Wieś i Rolnictwo 3 (176)/2017
ISSN 0137-1673
doi: 10.7366/wir032017/04

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Polish Farm Labour Force from the Perspective of Agricultural Worker Cooperatives

Abstract: The paper focuses on comparisons of the size of the labour force between cooperatives and other legal forms of enterprises in agricultural area. Precisely, the purpose of the paper is to analyse differences between cooperatives and other enterprises in the agricultural sector in the context of employment. An empirical analysis is done on the example of Polish agricultural production cooperatives (APC) and other farming entities. The paper brings answers to the following research questions: Do the agricultural cooperatives provide more employment than other farming entities? What was the level of employment in agricultural cooperatives and other farming entities and what will it be? How does the level of employment influence the profitability of agricultural cooperatives and other farming entities?

The conclusions are made on the basis of an analysis of the "List of the 300 best agricultural enterprises" prepared by the Institute of Agricultural and Food Economics – the National Research Institute in Poland. The analysis includes the following types of agricultural enterprises: agricultural production cooperatives, government-owned companies, individual farms, private companies and other farming entities. The time range of this research covers the years 2009–2015. The comparisons are made using analysis of variance, extrapolation method and correlation analysis.

The main finding is that there are no clear and significant differences between agricultural production cooperatives and other farming entities in terms of the level of employment, its impact on the overall profitability and partially on increase thereof. However, some of the entities are able to create a lot of jobs. Moreover, they can increase the return on sales by increasing the level of employment and maintain the existing jobs even in the time of a crisis.

Keywords: agricultural production cooperatives, farming entities, employment, profitability.

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1. Introduction

According to the International Labour Organization (ILO), the world is suffering from unprecedented unemployment, dramatic youth unemployment, an historic level of migration and a very substantial presence of informal and precarious employment (ILO 2013; ILO 2014a; ILO 2014b). The trends in employment and unemployment statistics worldwide are disturbing. Given the latest data provided by the ILO, in 2013 almost 202 million people were unemployed around the world – an increase of almost 5 million compared to the previous year (ILO 2014a). It seems that, in general, the enterprises are unable to maintain existing jobs and create new ones.

However, the studies on labour force in cooperatives do not go hand in hand with this statement. The report of the International Organisation of Industrial and Service Cooperatives (CICOPA) estimates that cooperative employment, both full time and part time, involves at least 250 million people in the world according to official data from 74 countries covering 75% of the world's population. 26.4 million of these people work in cooperatives as employees (15.6 million) or worker-members (10.8 million), while 223.6 million producers organize their production together within the scope of cooperatives (Roelants, Hyungsik, Terrasi 2014).

An important issue for agricultural cooperatives is not only doing business, but also organizing social activities for members and the local community. Thus, they should be focused on the interests of their members and their environment even more than on business profit and other economic results. Creating jobs and maintaining high level of employment could be one of these interests.

From this point of view it seems to be justified to search answers for the following questions: do the agricultural cooperatives provide more employment than other farming entities? What was the level of employment in agricultural cooperatives and other farming entities and what will it be? How does the level of employment influence the profitability of agricultural cooperatives and other farming entities?

The purpose of the paper is to analyse differences between cooperatives and other enterprises in the agricultural sector in the context of employment. An empirical analysis is made on the example of Polish agricultural production cooperatives (APC) and other farming entities (such as government-owned companies, individual farms, private companies). The author's intention is to verify if the worldwide trends mentioned below concerning employment in cooperatives are the same in the case of Polish farming.

2. Theoretical framework and previous research

2.1. Employment in worker cooperatives in the context of the theory of the firm

Unlike agricultural cooperatives commonly found in different parts of the world, agricultural production cooperatives in Poland, which are subject to the empirical analysis in this study, operate in fact within the employee-ownership model. Thus, they can be named "worker cooperatives", which means that they are owned and controlled by their members. Ben-Ner, Montias & Neuberger (1993) explain that this control relies on collective setting the rules of the organization. Moreover, worker cooperatives are "democratic firms", where the firm's labour force chooses the management and the administrative structure in a democratic political process (Bowles, Gintis 1996). To describe a worker cooperative Putterman (2006) uses the term "labour-managed firm" and emphasizes that this is an enterprise which operates under the ultimate control of those who work in it.

There are strong arguments explaining why labour-managed firms emerge in free markets. The main explanations offered in the literature can be derived from the major theories of the firm, which focus on asset specifics, monitoring incentives, wealth constraints, risk aversion and collective choice problems, and which are well known in the institutional economics debate (Belloc 2017). While both the literature and the economic reality justify the presence of labour-managed firms on the market, their objectives could be a topic for dispute.

The management of an investor-owned firm focuses on the objective to maximize the return on capital for investors, whereas the management of a cooperative has to take into consideration members' interests (Hendrikse, Liang 2013). One could agree that broadly defined profit maximization has been the dominant assumption in the context of the theory of the firm. However, the objectives pursued by worker-run firms have been largely discussed (Burdin, Dean 2012). The contemporary theoretical discussion comparing the objectives between worker cooperatives and their capitalist counterparts (firms in which owners provide capital, not work) finds its origins in Ward (1958). His basic neoclassical model assumes that worker cooperatives maximize net income per member instead of total profits. This view has been subject to a lot of criticism in the subsequent research. Domar (1966) claims that the results cannot be generalized to multiple input-multiple output cases. They also do not hold in the long run (Estrin 1982). Moreover, Kahana & Nitzan (1989), as ones of the first, propose the employment maximization as an alternative objective to income maximization for worker cooperatives.

Other authors (Moene 1989; Berman, Berman 1989; Dow 2003) indicate that the workers' welfare depends on variations in employment and this phenomenon

should not be ignored as it is the case in the Ward's model. Some theoretical studies prove that members internalize the risk of becoming unemployed if lay-offs are decided through fair procedures or if expelled members are compensated (Steinherr, Thisse 1979; Bonin 1981; Brewer, Browning, 1982). It means that the worker cooperatives would not change their employment level, resulting in an inelastic short-run supply curve (Burdin, Dean 2012).

Moreover, the Ward's model, developed in specific Yugoslavian conditions of the 1950s, assumes the absence of labour market. According to Dow (1986), members have the possibility to sell their shares through which they own their cooperatives to new members or to the firm. As a result, the presence of the membership market (potential candidates for cooperative membership) induces cooperatives to behave as capitalist firms in a competitive environment (Sertel 1982; Dow 1996), especially when there is a gap between income per worker in cooperative and market wages. Besides, there is also a possibility for the cooperatives to hire (and fire) non-member workers at market wages, which leads to a flexible employment policy not allowed in Ward's model. According to some opinions, by such behavior cooperatives could degenerate to conventional firms (Miyazaki 1984; Ben-Ner 1984).

Nevertheless, regarding the above theoretical arguments, it can be said that worker cooperatives pursue mixed objectives, placing importance both on employment and income per worker (Burdin, Dean 2012). In the context of the theory of the firm, they are supposed to employ the same or even greater number of workers than a profit-maximizing firm. Indeed, there are studies showing that cooperatives are able to maintain employment in better conditions than capitalist firms (Bretos, Marcuello 2017).

