer groups. The available funds obtained whitin the CAP may ensure producers of public support and, after its discontinuation, cause deterioration of financial liquidity of producer groups. Significant weaknesses of the functioning of groups of fruit and vegetables producers in Poland are the aversion of Polish farmers to associate, and administrative barriers to creating and running a producer group<sup>22</sup>. Producer groups rarely have members with high managerial competences on their boards, who would make modern business decisions according to the production scale of the managed groups <sup>23</sup> (Table 4).

The strengths are the combination of higher revenues and lower costs, which ultimately allow the producer to obtain higher income and stabilize the organization's position on the market. The research conducted by Gasior and Nowak<sup>24</sup> among farmers from the Lubelskie voivodeship, and by Olewnicki, Jabłońska and Marzec<sup>25</sup>among members of producer groups from the Grójec and Rawa poviats, shows that the most important benefits resulting from the joint organization are the improvement of production quality and better sales conditions, brand creation, better promotion, improved competitive position, lower business risk, joint investments and purchase of means of production, as well as better access to market information<sup>26</sup>. The fruit and vegetable producer groups have an impact on the development of rural areas. They also create new jobs for the rural population.

<sup>20</sup> W. Boguta: Grupy i organizacje producentów owoców i warzyw. Przewodnik praktycznego stosowania obowiązującego prawa (według stanu na dzień 01 września 2004 roku). Wydawnictwo Akademii Rolniczej w Lublinie, 2004.

<sup>&</sup>lt;sup>21</sup> J. Kania, W. Musiał: Dodawanie wartości w łańcuchach dostaw żywności-studium przypadku. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, 19(6), 2017, s. 105-110.

<sup>&</sup>lt;sup>22</sup> D. Olewnicki, J. Rybak: Rodzaje uprzedzeń właścicieli gospodarstw ogrodniczych do zrzeszania się w grupy producentów - przykład gminy Błędów Zeszyty Naukowe SGGW - Ekonomika i Organizacja Gospodarki Żywnościowej, 101, 2013, s. 129-138. <sup>23</sup> M. Bieniek Mailton K.-.

M. Bieniek-Majka: Korzyści i bariery tworzenia grup producentów owoców i warzyw. Roczniki Ekonomiczne Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy (4), 2011, s.11-19.

Zmarlicki K., Brzozowski P., Karmańska M. Analiza efektów ekonomicznych związanych z przynależnością do grupy producenckiej. W: Monitoring i prognozowanie uwarunkowań ekonomicznych produkcji roślin ozdobnych. Instytut Ogrodnictwa. Skierniewice. 2013. <sup>24</sup> Gąsior R., Nowak A. Integracja pozioma producentów rolnych – możliwości i bariery. Acta Oeconomia

 <sup>(51), 2017
 &</sup>lt;sup>25</sup> D. Olewnicki, L. Jabłońska, M. Marzec: Znaczenie logistyki w grupach i organizacjach producentów owoców na przykładzie powiatów grójeckiego i rawskiego. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, 18(5), 2016.

<sup>&</sup>lt;sup>26</sup> R. Gąsior, A. Nowak Integracja...op.cit,

Agricultural producers are at the beginning of the food supply chain. Producer organizations are able to control and maintain production quality more than individual producers and to respond to threats. Agro-logistical solutions related to planning, joint supply of associated producers with means of production, joint storage and preparation for sale, distribution and quality control are increasingly used in producer groups. They facilitate the operation of the organization, influence their development and increase their competitiveness<sup>27</sup>.

In Poland, after joining the European Union, the number of producer organizations began to gradually increase, but it is still small compared to other European countries, and individual producers are not competitive due to their small scale of production and a limited range that is not able to meet the needs of recipients. These are undoubtedly the weaknesses of cooperation in Polish horticultural production. The associating farmers, instead of competing with each other, should work together to a greater extent to compete with similar large entities, which is particularly important in the era of globalization.

Table 4. Assessment of the conditions for the functioning of producer groups

Positive, external conditions	Negative, external conditions
<ul> <li>&gt; financial assistance from the European Union and the State,</li> <li>&gt; the ability to guarantee large batches of goods of equal quality for large retail chains, and thus establish permanent cooperation,</li> <li>&gt; shorter supply chain,</li> <li>&gt; easier adjustment of the product to customer expectations, and therefore the possibility of obtaining higher prices,</li> <li>&gt; increased competitiveness against large trading and processing companies,</li> <li>&gt; a wider, more attractive selection,</li> <li>&gt; building recognizable brands of producer groups to which consumers will be loyal</li> </ul>	<ul> <li>competition from producers from other EU countries,</li> <li>too much dependence on financial aid that may cause loss of liquidity,</li> <li>the indissolubility of the fruit and vegetable industry from weather conditions</li> </ul>
Positive, internal conditions	Negative, internal conditions
<ul> <li>&gt; cost reduction, access to cheaper means of production and joint investments, ability to negotiate price,</li> <li>&gt; joint search for new markets and marketing activities,</li> <li>&gt; easier exchange of experiences and information,</li> <li>&gt; greater availability of knowledge, easier implementation of food quality and safety systems</li> </ul>	<ul> <li>&gt; the reluctance of farmers to form associations, the desire to maintain independence,</li> <li>&gt; extensive administration,</li> <li>&gt; difficulty in making decisions (management) in the case of groups with a large number of members,</li> <li>&gt; difficulty in preparing smaller batches because of complex technological processes.</li> </ul>

Source: authors' own study based on Zmarlicki i wsp., 2013 i Bieniek-Majka, 201128

<sup>&</sup>lt;sup>27</sup> D. Olewnicki, L. Jabłońska, M. Marzec: Znaczenie logistyki w grupach ...op.cit,

<sup>&</sup>lt;sup>28</sup> M. Bieniek-Majka: Korzyści.... Op cit.; K. Zmarlicki, P. Brzozowski, M. Karmańska: Analiza efektów... op.cit.