2.2. Employment in worker cooperatives in the light of previous research results

The previous findings confirm that worker cooperatives have a great potential of job creation. However, hitherto research is a bit fragmentary, because it refers mainly to individual countries or is based on small samples. As a result, there is still much we do not know on the subject. The first step should include summarizing the main findings on employment in worker cooperatives. They are presented below.

Conover, Molina & Morris (1993), by investigating fifteen service-sector cooperatives in California, prove that cooperatives are effective in improving employment opportunities. Polat (2014) also claims that cooperative model offers an important job-creation opportunity, especially in the face of the global unemployment and underemployment challenges. Moreover, by his case studies in four Turkish cooperatives, he draws attention to cooperatives contribution in providing good

quality jobs. Similarly, Roelants, Hyungsik and Terrasi (2014), in their 150pages of report, show that cooperative are able to create quality jobs with usually high socio-labour standards.

The literature also abounds in comparative evidence of job creation by cooperatives. This approach seems to be quite interesting, because it enables finding some reference points in the analyses. Workers cooperatives are usually compared to capitalist enterprises regarding different aspects of employment. Remuneration is one of them. Holtmann & Idson (1993) while comparing more than a thousand non-profit and for-profit nursing homes indicate that in the first group of institutions, which includes also so called physician's cooperatives where the staff seek to maximize their perquisites, wages are clearly higher. Another evidence comes from Uruguay, where the entire population of nearly 15 thousand cooperatives and their capitalist counterparts registered in the social security records were investigated by Burdin & Dean (2009). In the study the authors also prove that the average wages tend to be higher in worker cooperatives than in capitalist firms. Moreover, they point out that the advantageous situation in the context of remuneration applies also to non-member workers, because their wages stay at a relatively stable level. When it comes to wage inequality, Ben-Ner, Ren & Flint (2011) show, by analysing a sample of thousands of local government, for-profit and nonprofit organizations, including cooperatives in a single state (Minnesota), that it is lower within cooperatives.

Providing employment opportunities by enterprises always remains in the interest of local communities. Against this background, worker cooperatives also perform better than their capitalist counterparts. The abovementioned Burdin's & Dean's study (2009) confirms this statement. The authors prove that, similarly to wages, the average employment tends to be greater in Uruguayan worker cooperatives than in capitalist firms. Moreover, they claim that cooperatives tend to protect employment levels and accept more reductions in earnings than non-cooperatives. Simultaneously, they also find that cooperatives exhibit a well-defined and positive relationship between wages and employment of members, unlike capitalist firms. Thus, for cooperatives, wages and employment move in the same direction. Another evidence could be the study of Mago, Mazise & Hofisi (2013), who investigated five rural cooperatives in Amathole District Municipality is in the Eastern Cape Province of South Africa. The researchers reveal that these five establishments provide employment for a relatively big number of people (1413 in total). Thus, it can be said that worker cooperatives demonstrate job creation capabilities to a greater extent than conventional enterprises. However, there is a need to study this phenomenon in other parts of the world. Given this, the first hypothesis can be formulated as follows:

Hypothesis 1 (H_1): The level of employment in worker cooperatives is higher than in conventional firm.

Moreover, it turns out that employment in worker cooperatives is much more stable than in conventional firms. This is confirmed by a an in-depth study of Uruguayan firms (Alves, Burdin, Dean 2016). The authors point out that significantly fewer jobs are created and reduced by worker-managed firms (WMFs) than by capitalist firms. However, this refers mainly to worker-members. The study reveals some heterogeneous employment regimes within WMFs: job creation and reduction rates are very low for members, but high for hired workers. On the other hand, the greater member employment stability, the better survivability of this type of firms (Burdin 2014). Perotin (2014) partially agrees with this statement by claiming that worker cooperatives survive at least as well as conventional firms.

As regards the resistance of employment to output price changes and market shocks, the situation in general remains similar in both groups of enterprises. However, if one looks into details, one can observe significant heterogeneity. The research on a panel of enterprises from the Pacific Northwest plywood industry in the United States conducted by Craig and Pencavel (1992) indicate that an increase in output prices for conventional firms is associated with an increase in employment and by contrast – not significantly correlated with employment for worker cooperatives. Further research in turn prove that we cannot reject the hypothesis that employment responds inelastically to output prices changes (Burdin, Dean 2009). When it comes to sensitivity of employment to market shocks, it could be said that crises negatively affect change in employment for both, but the effect is significantly less dramatic in worker cooperatives than in conventional firms (Pencavel, Pistaferri, Schivardi 2006; Burdin, Dean 2009). Another study also reveals that cooperatives, as opposed to other types of enterprises, have reportedly been showing remarkable resilience to the crisis which flared up at the global level in 2008, including in terms of employment (Roelants, Hyungsik, Terrasi 2014). When looking at the issue of employment growth, it is found to be faster in employee owned businesses (such as cooperatives) – 7.46% in 2005–2008 and 12.9% in 2008–2009, compared to 3.87% and 2.70% for non-employee owned businesses during the same period (Lampel, Bhalla, Jha 2010). Regarding the stability of employment concerned, the second hypothesis may be formulated as follows:

Hypothesis 2 (H_2): The level of employment in worker cooperatives tends to grow more steadily and faster than in conventional firms.

Determining the level of employment is an important decision in business. This refers to any kind of business, regardless of its size, organizational and legal form or a sector within which it operates. It seems like simple math: the more the employer

pays his employees, the lower his profits. However, while the costs of increasing the number of jobs are obvious and easy to measure, the benefits are often indirect and not immediately felt (Ton 2009). There are verified hypotheses on a positive link between the level of employment or employee engagement and efficiency, productivity or profitability of the company. For example, Fisher, Krishnan and Netessine (2006), who examine retail stores, show that more jobs are associated with substantially higher sales. Whittam and Talbot (2014) consider the employee ownership on firms' performance (profitability, productivity, employment growth, share price and resilience). The impact of employee ownership on firms' profitability has also been analysed in other studies (Lampel, Bhalla, Jha 2010; Matrix Evidence 2010). They associate productivity and profitability gains with employee ownership. But this phenomenon may depend on the size of a company. Nuttal (2012), who have analysed businesses with share ownership, confirms that when 100 more workers are employed, the productivity of such a business (on sale per employee basis) diminishes. This supports the view that the employee ownership model offers particular benefits to small and medium-sized businesses, such as cooperatives (Lampel, Bhalla, Jha 2010). Motivated by the above findings the third hypothesis could be formulated as follows:

Hypothesis 3 (H_3): There is a correlation between the level of employment and profitability both in worker cooperatives and conventional firm.

The conclusive set of three hypotheses will be verified empirically in the further part of the study. The research sample will consist of worker cooperatives and other types of firms in agricultural sector.

3. Agricultural worker cooperatives: background information

Cooperatives and investor-owned firms coexist in many sectors of most modern economies and compete for market share, especially in the agricultural sector where cooperatives have played an active role for a very long time in many countries (Feng, Hendrikse 2011). Practice shows that there are different types of agricultural cooperatives worldwide (Münkner 2012; USDA 1991). An agricultural cooperative, also known as a farmers' cooperative, is a cooperative where farmers pool their resources in certain areas of activity (Smith 2011). According to the definition adopted in 1987 by the United States Department of Agriculture, "a cooperative is a user-owned, user-controlled business that distributes benefits on the basis of use" (Zeuli, Cropp 2004). It means, more or less, that net earnings in cooperatives should be distributed on the basis of proportional use – purchasing, selling, exchanging of services, trading etc.