#### Summary

The efficient functioning of fruit and vegetable producer groups is influenced by many factors related to both the conditions of horticultural production, as well as the market situation and appropriate management. The association of horticultural producers entails many benefits and opportunities. One of the chances is usually lowering the costs of means of production or investments. Taking into account the losses on sales generated by the groups, it can be concluded that high production costs are still a big problem in horticultural production. The net financial results are largely dependent on the subsidies. Financial aid is an important element influencing the formation of producer groups. It is considered as an opportunity, and at the same time excessive dependence on it causes a decrease in liquidity, i.e. the ability to pay liabilities on time. The mean values of the liquidity ratios of the studied groups were lower than the recommended values. In recent years, a decline in their profitability has been noticeable, but the cooperation of producers is still a great opportunity for them.

The opportunities and strengths of the functioning of fruit and vegetable producer groups outweigh the number of threats and weaknesses. The manifestations of these positive impulses are only partially reflected in the financial situation of the analyzed groups of fruit and vegetable producers. The revenues of the analyzed groups in 2016-2017 ranged from approx. PLN 1 million up to approx. PLN 65.5 million. Vegetable producer groups were distinguished by higher average revenues than the others. The final financial results varied considerably, from over PLN 2 million net loss at the GPW10 to nearly PLN 1 million profit at GPO4. The average net profit was more favorable for the groups of fruit producers. Fruit and vegetable producer groups in Poland in 2016-2017 had a problem with profitability and liquidity.

#### Bibliography

Bednarski L. Analiza finansowa w przedsiębiorstwie. Państwowe Wydawnictwo Ekonomiczne, 2007

Bieniek-Majka M. Korzyści i bariery tworzenia grup producentów owoców i warzyw. Roczniki Ekonomiczne Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy (4), 2011, s. 11-19

Boguta W. Grupy i organizacje producentów owoców i warzyw. Przewodnik praktycznego stosowania obowiązującego prawa (według stanu na dzień 01 września 2004 roku). Wydawnictwo Akademii Rolniczej w Lublinie, 2004.

Chlebicka A., Fałkowski J., Wołek T. Powstawanie grup producentów rolnych a zmienność cen. FAPA. Warszawa. 2008

Domagalska-Grędys M., Czynniki kształtujące zmianę dochodu współpracujących gospodarstw grup producenckich z województwa podkarpackiego. Rocz. Nauk Roln. 97, 4, 2010, s.45-53

Dyktus J., Gaertner M., Malik B. Sprawozdawczość i analiza finansowa. Difin, 2017

Gąsior R., Nowak A. Integracja pozioma producentów rolnych – możliwości i bariery. Acta Oeconomia (51), 2017

Hardaker J.B., Huirne R.B.M., Anderson J.R., Lien G. Coping with Risk in Agriculture. CABI Publushing. Wallingford, 2004

Kania J., Musiał W. Dodawanie wartości w łańcuchach dostaw żywności-studium przypadku. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, 19(6), 2017, s.105-110

Klepacki B., Krajewski J. Wykorzystanie środków pomocowych unii europejskiej w rozwoju infrastrtury logistycznej grup producenckich w ogrodnictwie. Roczniki Naukowe SERIA XVII (5), 2015, s. 136-140.

Leszko D. Organizacja unijnego rynku owoców i warzyw oraz konieczność dostosowania w Polsce. FAPA. Warszawa, 2000

Lipińska I.. Rola integracji poziomej w ograniczaniu występowania ryzyka produkcyjnego w kontekście reformy wspólnej polityki rolnej – aspekty prawne i ekonomiczne. Roczniki Naukowe SERIA XVI (5), 2014, s.139-145

Malinger J. Wynikiekonomiczneuznanychorganizacjiproducentówjabłek z powiatugrójeckiego. Roczniki Naukowe SERIA, XVIII(1), 2016, s. 169-173.

Małysz J. Integracja w Agrobiznesie. W: A. Woś (red.) Encyklopedia Agrobiznesu, Fundacja Innowacja. Warszawa, 1998 s. 389-391

Martyniuk T. Przychody jako kategoria prawa bilansowego. Zeszyty Teoretyczne Rachunkowości, 54. 2010, s.117-128.

Olewnicki D., Jabłońska L., Marzec M., Znaczenie logistyki w grupach i organizacjach producentów owoców na przykładzie powiatów grójeckiego i rawskiego. Roczniki Naukowe Stowarzyszenia Ekonomistów Rolnictwa i Agrobiznesu, 18(5), 2016.

Olewnicki D. Rybak J. Rodzaje uprzedzeń właścicieli gospodarstw ogrodniczych do zrzeszania się w grupy producentów – przykład gminy Błędów Zeszyty Naukowe SGGW - Ekonomika i Organizacja Gospodarki Żywnościowej, 101, 2013, s. 129-138

Sobczak W., Jabłońska L., Dziedzic A. Wybrane problemy funkcjonowania grup producentów owoców z regionu grójeckiego i rawskiego. Journal of Agribusiness and Rural Development, (03, 29), 2013.

Stefko O. Płynność finansowa gospodarstw ogrodniczych a zmiany zachodzące na rynku międzynarodowym. Problems of World Agriculture/Problemy Rolnictwa Światowego, 16, 2016, s. 325-334.

Szałata Ł., Zwoździak, J. Analiza SWOT jako podstawowe narzędzie w zarządzaniu środowiskiem. Rocznik Ochrona Środowiska (Annual Set The Environment Protection), 13, 2011, s. 1105-1114.

Załuska K.. Grupy wstępnie uznane i organizacje producentów na rynku owoców i warzyw w Polsce, Europie i na świecie. W: ABC organizacji i funkcjonowania grup producenckich. CDR w Brwinowie oddział w Radomiu, 2010

Zmarlicki K., Brzozowski P., Karmańska M. Analiza efektów ekonomicznych związanych z przynależnością do grupy producenckiej. W: Monitoring i prognozowanie uwarunkowań ekonomicznych produkcji roślin ozdobnych. Instytut Ogrodnictwa. Skierniewice. 2013.

# Ocena sytuacji ekonomiczno-finansowej oraz analiza strategiczna działań grup producentów owoców i warzyw w Polsce

## Streszczenie

Polska zajmuje wysokie miejsce w światowej i europejskiej produkcji owoców oraz warzyw. Jednym z problemów polskiego rolnictwa jest nadal, choć w nieco mniejszym stopniu rozdrobnienie. Pomoc krajowa i unijna sprawiła, że wśród producentów wzrosło zainteresowanie zrzeszaniem się w grupy producenckie. Ich funkcjonowanie uwarunkowane jest wieloma czynnikami związanymi ze specyfiką produkcji ogrodniczej, z obowiązującym prawodawstwem czy sytuacją rynkową. Organizacje na rynku owoców i warzyw wykazują znaczne zróżnicowanie w funkcjonowaniu jak również w osiąganych wynikach produkcyjno-ekonomicznych.

Celem artykułu jest ocena sytuacji finansowo ekonomicznej oraz analiza strategiczna uwarunkowań działania grup producentów owoców i warzyw w Polsce. Dokonano jej na podstawie danych zawartych w sprawozdaniach finansowych wybranych grup z lat 2016-2017 oraz obliczonych na ich podstawie wskaźników finansowych płynności i rentowności.

W opracowaniu przedstawiono także analizę strategiczną SWOT dla organizacji i grup producentów. W badanych latach odnotowano niską rentowność i płynność finansową badanych grup. Za kluczowe o znaczeniu strategicznym dla funkcjonowania omawianych podmiotów należy zaliczyć takie czynniki jak: widoczny wpływ pomocy finansowej na funkcjonowanie grup producenckich oraz korzyści skali wynikające z większej agregacji konkurencji z drugiej strony. Rolnicy nadal niechętnie się zrzeszają i często posiadają ograniczone kompetencje biznesowe do prowadzenia grup producenckich.

Słowa kluczowe: grupy producentów, organizacje producentów, rynek owoców i warzyw, analiza finansowa, analiza wskaźnikowa JEL Codes: D22, D24,Q14, Q13

Information about the authors:

Dr inż. Dagmara Stangierska, Warsaw University of Life Sciences Institute of Horticultural Sciences Nowopursynowska Street 159, 02-776 Warsaw, dagmara.stangierska@sggw.edu.pl ORCID: 0000-0002-8104-0527

#### Dr inż. Dawid Olewnicki,

Warsaw University of Life Sciences Institute of Horticultural Sciences Nowopursynowska Street 159, 02-776 Warsaw, e-mail: dawid\_olewnicki@sggw.edu.pl ORCID: 0000-0002-3096-3882

Mgr inż. Ewa Sabała

DOI 10.22630/PEFIM.2021.25.74.8

Received: 05.06.2021 Accepted: 25.06.2021

Mirosław Wasilewski Marzena Ganc Szkoła Główna Gospodarstwa Wiejskiego w Warszawie

# METHODOLOGY OF COST RECORDING AND ACCOUNTING IN DAIRY COOPERATIVES

The purpose of the research is to present the theoretical and practical aspects of determining the unit cost of producing dairy products in what is defined as a "typical" dairy cooperative. The Euclidean and urban distance method was used to determine a typical object with n = 88 dairy cooperatives the following set of variables was defined, which are common to all cooperatives and reflect the size and specificity of cooperative units on the milk market in Poland. The selected cooperative provides a procedure for calculating the unit costs of dairy products on the basis of a detailed case study. The full cost account used in cooperatives does not provide cost information for management decisions. Indirect cost accounting using contractual factors does not provide reliable cost data. An important issue in determining the coefficients is the adoption of a measure which reflects the actual relationship between cost and cost carrier, a product which, in the case of dairy products, may be difficult. It would be appropriate to attempt to introduce a variable cost account in dairy cooperatives in order to avoid the contractual assignment of indirect costs to products. The main problem highlighted by the authors is the lack of an adequate information system for the cost accounting in dairy cooperatives. The implementation of such solutions would allow managers of a dairy cooperative to make appropriate (short-term) decisions in terms of developing an assortment structure based on data e.g. on profitability at the level of individual products.

Key words: dairy cooperatives, costing calculation, cost accounting. JEL Codes: M49, Q19, P13.

### Introduction

Cost calculation in dairy cooperatives in Poland has undergone and is still undergoing modifications, dictated by the need for information changes in the period of marketisation in the economy, changes in the scale and scope of activity of economic units, their structures and management methods, the increase in demand for reliable cost information and growing competition on the dairy products market. Reliable cost information is needed under the conditions in which modern businesses operate. Providing this information is the main task of cost accounting, which is one of the most important components of accounting, with the task of grouping costs and establishing a series of relationships between production processes and the amount of costs. Cost calculation should take into account changes occurring both in production technology and in the market environment of the dairy cooperative, as these factors justify the need for cost information (Ganc 2017; Wasilewski, Kowalczyk 2004; Stanisławski 2006).

In economic units operating on the milk market in European countries, the costs incurred in a given period "have always" been recorded in generic accounts and by type of activity (Alnestig, Segersted 1996; Turner, Hilton 1989; Tishlias, Chalos 1988;



Bruegelmann 1985; Schiff 1987; Doost 2018; Ganc 2017; Dickhaut, Lere 1983; Horngren, Foster, Datar 1997). Indirect costs and other direct costs (excluding costs of milk raw material) are recorded on appropriate accounts of the types of activity, e.g. on the account "auxiliary departments" or "departmental costs" (Jaruga, Nowak, Szychta 1999). The costs of purchase and procurement of raw material are accounted for by nature and the respective amounts are transferred to the "costs of purchase and procurement" account. After the costs are recorded and allocated to the arrangement according to the types of activity, the costs incurred in the earlier periods, but related to the current cost account (period), are settled on the account "settlements of accrued costs" (Bazydło, Sokołowski 1998; Garrison, Noreen 1994; Czubakowska, Gabrusewicz 2006).