Indeed, regarding the definition, probably this is the best model of an agricultural cooperative: when farmers have shares in the cooperative and therefore can control it, trade with their cooperative and carry out their daily agricultural activities on their own. Thus, member commitment is crucial in agricultural cooperatives (Bijman et al. 2013). However, the model of agricultural cooperatives has been evolving. Some traditional cooperatives have transformed into a non-traditional cooperative organization, by e.g. changing collective ownership to individual ownership of particular members, whether in part or in whole or by absorption as a result of mergers or acquisitions (Nilsson 1998; Nilsson, Svendsen, Svendsen 2012).

In Poland, agricultural cooperatives perform agriculture-related functions involving production, service and processing (Matyja 2015). This includes mainly supply and sales co-operatives, dairy co-operatives, gardening and apicultural co-operatives, co-operatives of agricultural organizations, cooperative agricultural producers groups and agricultural production cooperatives (APCs). This analysis concernes the last type of cooperatives. Polish APCs operate within the employee owned model, where members work instead of trading. The field of APC's operations is mainly crops and livestock farming. There are more than 700 APCs registered in Poland. In total they associate about 42,000 members and hire approx. 8,000 workers (NCC 2013).

The next parts of the paper focus on comparisons of the size of the labour force between agricultural production cooperatives and other legal forms of enterprises in agricultural area in Poland.

4. Methodology and Data

This study makes use of a sampling frame consisting of agricultural entities from the "List of the 300 best agricultural enterprises", also known as "The 300 Ranking" or "The 300 List", prepared annually by the Institute of Agricultural and Food Economics – the National Research Institute in Poland (IAFE 2009–2015). It includes agricultural enterprises established from the state property (former state farms) and agricultural production cooperatives. The source data is collected by means of a specially designed questionnaire, which is aligned with the official items of financial statements. This fact automatically limits the range of participants mainly to the units engaged in systematic records of business operations. The survey is sent to participants by snail mail or by e-mail.

"The 300 List" ranks agricultural enterprises according to a specific criterion, namely the summary index consisting of weighted indicators: business profitability, value creation, added value and generating of operating cash. A set of metrics

and indicators is multiple, so that it presents the performance of enterprises in a multidimensional way. Thus, in the ranking lists there are the relations in the field of profitability and efficiency, financial and operational liquidity, financial risk and solvency. In addition, the rankings present characteristics that is typical for agriculture, such as agricultural area or soil quality indicator.

Although "The 300 List" is very detailed and the source data is repeatedly verified, it doesn't include private individual farms which were not formed in the process of transformation of the state property. The list and this study analyse the following types of agricultural entities:

- agricultural production cooperatives – APC;
- government-owned companies (Agricultural Property Agency) – CSA;
- individual farms with assets mostly owned – IFB;
- individual farms with assets mostly leased – IFL;
- private companies with assets mostly owned – PCB;
- private companies with assets mostly leased – PCL;
- the rest of the entities – RE.

The time range of this study covers the years 2009–2013. The analysis is made of the sample of 300 entities each year, except 2009. In the first year 260 enterprises were analysed due to difficulties in determining the types of entities, which were different than in the years 2010–2013. When analyzing the trend in employment two more periods (2014 and 2015) were added. Detailed data concerning the number and percentage of entities in the research sample is presented in Table 1, and their average turnovers for each group of entities are presented in Table 2.

Table 1. The number and percentage of entities in the research sample in each year

Type of entity	2009		2010		2011		2012		2013		Avarage %
	Number	%	Number	%	Number	%	Number	%	Number	%	
APC	82	31.5	82	27.3	90	30.0	87	29.0	98	32.7	30.1
CSA	43	16.5	40	13.3	41	13.7	38	12.7	36	12.0	13.6
IFB	5	1.9	12	4.0	9	3.0	12	4.0	13	4.3	3.5
IFL	5	1.9	7	2.3	5	1.7	5	1.7	8	2.7	2.1
PCB	31	11.9	47	15.7	47	15.7	53	17.7	56	18.7	15.9
PCL	85	32.7	103	34.3	93	31.0	88	29.3	75	25.0	30.5
RE	9	3.5	9	3.0	15	5.0	17	5.7	14	4.7	4.4
Total	260	100	300	100	300	100	300	100	300	100	100

Source: own study.

It is worth noting that agricultural production cooperatives rank high in the list of agricultural enterprises in Poland. Approximately 30% of positions on the ranking list are taken by APCs in each year. In general, this may mean that these entities, as well as private companies with assets mostly leased, achieve comparatively high economic and financial results.

Table 2. The annual turnover of entities in the research sample (PLN)

Type of entity	Average	Min	Max
APC	5,094	353	48,323
CSA	26,177	2,973	112,438
IFB	5,789	1,490	19,079
IFL	5,032	802	16,411
PCB	8,836	1,217	161,315
PCL	13,132	732	321,336
RE	5,193	904	16,113

Source: own study.

Unfortunately, the research sample, although relatively large, cannot be seen as representative. These 300 enterprises represent only about 0.33% of the total number of agricultural enterprises in Poland. Moreover, they can be compared to only 3% of individual farms bigger than 100 ha. There are some constraints that influence the representativeness of the research sample. The main include:

- non-random sampling;
- not all of the agricultural types of entities included, for example producer groups;
- relatively large differences in the number of particular entities, especially in the case of individual farming;
- not exactly the same entities of every type analysed each year;
- the source data collected only from financial statements, all the objective errors and bias included.

However, because of its large size and the level of detail the research sample undoubtedly provides interesting information on economic and financial results of agricultural enterprises in Poland. Moreover, it enables comparisons between these entities, which is going to be done in this study. The author is aware that the results of the analysis provide exclusively a view on the matter, and should be treated as such.

To add insight to the understanding of how the employment situation in Polish agricultural enterprises looks like, the author proposes a set of three

hypotheses strictly connected with those formulated above. They are designed to assess if agricultural production cooperatives differ from other farming entities in the context of employment. They verify if:

- the level of employment in the agricultural production cooperatives is higher than in other farming entities (like in H_1),
- the level of employment in agricultural production cooperatives tends to grow more steadily and faster than in other farming entities (like in H_2),
- there is a correlation between the level of employment and profitability both in agricultural production cooperatives and other farming entities (like in H_3).
- The level of employment is measured as an average number of employees in each year, including worker-members working in cooperatives. The profitability measure consists of three components:
- return on sales (ROS) – the ratio of profit on sales to the sum of revenues from sales of products, goods and materials. The operating costs, calculated in the profit on sales, include also the labour costs of member-workers of agricultural production cooperatives;
- return on equity (ROE) – the ratio of net financial profit, adjusted for profit (–) or losses (+) from the disposal of non-financial assets, to capital equity at the end of a year;
- value index (VI) – the ratio of return on equity and the cost of capital equity containing, among others, average interest rates on bank deposits. Only index higher than one means that the value of the farm was increased for its owner.