A dairy cooperative does not have costing schemes imposed 'from above'. Managers may apply the principles for the calculation of manufactured products according to the assumptions adopted by the management board of a given cooperative or use solutions proposed by various unions and associations of dairy cooperatives, taking into account the standards applicable in accounting (Ganc, Soliwoda 2011). The main rationale for preparing spreadsheets is to determine the unit costs of individual products, needed to make pricing decisions and to analyse the level of costs incurred per unit of product (Ganc 2017). Dairy commodities are mass-produced products from the same raw material but through a variety of production processes, which is why dairy cooperatives use apportionment calculations with factors and addition calculations. In determining the consumption of raw material per unit of production, the apportionment calculation with coefficients is applied, while indirect costs are added to the costs of raw material (milk) using the cost-plus pricing, with the help of appropriately selected apportionment keys (Wasilewski, Chmielewska 2006).

The raw milk is accounted for in the individual products according to the consumption norms for fat and plasma units, sometimes including the consumption norm for protein or casein units - which depends on the decisions of the cooperative's managers. The raw material consumption standard for a product defines the number of fat and plasma units that are used to produce a unit of finished product. The consumption standard is different for each type of product and takes into account the losses incurred in the production process. The cost of a unit of fat is calculated by multiplying the price of a unit of fat by the standard rate of fat consumption per product, while the value of plasma units is obtained by multiplying the price of a unit of plasma by the standard rate of consumption of these units per product<sup>1</sup>. The prices of fat and plasma units are determined according to the following formulae:

$$CJT = \frac{SM}{(JT + JB)}$$
$$JB = litry * 3_{2}$$

<sup>&</sup>lt;sup>1</sup> In those cooperatives where the raw material cannot be accounted for directly per product (where the milk comes not only from procurement - from supplier-members of the cooperative, but also from purchase - from other cooperatives), the value of the raw material is accounted for per product on the basis of the weighted average prices of fat units and plasma in purchase and procurement.

 $<sup>^{2}</sup>$  3% is the average protein content of milk, so the total number of protein units in the production of a product is the number of litres multiplied by 3. The fat content of milk in cooperatives in Poland can vary, ranging from 3% to 5%.

$$CJP = CJT * \frac{JB}{JP}$$

Where:

CJT - price of fat unit, JB - protein units, JT - fat units, JP - plasma units, CJP - price of plasma unit, SM - amount paid for raw milk.

Cost accounting in a dairy cooperative is a specific process, as the main production takes place using only one basic material, which is procured milk (Chmielewska 2006). This material (raw material) must be quickly processed into the final product as it has a short shelf life, which requires appropriate organisation of the production process. The total net dairy raw material cost of a given product is defined as the sum of the value of the fat and plasma units, less the value of the usable waste generated in the manufacture of the product (usable waste is any milk powder sweepings, cheese trimmings, etc.).

Costs by type are allocated to the places where they arise, with particular emphasis on raw material costs, which in dairy cooperatives account for approximately 85% of all operating costs and purchase and procurement costs. Once the costs by type have been allocated to the places where they arise, the value of work in progress is determined and the cost of dairy products is calculated. After adding the costs of management and sales to the cost of production, the own expense (including the costs of primary and secondary production and the costs of management and sales) is calculated.

#### **Research methodology**

The aim of the research is to present the methodology for determining the unit production cost of dairy products on the example of a typical dairy cooperative, determined using the Euclidean distance and urban distance method [Borkowski, Dudek, Szczesny 2003; Nowak 2001]. The Euclidean distance is defined by the formula:

$$\sqrt{\sum_{i=1}^{m} (Z_{ij} - Z_{ij})^{2}}$$
Urban distance is defined by the formula
$$\sqrt{\sum_{i=1}^{m} |Z_{ij} - Z_{il}|}$$

d<sub>ij</sub> - distance between i - this and j - this object,

 $z^{ii}$  - the value of i - this variable for 1 - this object.

A typical cooperative is characterised by the most close to average magnitudes of the selected variables to be analysed. In order to define a typical object with n = 88 dairy cooperatives, the following set of variables was defined, which are common for all cooperatives and reflect the size and specificity of cooperative units on the milk market in Poland - (m = 13):  $m_1$  - value of own fund (PLN),  $m_2$  - value of total assets (PLN),  $m_3$  - value of share fund (PLN),  $m_4$ - size of employment (people),  $m_5$  - value of processed raw material (PLN),  $m_6$  - operating costs (PLN),  $m_7$  - average balance of receivables (PLN),  $m_8$  - average balance of liabilities (PLN),  $m_9$  - sales revenue (PLN),  $m_{10}$  - profit/loss on

sales (PLN),  $m_{11}$  - net profit/loss (PLN),  $m_{12}$ - number of suppliers (people),  $m_{13}$  - milk procurement volume (hl).

In a selected typical cooperative, the systematics of calculating unit manufacturing costs of dairy products and the adopted settlement keys for indirect costs, determined on the basis of fat and plasma units, were presented in the form of a case study. The data needed to determine the methodology for determining the cost of dairy production was for 2019 and included both accounting records and non-accounting information (analytical costing, management data). The article attempts to answer the following research questions: 1) How are indirect costs accounted for dairy products and what are the consequences for the level of unit cost? 2) Does the methodology adopted by cooperatives for cost accounting make it possible to take management decisions? 3) What would be the desired direction for changes in the applicable cost accounting to increase information capacity?

#### Results

In the calculation of dairy products, account shall be taken of the costs of preparing the production which relate to the product being manufactured for the first time or, where new technology is applied, to the product to which it relates.

The costs of procurement and purchase of raw material are charged directly to the specified product, by means of detailed off-book accounting records. Where it is not possible to allocate purchase and procurement costs directly to a product, coefficients established within the relevant cooperative shall be applied and accounted for on the basis of the net consumption of raw material per product or on the basis of the sum of the imputed units. Purchase and procurement costs are not accounted for on buttermilk and products made from it, and on own whey products, as they do not include imputed units.

Departmental costs are accounted for on a per-product basis through cost-intensity ratios, determined by the cooperative's management and accounting department, multiplied by the volume of production. They are usually determined on the basis of, among other things, labour intensity and product weight. An important issue in determining the coefficients is the adoption of such a measure that will reflect the actual relationship between the cost and the cost carrier - the product, therefore it would be advisable to settle these costs in relation to the net consumption of raw material or the sum of the calculation units.

During the production process of dairy products, products are produced that do not meet the required standards and are not suitable for consumption, but will be sold for other purposes such as feed. The costs of losses due to production shortages are accounted directly to the product in the manufacture of which the shortage was identified. If, on the other hand, by-products are generated in the production of a given product, the production costs of the main product are reduced by the value of the by-products at their selling price<sup>3</sup>.

Management costs, known as overhead, are charged to products, usually taking as a basis the sum of purchase and procurement costs and departmental costs (this may be a different basis depending on the basis established by the cooperative), which are then

<sup>&</sup>lt;sup>3</sup> By-products are valued at their realisable selling prices.

charged to products using a calculated coefficient (overhead divided by the basis for charging these costs).

The basis for accounting for the cost of sales for specific products is off-book records. Selling costs consist of direct costs attributable to the product in question and common costs, which can be calculated as follows:

- the cost of distributing certain dairy products to the retail network in relation to the volume of products sold in a given period,
- other selling costs in relation to all products sold in a given period.

The costs of financial operations directly related to the production of products are accounted for by adopting the basis for calculation, which cooperatives determine on their own (most often it is the technical production cost, management costs and selling costs) (Rogowska 2013).

With all costs accounted for in the spreadsheet, the technical production cost of the product and the total cost of ownership of the product are determined. Manufacturing cost is the sum of net raw material consumption, other direct materials, purchase and procurement costs and departmental costs. Total own expense is determined as the sum of the technical production cost of a product, factory overheads and selling costs.

On the basis of the manufacturing cost and the cost of each product, the unit manufacturing cost and the unit own expense are determined by dividing them by the quantity of the type of product manufactured, respectively. The calculation of dairy products separately includes two more items - the value of production at realisation prices, which includes the production of the product concerned multiplied by the average selling price, and the difference between the value of production at realisation price and the total cost of ownership.

In dairy cooperatives, indirect costs constitute a small part of total production costs (about 10%), but their allocation to individual products poses many problems (Reinstein, Bayou 1997; Black, Gray 1995). The costs of purchase and procurement of raw material in cooperatives in Poland are settled directly on a specific product, by means of a coefficient established within a given cooperative and they are settled in relation to the net consumption of raw material for a given product or in relation to the sum of calculation units (Wasilewski, Chmielewska 2006).

Dairy products are mass produced using the same raw material but through different production processes. The use of the same raw material makes it possible to calculate the cost of its consumption using a job-order cost accounting with calculation factors, while the use of different processes results in the need to account for indirect costs using job-order cost accounting keys. The dairy calculation methods combine two types of calculation - job-order cost accounting with factors and cost-plus pricing.

Table 1 provides a summary of the raw material income in fat and plasma units.

The cooperative under study procured dairy raw material from farmers (cooperative owners) on an annual basis, in terms of fat and plasma units 15 million and about 4 million calculation units respectively. Raw material from purchases from other cooperatives amounted to about 4 million units of fat and about 1.4 million units of plasma. Total raw milk income, after taking into account reprocessing, shortages, surpluses and transfers between plants, was approximately 19.7 million in fat units, approximately 5.5 million in plasma units.

		Fat		Plasma	
No.	Content	Quantity	Value (PLN)	Quantity	Value (PLN)
1.	Procurement	15 927 383	3 330 202	4 062 526	2 648 165
2.	Purchase	4 030 969	1 123 696	1 447 245	1 293 234
3.	Reprocessing	17 981	6 128	4 756	5 046
4.	Differences from transfers between branches (plants) – shortages	6 668	1 398	924	602
5.	Shortages	526 716	115 908	71 227	50 527
6.	Surpluses	286 804	61 445	61 170	43 690
	Total (1+2+3-4-5+6)	19 729 733	4 404 165	5 503 546	3 938 961

 Table 1. Overview of raw dairy products

Source: authors' own elaboration.

Table 2 shows the cost calculations per unit of fat and plasma. When calculating the costs per unit of fat and plasma, account is taken of work in progress at the beginning of the period, the already calculated raw material receipts converted into fat and plasma and work in progress at the end of the year (also in units of fat and plasma). The cost per fat unit was calculated as the quotient of total fat units and total raw material revenue in fat units and amounted to PLN 0.22 per unit. The plasma cost, which was PLN 0.69 per unit, was calculated as the total plasma units divided by the total raw material revenue in those units.

Table 2. Methodology for the calculation of fat and plasma unit costs

Content	Number of units		Value of units (PLN)		
	Fat	Plasma	Fat	Plasma	
1. Work in progress at the beginning of the period	474 463	90 019			
2. Raw material income	19 729 733	5 503 546	4 404 165	3 938 961	
3. Production at the end of the period	563 190	66 696			
4. Total raw material (1+2-3)	19 641 006	5 526 869	4 404 165	3 938 961	
4 a) including from purchase:	48 904	420 410	9 394	397 195	
4 b) from procurement $(4-4a)$	19 592 102	5 106 459	4 394 771	3 541 766	
5. Cost per unit at average unit cost	1	1	4 394 771/19 592 102 = 0,2243134	3 541 766 /5 106 459 = 0,6935855	

Source: authors' own elaboration.

The raw milk is accounted for in the individual products according to the consumption norms for fat and plasma units, sometimes including the consumption norm for protein. The raw material consumption standard for a product defines the number of fat and plasma units that are used to produce a unit of finished product. The consumption standard is different for each type of product (e.g. for milk with a fat content of 2% it is 2.01 fat units and 0.98 plasma units) and takes into account the losses incurred in the

production process. The value of raw milk for individual products is recorded in units of fat and plasma.