Because these three indicators represent different aspect of the overall profitability, they should be considered together. ROS and ROE are well-known ratios of profitability and they help to evaluate a business's ability to generate earnings compared to its expenses incurred during a period of time (Machek 2014; Bumbescu 2015). Value index shows additionally the ability of multiplication of the member-workers' capital.

The data analysis was carried out with the help of STATISTICA software. In order to accomplish the objectives of the research and to verify the hypotheses, the following research methods are used:

- analysis of variance for verifying H_1, with the level of significance of $\alpha = 0.05$;
- extrapolation for verifying H_2;
- correlation analysis for verifying H_3, with the level of significance of $\alpha = 0.05$.

The variables used in the data analysis include type of entity, employment, profitability (ROS, ROE, VI) and time. A grouping variable is the type of entity. Because the variables (employment and profitability) in each group are not normally distributed there is a need to use non-parametric methods of correlation and analysis of variance.

5. Results

The Kruskal-Wallis test and multiple comparisons procedure are used to determine if agricultural production cooperatives differ from other farming entities as regards the level of employment. Their results are presented in Table 3. The analysis reveals differences in analysed groups in average employment in each year ($p = 0{,}00$ in Kruskal-Wallis test). The detailed results indicate that there is statistically significant difference in the level of employment between CSA and other entities in each year ($p < 0{,}05$ in multiple comparisons). The two exceptions are the years 2009 and 2010 and comparisons between CSA and RE. Moreover, the detailed results indicate that there is statistically significant difference in the level of employment between PCL and PCB in 2009 and 2010. In comparison of the average employment between other entities there is no statistically significant difference.

Table 3. Verifying H_A. Results of Kruskal-Wallis test and multiple comparisons*

Year	Type of entity	Number of entities	Kruskal-Wallis test p-value	p-value for multiple comparisons (bilateral)					
				APC	CSA	IFB	IFL	PCB	PCL
	APC	82							
	CSA	43		0.000000					
	IFB	5		0.918245	0.000068				
2009	IFL	5	0.0000	1.000000	0.022100	1.000000			
	PCB	31		0.074252	0.000000	1.000000	1.000000		
	PCL	85		1.000000	0.000000	0.712552	1.000000	0.033695	
	RE	9		1.000000	0.056024	1.000000	1.000000	0.803529	1.000000
	APC	82							
	CSA	40		0.000000					
	IFB	12		1.000000	0.000000				
2010	IFL	7	0.0000	1.000000	0.000269	1.000000			
	PCB	47		0.115300	0.000000	1.000000	1.000000		
	PCL	103		1.000000	0.000000	0.664251	1.000000	0.018215	
	RE	9		1.000000	0.146626	0.537514	1.000000	0.250024	1.000000
	APC	90							
	CSA	41		0.000000					
	IFB	9		1.000000	0.000003				
2011	IFL	5	0.0000	1.000000	0.000345	1.000000			
	PCB	47		1.000000	0.000000	1.000000	1.000000		
	PCL	93		1.000000	0.000000	1.000000	1.000000	1.000000	
	RE	15		1.000000	0.004330	1.000000	1.000000	1.000000	1.000000

Table 3 – continued

Year	Type of entity	Number of entities	Kruskal-Wallis test p-value	p-value for multiple comparisons (bilateral)					
				APC	CSA	IFB	IFL	PCB	PCL
	APC	87							
	CSA	38		0.000000					
	IFB	12		1.000000	0.000000				
2012	IFL	5	0.0000	1.000000	0.000457	1.000000			
	PCB	53		1.000000	0.000000	1.000000	1.000000		
	PCL	88		1.000000	0.000000	1.000000	1.000000	1.000000	
	RE	17		1.000000	0.006340	0.254306	1.000000	0.300999	1.000000
	APC	98							
	CSA	36		0.000000					
	IFB	13		0.236711	0.000000				
2013	IFL	8	0.0000	1.000000	0.000001	1.000000			
	PCB	56		1.000000	0.000000	1.000000	1.000000		
	PCL	75		1.000000	0.000000	0.085732	0.584663	0.348700	
	RE	14		1.000000	0.014886	0.097278	0.383810	0.616965	1.000000

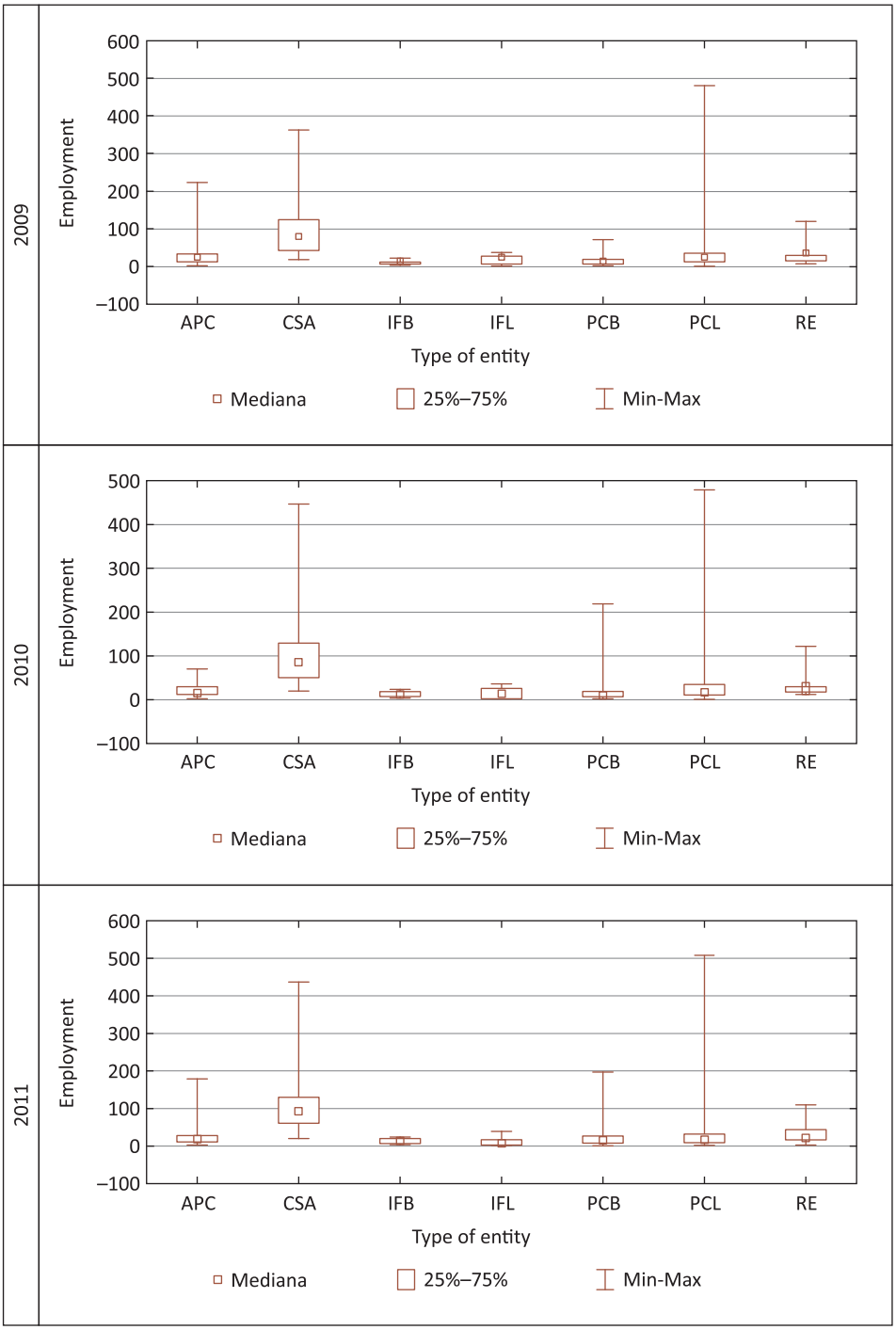
* Dependent variable: level of employment. Independent (grouping) variable: type of entity.