Table 3 shows the total consumption of raw material according to the applicable standards for all products manufactured in the cooperative under study. A total of approximately 19.6 million fat units and 5.5 million plasma units were used. The highest consumption of fat units occurred for table butter, extra butter and milk powder. The highest consumption of plasma units (by standards) was recorded for milk powder.

The value of direct materials is charged directly to the product concerned. In the example in question, other direct materials in the amount of PLN 141,688 were used to manufacture the products (the data were obtained directly from the entity's accounting records). Each cooperative has a list of other direct materials, related to the specific product (e.g. other materials for butter are: butter bag, cooking salt, pure cultures for sourdough, etc.). The costs of direct materials are determined at their purchase price. Detailed off-book records shall be kept in respect of them for individual products. The type and value of the particular material needed for the product shall be specified. Those materials which are incorporated in several products are accounted for in proportion to their weight or to the consumption standards set by cooperatives.

N			Consumption according to standards		
INO.	Content	Quantity (I, kg)	Fat units	Plasma units	
1	Milk powder	428 500	3 480 993	4 683 336	
2	Packaged table butter	124 455	9 421 282	43 560	
3	Extra butter	59 828	5 022 560	17 948	
4	Buttermilk feed	204 620	81 848	204 824	
5	Drinking milk 2% bottle	105 552	213 217	104 496	
6	Drinking milk 2% in bulk	55 943	112 445*	55 103	
7	Drinking milk 3.2%	126 216	407 930	123 439	
8	30% cream 0.5 litres	8 058	244 401	5 706	
9	30% cream	200	6 040	141	
10	18% cream 0.25 litres	19 862	361 805	16 485	
11	18% cream	4 465	34 216	3 458	
12	Semi-skimmed cottage cheese	33 560	213 240	264 418	
13	Milk sold at procurement	2 646	10 122	2 545	
	Total		19 641 006	5 526 869	

Table 3. Raw material consumption by product manufactured in the surveyed cooperative

\* e.g. for 2% bulk milk the fat unit consumption is the standard times the quantity (55,943 x **2.01** = 112,445) Source: authors' own elaboration.

In the calculation of dairy products, account shall be taken of the costs of preparing the production which relate to the product being manufactured for the first time or, where new technology is applied, to the product to which it relates. Table 4. Clearance of purchase and procurement costs

Content	Amount (PLN)		
1. Total purchase and procurement costs, including:	824 982		
a) purchase costs	11 868		
b) procurement costs	813 197		
2. Net value of raw material consumed	8 334 021		
a) the value of purchased raw material	406 589 *		
3. Value of raw material (basis for determining the rate of procurement and purchase cost mark-up) (2-2a)	7 927 432		
Ratio	813 197 : 7 927 432 = 0.102580129		

\* Net raw material is the value of the raw material minus the waste: gross raw material = 4,404,165 + 3,938,961

= 8,343,126 minus the value of the waste - in our example 9,105 = 8,334,021

\* Value of raw material purchased (fat and plasma units) 9,394 + 397,195 = 406,589

Source: authors' own elaboration.

The costs of procurement and purchase of raw material are charged directly to the specified product, by means of detailed off-book accounting records (Table 4). Where it is not possible to allocate purchase and procurement costs directly to a product, coefficients established within the relevant cooperative shall be applied and accounted for on the basis of the net consumption of raw material per product or on the basis of the sum of the inputed units. Purchase and procurement costs are not accounted for on buttermilk and products made from it, and on own whey products, as they do not include inputed units. The costs of purchase and purchase in the investigated cooperative amounted to approximately PLN 825 thousand and for their settlement the value of total raw material minus the value of purchased raw material was taken as the basis. The clearing factor was 0.102580129.

Departmental costs are accounted for on a per-product basis through cost-intensity ratios, determined by the management, multiplied by the volume of production. They are usually determined by the labour intensity of the product, its weight, etc. An important issue in determining the coefficients is the adoption of such a measure that will reflect the actual relationship between the cost and the cost carrier - the product, therefore it would be advisable to settle these costs in relation to the net consumption of raw material or the sum of the calculation units. Departmental costs are not accounted for in relation to milk that is already sold at the collection centre (Table 5). In the cooperative studied, departmental costs were accounted for with reference to the departmental cost mark-up ratio, calculated by dividing the value of departmental costs by the number of costing units. The cooperative has four departments: liquid products, cottage cheese, powder and butter plant. The highest departmental costs are incurred in the powder plant. The costs of losses due to production shortages are accounted directly to the product in the manufacture of which the shortage was identified. If, on the other hand, by-products are generated in the production of a given product, the production costs of the main product are reduced by the value of the by-products at their selling price<sup>4</sup>.

<sup>&</sup>lt;sup>4</sup> By-products are valued at their realisable selling prices.

Table 5. Cleara	nce of departmental costs
-----------------	---------------------------

Departments	Number of calculation units - contractual*	Departmental costs (PLN)	Cost mark-up ratio (departmental costs : number of basic units)
Liquid articles	729 457	370 819	0,50834936**
Cottage cheese plant	33 560	84 599	2,52082836
Milk powder plant	457 725	1 022 090	2,23297831
Butter plant	184 283	338 706	1,83796660
Total		1 816 214	

\* The number of calculation units - contractual units is the quantity of output times a factor.

\*\*370,819 : 729,457 = 0.05834936, 84,599 : 33,560 = 2.52082836, 1,022,090 : 457,725 = 2.23297831 338706 : 184,283 = 1.83796660.

Source: authors' own elaboration.