Source: own study.

These findings are confirmed by the box and whisker plots (Figure 1). The median of the level of employment in CSA is noticeably higher than in other entities in every year. The average employment in APC, IFB, IFL, PCB, PCL and RE seems to achieve similar level. Hence, the findings fail to support the H_1. However, it is worth noting that in the case of APC as well as CSA and PCL, a relatively large group of entities (25%) has relatively high level of employment (long upper whisker). This means that there are some APCs which are able to create a lot of jobs, as opposed to IFB, IFL, RE and partially PCB (short upper whisker).

The extrapolation of trend is conducted to determine the average level of employment in the agricultural enterprises. The results are presented in Figure 2. The average number of employees inconsiderably increases mainly in PCB. The downward trend of employment can be observed in APC, IFL and RE. Entities such as CSA, IFB and PCL show a relatively stable trend. Detailed calculations concerning changes in the level of employment are presented in Table 4.

Coefficient of variation for APCs is relatively high (11%). Moreover, the level of employment in APCs decreases with the rate of 5% instead of growing. However, when looking closer at the annual data, we can observe that, besides the relatively


2009
Employment
600
500
400
300
200
100
0
–100
APC
CSA
IFB
IFL
PCB
PCL
RE
Type of entity
Mediana
25%–75%
Min-Max
2010
Employment
500
400
300
200
100
0
–100
APC
CSA
IFB
IFL
PCB
PCL
RE
Type of entity
Mediana
25%–75%
Min-Max
2011
Employment
600
500
400
300
200
100
0
–100
APC
CSA
IFB
IFL
PCB
PCL
RE
Type of entity
Mediana
25%–75%
Min-Max

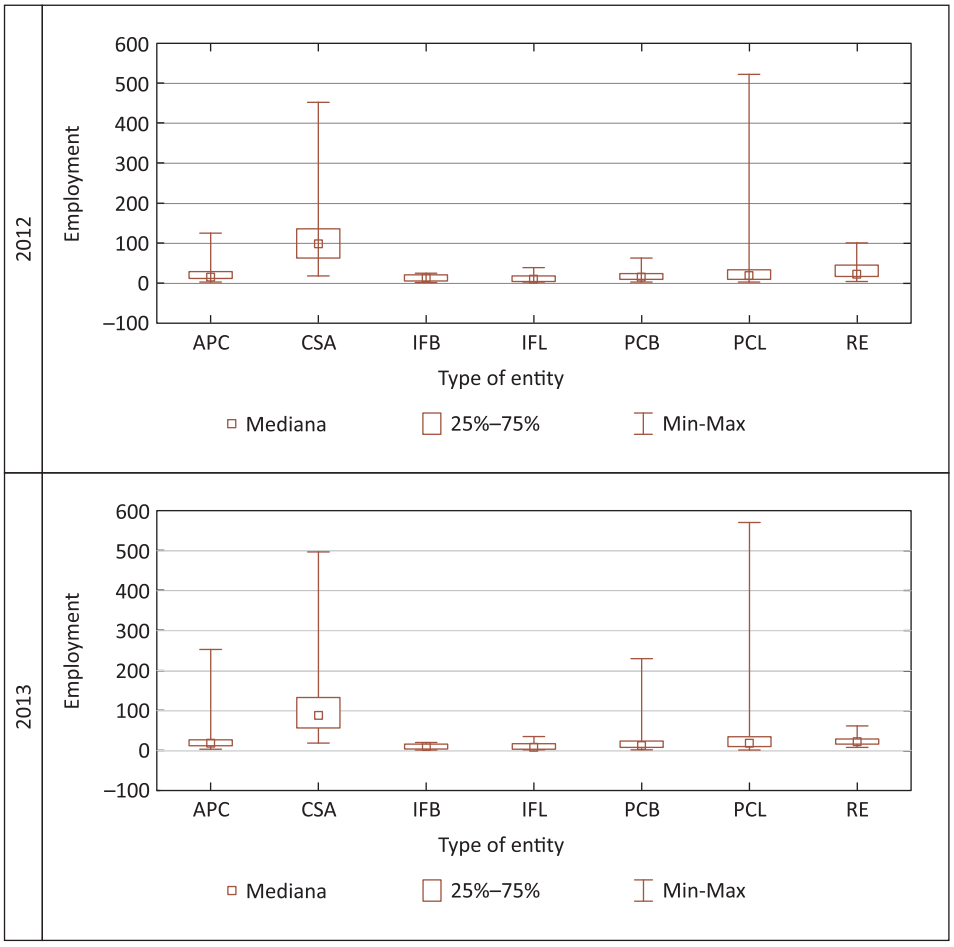


Figure 1. Verifying H_1. Interpretation of the results of analysis of variance by box and whisker plots.

Source: own study.

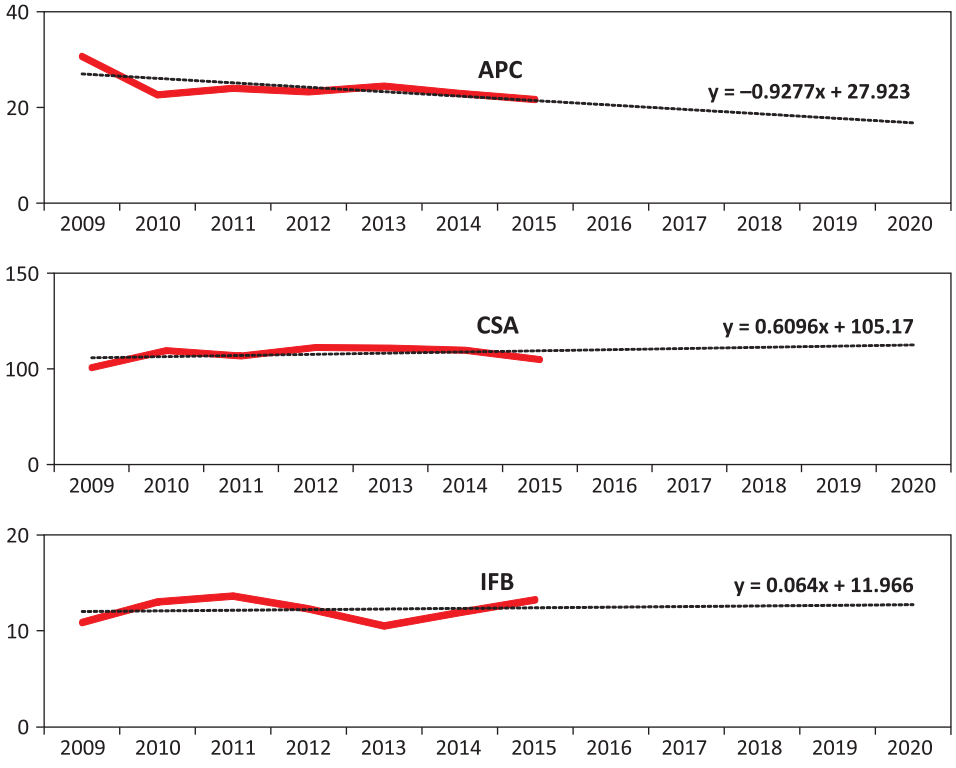
big fall of employment in 2009, the number of people working in APCs stays at the same level (the average of 23–24 employees per one cooperative). Still, they are exactly in the middle of the ranking of all the agricultural enterprises. Nevertheless, we cannot say that the level of employment in APCs tends to grow more steadily and faster than in other farming entities. Hence, the findings fail to support H_2 as well.