Table 6.	Unit	production	cost of	dairy	products
----------	------	------------	---------	-------	----------

Content	Consum accordii standards j	ption ng to per unit	Co (PLN)	ost /unit)	Cost of raw material (PLN/l, kg)	Costs of direct materials (PLN/ l, kg)	Purchase and procurement costs (PLN/ l, kg)	Departmental costs (PLN/ l, kg)	Unit Manufacture Cost (PLN/ l, kg)
	Fat	Plasma	Fat	Plasma					
Milk powder (kg)	8,1	10,93	0,2	0,69	9,40	0,11	0,96	2,05	12,52
Packaged butter (kg)	75,7	0,35	0,2	0,69	17,22	0,43	1,77	1,69	21,11
Extra butter (kg)	83,9	0,30	0,2	0,69	19,04	0,47	1,95	1,69	23,15
Buttermilk feed (l)	0,40	1,00	0,2	0,69	0,78	0,01	0,08	0,47	1,34
Drinking milk 2%	2,02	0,99	0,2	0,69	1,14	0,02	0,12	0,47	1,74
Drinking milk 2% (l)	2,01	0,98	0,2	0,69	1,13	0,02	0,12	0,47	1,73
Drinking milk 3.2% (l)	3,23	0,98	0,2	0,69	1,40	0,02	0,14	0,47	2,04
30% cream 0.5 litres (l)	30,3	0,71	0,2	0,69	7,29	0,17	0,75	0,47	8,68
30% cream (l)	30,2	0,71	0,2	0,69	7,26	0,17	0,75	0,47	8,65
18% cream 0.25 litres (l)	18,2	0,83	0,2	0,69	4,66	0,11	0,48	0,47	5,71
18% cream (l)	7,6	0,77	0,2	0,69	2,26	0,05	0,23	0,47	3,00
cottage cheese (kg)	6,3	7,88	0,2	0,69	6,89	0,08	0,71	2,31	9,99
Milk sold at procurement (l)	3,8	0,96	0,22	0,69	1,53	0,03	0,16	0,47	2,18

Source: authors' own elaboration.

Once the cost of production has been determined, the own cost of dairy products sold is determined, accounting for management costs and selling costs. Management costs, known as overhead, are charged to products, usually taking as a basis the sum of purchase and procurement costs and departmental costs (this may be a different basis depending on the basis established by the cooperative), which are then charged to products using an added coefficient (overheads divided by the basis for charging these costs). The basis for calculating the costs of sales for specific products is off-book records (Bazydło, Sokołowski 1998). Selling costs consist of direct costs attributable to the product in question and common costs, which in the cooperative studied are calculated as follows:

- the cost of distributing certain dairy products to the retail network in relation to the volume of products sold in a given period,
- other selling costs in relation to all products sold in a given period.

Based on the cost information obtained, the unit production cost of dairy products is determined (Table 6).

The highest manufacturing cost per unit was for extra butter and pre-packed table butter. In dairy cooperatives, butter is the most cost-intensive product when using the methodology of accounting for indirect costs on dairy products.

### Conclusions

There have been no significant and radical changes in management, including the functioning of cost accounting, in cooperative dairying in Poland. The main cost accounting transformations were minor modifications concerning the choice of basis for allocating indirect costs to products, which in a changing market environment is a negative situation. Dairy cooperatives in Poland need new solutions for cost accounting in order to face competition from other legal forms operating in the milk market. The majority of Polish dairy cooperatives in the food industry do not systematically use solutions within modern cost accounting systems. The implementation of such a system often requires not only the reconstruction of cost accounting and changes in reporting and analysis principles, but also the reconstruction of management structures. Therefore, only selected problem accounts are generally maintained when the need arises

The methodology adopted by the cooperative for cost accounting is based on the division of costs into direct and indirect costs, which significantly limits the possibilities for management decisions. Moreover, the method of calculating the unit cost of dairy products, based mainly on the inputs of the raw material, distorts the level of the cost of production and significantly inflates it, e.g. in the case of butter.

The main problem that should be highlighted is the lack of an adequate cost accounting information system. The implementation of such solutions would allow the managers of a dairy cooperative to make appropriate (short-term) decisions on the development of the assortment structure based on data such as profitability at the level of individual products.

The solutions used in the cooperative surveyed for allocating indirect costs to products in relation to the number of calculation units (fat and plasma) distort the cost information in the case of, for example, butter, the production of which is raw materialintensive (thus consisting of more calculation units), resulting in a higher amount of indirect costs being allocated to this product. Therefore, it can be assumed that the information system of the applied full cost accounting in a dairy cooperative is not completely reliable, especially for short-term decisions (e.g. regarding profitability at the level of individual products). It would therefore make sense to introduce variable costing, which would improve the decision-making process regarding manufactured products, mainly in terms of their assortment structure and production optimisation.

Moving towards the use of variable costing in dairy cooperatives can provide cooperative managers with information about profitability at the level of the individual product. On this basis, they could make decisions regarding the choice of the product mix structure of the manufactured products. In order to imply variable costing, it would be necessary to introduce a controlling procedure, which would considerably improve the cost management area. It is important that the identification of ways to improve the efficiency of dairy cooperatives within the framework of using information from the cost accounting system covers all areas of their operation.

#### References

Alnestig P., Segerstedt A., Product costing in ten Swedish manufacturing companies, Economics, 46-47, 1996, p. 441-458.

Bazydło I., Sokołowski T., Rozliczanie surowca w zakładach mleczarskich. Krajowe Porozumienie Spółdzielni Mleczarskich, Związek Rewizyjny, Warszawa 1998, s. 5.

Black T., Gray Ph., The effect of the production volume variance on absorption costing income, Accounting and Finance, 35, 1, 133-143, 1995.

Borkowski B., Dudek H., Szczesny W., Ekonometria. Wybrane zagadnienia. Wydawnictwo Naukowe PWN, Warszawa 2003, s. 98.

Bruegelmann T., How variable costing is used in pricing decisions, in Management Accounting, 66, no. April, 1985, p. 58-63

Chmielewska M., Kalkulacja kosztów spółdzielni mleczarskiej z wykorzystaniem różnych podstaw podziału kosztów pośrednich. Zarządzanie produkcją i logistyką - koncepcje, metody i rozwiązania praktyczne. Wydawnictwo Instytutu Inżynierii Zarządzania Politechniki Poznańskiej, Poznań 2006. Czubakowska K., Gabrusiewicz W., Nowak E., Fundamentals of managerial accounting, Polish Economic Publishing House, p. 16, Warsaw 2006.

Dickhaut J., Lere J., Comparison of Accounting Systems and Heuristics, Selecting Economic Optima, in Journal of Accounting Research, 21, 2, 495-514, 1983.

Doost R., Allocating the cost of accounting for com- puter services, The CPA Journal, 66, 6, 68-69. Ganc M., Soliwoda M., Usefullnes of Variable Costs Accounting in Dairy Cooperatives in Poland, Management and Production Engineering Review, vol. 2, 2011, 16-21.

Ganc, M., The usefulness of costs worksheet to manage costs in dairy cooperatives Zarządzanie Finansami i Rachunkowość, 2017, vol.5, nr 3, s. 35-44.

Garrison R.H., Noreen E.W., Managerial Accounting, Burr Ridge, IL, Irwin, 1994.

Horngren C.T., Foster G., Datar S.M., Cost Ac- counting, A Managerial Emphasis, 9th ed., NJ: Prentice-Hall, Englewood Cliffs, 1997, p. 263.

Jaruga A., Nowak W., Szychta A., Managerial Accounting- concepts and applications, Publisher Graduate, Lodz 1999, p. 35.

Nowak E. [Ed.], Kacprzak K., Statistical methods in the analysis of the company's activities, Polish Economic Publishing House, Warsaw 2001, p. 189.

Reinstein A., Bayou M.E., Product costing continuum for managerial decision, Managerial Auditing Journal, 12, 9, 490-497, 1997.

Rogowska E. 2013: Systematyczny rachunek kosztów jako narzędzie wspomagające pozyskiwanie informacji do celów zarządzania przedsiębiorstwem, Zeszyty Naukowe Uniwersytetu Szczecińskiego nr 765, Finanse, Rynki Finansowe, Ubezpieczenia, nr 61, t. 2, s. 225-341.

Schiff M., Variable costing: a closer look, Manage ment Accounting, 68, No. February, 36-40, 1987. Stanisławski K. [Ed.], Dairy industry in Poland, Wydawnictwo Czarno-Biała, Bydgoszcz 2006, p. 2.
Tishlias D.P., Chalos P., Product Pricing Behavior Under Different Costing Systems, Accounting and Business Research, 18, 71, 257-266, 1988.

Turner M., Hilton R., Use of Accounting Product- Costing Systems in Making Production Decisions, Journal of Accounting Research, 27, 2, 297-313, 1989.

Wasilewski M., Kowalczyk A., A comparative analysis of dairy cooperatives according to quality of management and production, Electronic Journal of Polish Agricultural Universities, Economics, 7, 2, 1-10, 2004.

Wasilewski M., Chmielewska M., Practical aspects budgeting the costs of dairy cooperatives, Scientific Papers of Wroclaw AE, No. 1121, p. 235, Wroclaw 2006.

Włodarczyk H., Górniak J., Costs acounting In dairy cooperatives, Sannpollac Sp. z o.o. Warsaw 1992, p. 8.

## Metodyka rozliczania i kalkulacji kosztów w spółdzielni mleczarskiej

## Streszczenie

Celem badań jest przedstawienie teoretycznych oraz praktycznych aspektów ustalania jednostkowego kosztu wytworzenia produktów mleczarskich w jednej określonej jako "typowa" spółdzielni mleczarskiej. Dla określenia obiektu typowego z n = 88 spółdzielni mleczarskich wykorzystano metodę odległości euklidesowej i miejskiej - określono zestaw zmiennych, które są wspólne dla wszystkich spółdzielni i odzwierciedlają wielkość oraz specyfikę spółdzielczych jednostek na rynku mleka w Polsce. W wybranej spółdzielni przedstawiono procedurę kalkulacji kosztów jednostkowych produktów mleczarskich na podstawie szczegółowego case study. Stosowany w spółdzielniach rachunek kosztów pełnych nie zapewnia pozyskiwania informacji o kosztach do podejmowania decyzji zarządczych. Rozliczanie kosztów pośrednich przy wykorzystaniu umownych współczynników nie zapewnia wiarygodnych danych o kosztach. Istotną kwestia przy ustalaniu współczynników jest przyjęcie takiej miary, która odzwierciedli rzeczywisty związek między kosztem a nośnikiem kosztu – wyrobem, co w przypadku wyrobów mleczarskich może być utrudnione. Zasadne byłoby podjęcie próby wprowadzenia rachunku kosztów zmiennych w spółdzielniach mleczarskich, co umożliwiłoby uniknięcie umownego przypisania kosztów pośrednich na wyroby. Głównym problemem, na który zwracają uwagę Autorzy, jest brak odpowiedniego systemu informacyjnego rachunku kosztów w spółdzielniach mleczarskich. Wdrożenie takich rozwiązań pozwoliłoby zarządzającym spółdzielnią mleczarską na podejmowanie odpowiednich decyzji (krótkookresowych) w zakresie opracowania struktury asortymentu w oparciu o dane np. o zyskowności na poziomie pojedynczych produktów.

Słowa kluczowe: spółdzielnie mleczarskie, kalkulacja kosztów, rachunek kosztów. Kody JEL: M49, Q19, P13.

Information about the authors:

Dr hab. Mirosław Wasilewski, prof. SGGW w Warszawie, Instytut Ekonomii i Finansów, Katedra Finansów, Nowopursynowska Street 166, 02-776 Warsaw, e-mail: miroslaw\_wasilewski@sggw.edu.pl ORCID: 0000-0001-6791-5713

## Dr Marzena Ganc,

Instytut Ekonomii i Finansów, Katedra Finansów, Nowopursynowska Street 166, 02-776 Warsaw, e-mail: marzena\_ganc@sggw.edu.pl ORCID: 0000-0002-5267-7940