Table 4. Verifying H_2. The changes of the level employment in years 2009–2015

Type of entity	Average	Standard deviation	Coefficient of variation	Average annual growth rate
APC	24	3	11%	–5%
CSA	108	4	3%	1%
IFB	12	1	9%	4%
IFL	14	3	25%	–13%
PCB	20	3	16%	10%
PCL	33	2	6%	–1%
RE	29	4	15%	–6%

Source: own study.

The Spearman's rank correlation is conducted to determine if and how the level of employment is associated with the profitability in particular agricultural enterprises. The interpretation of correlation coefficient is shown in Table 5.



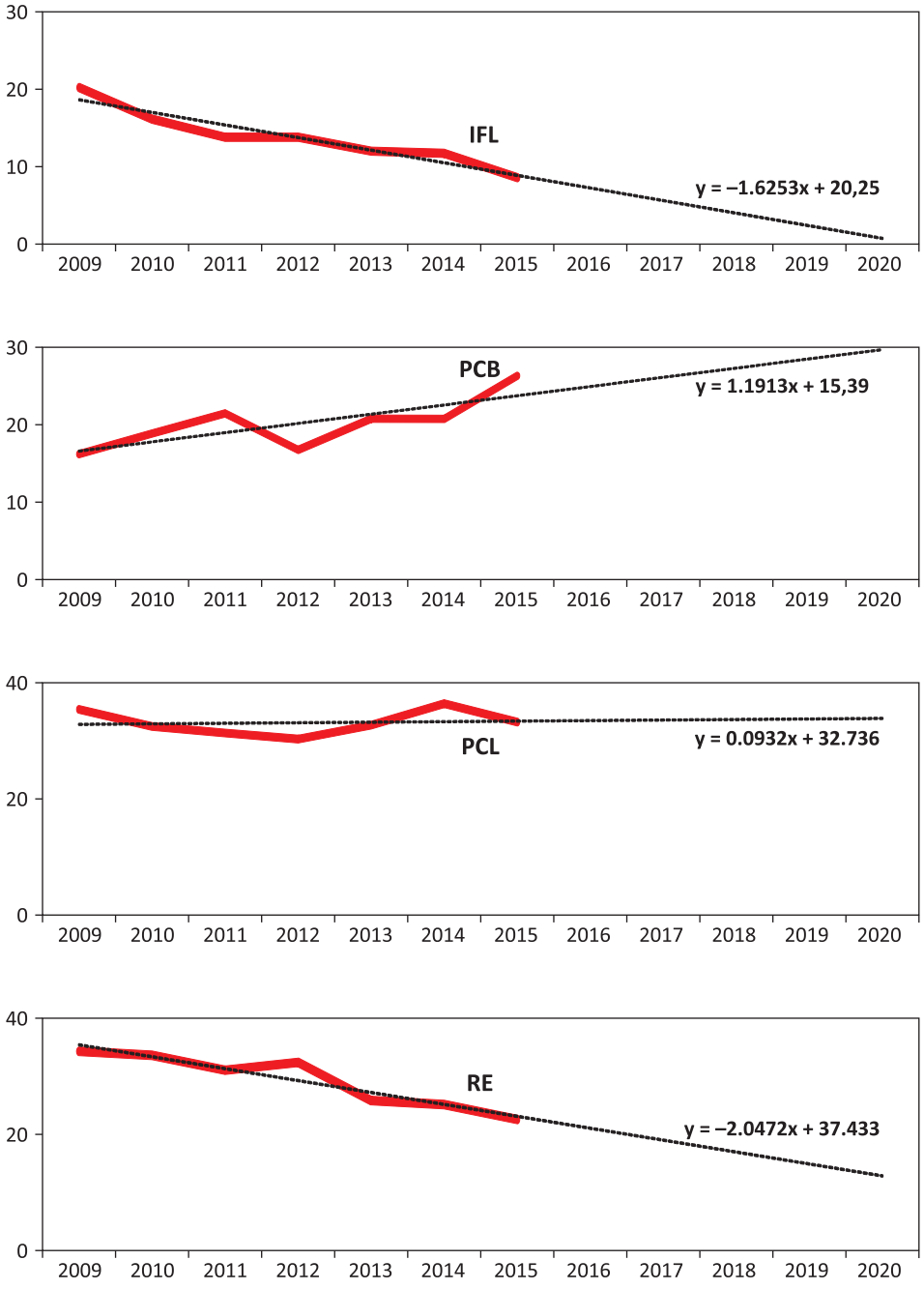


Figure 2. Verifying H_2. The trend of employment in analyzed entities.

Source: own study.

Table 5. Verifying H_3. Interpretation of the results of correlation analysis

Indicator of profitability	Type of entity	Correlation between the level of employment and profitability in year				
		2009	2010	2011	2012	2013
ROS	APC	+ weak	+ weak	none	+ weak	+ average
	CSA	+ average	+ high	+ average	+ average	+ high
	IFB	– almost full	none	none	none	none
	IFL	none	none	none	none	none
	PCB	none	none	none	none	none
	PCL	+ weak	none	none	none	none
	RE	none	none	none	none	none
ROE	APC	– weak	none	– average	none	none
	CSA	none	+ average	+ average	none	+ high
	IFB	none	none	none	none	none
	IFL	none	none	– almost full	none	– very high
	PCB	none	none	none	none	none
	PCL	none	– average	none	– weak	none
	RE	none	none	none	none	none
VI	APC	– weak	none	– average	none	none
	CSA	none	+ average	+ average	none	+ high
	IFB	none	none	none	none	none
	IFL	none	none	none	none	– very high
	PCB	none	none	none	none	none
	PCL	none	– average	none	– weak	none
	RE	none	none	none	none	none

Source: own study.

The level of employment is found to be positively and significantly correlated:
- in APC with ROS in years: 2009, 2010, 2012, 2013 (weak correlation in most cases);
- in CSA with ROS in each year; with ROE in years: 2010, 2011, 2013; with VI in years: 2010, 2011, 2013 (average correlation in most cases);
- in PCL with ROS in 2009 (weak correlation).

The level of employment is found to be negatively and significantly correlated:
- in APC with ROE and VI in 2009 (weak correlation) and 2011 (average correlation);

– in IFB with ROS in 2009 (almost full correlation);
– in IFL with ROE in 2011 (almost full correlation) and also VI 2013 (very high correlation);
– in PCL with ROE and VI in 2010 (average correlation) and 2012 (weak correlation).

The remaining cases show no correlation between the level of employment and profitability. Hence, the findings fail to support H_3. This means that in general the number of jobs is not associated with profitability in almost all of the analysed enterprises (except for CSA). However, it is worth emphasizing that in APC, as in CSA and as opposed to the other entities, the level of employment is slightly positively correlated with the return on sales. The larger number of employees, the higher values of ROS. Thus, one can say that by hiring more people APCs achieve more profit from a unit of sold good.

6. Discussion

In the light of the literature review made in this study, the above findings appear to be surprising. The analysis did not confirm the significant positive differences between cooperatives and other types of agricultural enterprises in terms of the analysed aspect of employment. Polish APCs are not as good employers as CSAs, in which the level of employment is noticeably higher, more stable and positively correlated with the overall profitability. By the way, it is somehow interesting and constructive at the same time that CSAs, as the sole representatives of the public sector, care about employment more than others. Against this background Polish cooperatives appear to be similar to other private entities operating in agriculture.

On the other hand, it should be noted that most cooperatives are not 'instruments' of employment promotion; they are enterprises that offer economic services to their members (Babalola, Tiamiyu 2013). Indeed, Polish APCs try to maintain the existing level of employment and their slightly downward trend may be due to retirement of member-workers. According to another study, members of Polish agricultural cooperatives are mostly elderly people (Matyja 2015), so it is obvious that assuming that new workers are hired, the employment level trend will be influenced negatively.

However, this assumption can also cause anxiety and the next question that arises is why Polish cooperatives do not want to increase their level of employment. The answer could be related to the crises that they are currently experiencing: the identity crisis and environmental crisis (Münkner 1995; Brodziński 2014). The first one refers to loss of cooperative identity, the second one – to adverse

political, economic and social environment. It is worth underlying that cooperatives in Poland still suffer from negative perception of the environment as a relic of the previous political system and often face a number of internal problems (Dzun 2009; Chloupková 2002). This may also affect the employment aspects.

Another important issue that should be discussed is the relationship between the level of employment and the profitability of cooperatives. The study revealed that this relationship is weak (regarding ROS) or it does not exist whatsoever (regarding ROE and VI). Nevertheless, is has to be emphasized that worker cooperatives are even expected to have a low profitability level (Martínez-Victoria, Arcas-Lario, Maté-Sánchez-Val 2015), because payment for members' work as a cost reduces profits. As Sexton and Iskow (1988) point out, financial analyses of cooperatives, although popular, are not based on economic theory. Thus, weaker relationship of employment and profitability in cooperatives should in fact not bother. Cooperatives are not profit-oriented and they exist to maximize the benefits for members and their local community.

Finally, as it was mentioned before, the empirical analysis in this study is fraught with imperfections. Although it provides some important view on the employment aspects in cooperatives in comparison to other entities in agriculture, the results are not representative. The research sample includes APCs and enterprises established from the state property after political system change in Poland. This limits the conclusions to the specific conditions. And instead of going into more detail with the sample construction (e.g. organizational form of entities, the direction of production, the number of refusals, the circumstances of being "the best" in the list), it would be better to extend it to other entities so that to guarantee its representativeness.

7. Conclusions

The main topic of the article was to investigate the differences between agricultural production cooperatives and other farming entities in the context of employment. The investigation was based on empirical data on agricultural enterprises functioning in Poland, collected annually by IAFE. The literature review resulted in three research hypotheses which were than empirically verified by statistical analysis.

The findings seem to not correspond with the results of studies of other researchers mentioned in the introduction. The main conclusion that can be drawn from this study is that there are no clear, significant positive differences between agricultural production cooperatives and other farming entities in terms of employment. The level of employment in APCs in general:

A. is not higher than in other entities,
B. doesn't grow more steadily and faster than in other farming entities,
C. is not correlated with the overall profitability as in other entities;

However, the findings also show some positive aspects of employment in APCs. It turns out that some of them are able to create a lot of jobs. Moreover, they can increase the return on sales by increasing the level of employment and maintain existing jobs even in the time of a global crisis.

The present study is based on the secondary data that do not ensure representativeness of the sample. Besides, it does not take into account other important aspects of employment in agricultural enterprises, such as worker/members' age and gender structure, engagement, earnings, social benefits etc. There is a need for future research to explore these problems further.

Bibliography

Alves G., Burdin G., Dean A. (2016). Workplace democracy and job flows. *Journal of Comparative Economics*, 44, 258–268.

Babalola Y.A., Tiamiyu R., (2013). Cooperatives Enterprises: A panacea to job creation and economic empowerment. *Information and Knowledge Management*, *3* (5), 61.

Belloc F. (2017). What deters labour-owned firm creation? Evidence from Italian manufacturing sectors. *Journal of Comparative Economics*, 45, 139–153.

Ben-Ner A. (1984). On the stability of the cooperative form of organization. *Journal of Comparative Economics*, 8, 247–260.

Ben-Ner A., Montias J.M., Neuberger E. (1993). Basic issues in organizations: A comparative perspective. *Journal of Comparative Economics*, *17* (2), 207–242.

Ben-Ner A., Ren T., Flint D. (2011). A sectoral comparison of wage levels and wage inequality in human services industries. *Nonprofit and Voluntary Sector Quarterly*, 40, 608–633.

Berman K., Berman M. (1989). An empirical test of the theory of the labour-managed firm. *Journal of Comparative Economics*, 13, 281–300.

Bijman J., Cechin A., Omta O., Pascucci S. (2013). Decomposing the member relationship in agricultural cooperatives: Implications for commitment. *Agribusiness*, *29* (1), 39–61.

Bonin J. (1981). The theory of the labour-managed firm from the membership's perspective with implications for marshallian industry supply. *Journal of Comparative Economics*, 5, 337–351.

Bowles S., Gintis H. (1996). The distribution of wealth and the viability of the democratic firm. In: P. Ugo, R. Robert (eds). *Democracy and Efficiency in the Economic Enterprise* (pp. 64–81). New York: Routledge.

Bretos I., Marcuello C. (2017). Revisiting globalization challenges and opportunities in the development of cooperatives. *Annals of Public and Cooperative Economics*, *88* (1), 47–73.

Brewer A., Browning M. (1982). On the employment decision of a labour managed firm. *Economica*, 49, 141–146.
Brodziński M. (2014). *Oblicza polskiej spółdzielczości wiejskiej. Geneza – rozwój – przyszłość*. Warszawa: FREL.
Bumbescu S.S. (2015). Performance analysis in agriculture using Du Pont model. *Sibiu Alma Mater University Journals, Series A. Economic Sciences*, *8* (2), 41–47.
Burdin G. (2014). Are worker-managed firms more likely to fail than conventional enterprises? Evidence from Uruguay. *ILR Review*, 67 (1), 202–238.
Burdin G., Dean A. (2009). New evidence on wages and employment in worker cooperatives compared with capitalist firms. *Journal of Comparative Economics*, 37, 517–533.
Burdin G., Dean A. (2012). Revisiting the objectives of worker-managed firms: An empirical assessment. *Economic Systems*, 36, 160–167.
Chloupková J. (2002). *European Cooperative Movement – Background and common denominators.* Unit of Economic Working Papers, Copenhagen, Denmark: The Royal Veterinary and Agricultural University, 11.
Conover N., Molina F., Morris K. (1993). *Creating Jobs Through Cooperative Development*. Davis, California: National Economic Development & Law Center.
Craig B., Pencavel J. (1992). The behavior of workers cooperatives: The plywood companies of the Pacific Northwest. *American Economic Review*, *82* (5), 1083–1105.
Domar E.D. (1966). The Soviet collective farm as a producer co-operative. *American Economic Review*, 56, 734–757.
Dow G.K. (1986). Control rights, competitive markets, and the labour management debate. *Journal of Comparative Economics*, 10, 48–61.
Dow G.K. (1996). Replicating Walrasian equilibria using markets for membership in labour-managed firms. *Economic Design*, 2, 147–162.
Dow G.K. (2003). *Governing the Firm: Workers' Control in Theory and Practice*. Cambridge: Cambridge University Press.
Dzun W. (2009). Spółdzielnie produkcji rolnej w procesie przemian systemowych. *Zagadnienia Ekonomiki Rolnej*, 4, 74–87.
Estrin S. (1982). Long-run responses under self-management. *Journal of Comparative Economics*, 6, 363–378.
Feng L., Hendrikse G. (2011). Chain interdependencies, measurement problems and efficient governance structure: Cooperatives versus publicly listed firms. *European Review of Agricultural Economics*, *39* (2), 241–255.
Fisher M.L., Krishnan J., Netessine S. (2006). *Retail Store Execution: An Empirical Study*. Working papers. https://pdfs.semanticscholar.org/0bb1/b85a38d93f69a9d9ccbd2df1e6ab42bbc979.pdf [accessed: 11.12.2017].
Hendrikse G., Liang Q. (2013). Cooperative CEO identity and efficient governance: Member or outside CEO? *Agribusiness*, *29* (1), 23–38.
Holtmann A., Idson T. (1993). Wage determination of registered nurses in proprietary and nonprofit nursing homes. *Journal of Human Resources*, 28, 55–79.
IAFE (2009–2015). *List of the 300 best agricultural enterprises.* http://www.ierigz.waw.pl/prace-badawcze/ranking-300 [accessed: 11.12.2017].

ILO (2013). *Global Employment Trends for Youth 2013 – A generation at risk*. Geneva: ILO.
ILO (2014a). *Global Employment Trends 2014*. Geneva: ILO.
ILO (2014b). *World of Work: Migrant Workers Are Not a Commodity*. ILO Magazine: Special issue. Geneva: ILO.
Kahana N., Nitzan S. (1989). More on alternative objectives of labour-managed firms. *Journal of Comparative Economics*, 13, 527–538.
Lampel J., Bhalla A., Jha, P. (2010). *Model Growth: Do Employee-owned Businesses Deliver Sustainable Performance? Cass Business School/Employee Ownership Association/John Lewis Partnership*. http://www.saxbam.com/_ClientFiles/uploads/Model_Growth___Do_employee_owned_businesses_deliver_sustainable_growth.pdf [accessed: 14.08.2015].
Mago S., Mazise A., Hofisi C. (2013). Employment generation by co-operatives: Myth or reality? *Mediterranean Journal of Social Sciences*, *4* (3), 761.
Machek O. (2014). The relationship between financial performance and total factor productivity: Evidence from the Czech agricultural sector. *International Journal of Social Sciences And Humanity Studies*, 6 (2), 57–67.
Martínez-Victoria M.C., Arcas-Lario N., Maté-Sánchez-Val M.L. (2015). *Comparison of the Financial Behaviour of Agri-Food Cooperatives with Non-Cooperatives from a Static and Dynamic Perspective: an Empirical Application to Spanish Companies*. Cartagena: Comunicaciones Presentadas – Actas del XVIII Congreso AECA, 6.
Matyja M. (2015). Additional education and professional development in Polish agricultural cooperatives. *China-USA Business Review*, *14* (8), 399–404.
Matrix Evidence (2010). *The Employee Ownership Effect: A Review of the Evidence. John Lewis Partnership/Employee Ownership Association/Circle*. https://www.employeeownership.co.uk/publications/the-employee-ownership-effect-a-review-of-the-evidence/ [accessed: 14.08.2015].
Miyazaki H. (1984). On success and dissolution of the labour-managed firm in the capitalist economy. *Journal of Political Economy*, 92, 909–931.
Moene, K.O. (1989). Strong unions or worker control? In: J. Elster, K.O. Moene (eds.), *Altenatives to Capitalism* (pp. 83–98). New York: Cambridge University Press.
Münkner H.-H. (1995). *Chances of Co-operatives in The Future*. Marburg: University of Marburg/Lahn.
Münkner H.-H. (2012). Co-operation as a remedy in times of crisis. Agricultural co--operatives in the World. Their roles for rural development and poverty reduction. *Marburg Studies on Cooperation and Cooperatives*, 58, 21–23.
NCC (2013). Data of National Council of Cooperatives on Agricultural Production Cooperatives. http://www.krs.org.pl/index.php?option=com_content&view=article&id=30&Itemid=286 [accessed: 11.12.2017].
Nilsson J. (1998). The emergence of new organizational models for agricultural cooperatives. *Swedish Journal of Agricultural Sciences*, 28, 39–47.
Nilsson J., Svendsen G.L.H., Svendsen G.T. (2012). Are large and complex agricultural cooperatives losing their social capital? *Agribusiness*, *28* (2), 187–204.

Nuttall G. (2012). *Sharing Success: The Nuttall Review of Employee Ownership*. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/31706/12-933--sharing-success-nuttall-review-employee-ownership.pdf [accessed: 14.08.2015].

Pencavel J., Pistaferri L., Schivardi F. (2006). Wages, employment, and capital in capitalist and worker-owned firms. *Industrial and Labour Relations Review*, *60* (1), 23–44.

Perotin V. (2014). Worker cooperatives: Good, sustainable jobs in the community. *Journal of Entrepreneurial and Organizational Diversity*, *2* (2), 34–47.

Polat H. (2014). Cooperative response to unemployment in rural and urban Turkey. In: *Cooperatives' Power of Innovation*. Texts selected from the international call for papers, International Summit of Cooperatives, Quebeck. https://www.sommetinter.coop/en/virtual-library/scientific-articles/cooperative-response-unemployment-rural-and-urban-turkey [accessed: 30.06.2017].

Putterman L. (2006). Labour-managed firms. Working Paper, Brown University, Department of Economics, 2006–18, 1.

Roelants B., Hyungsik E., Terrasi E. (2014). *Cooperatives and Employment: a Global Report*. CICOPA & Desjardins Group, 9, 15.

Sertel M.R. (1982). *Workers and Incentives*. Amsterdam: North Holland.

Sexton R.J., Iskow J. (1988). *Factors Critical to the Success or Failure of Emerging Agricultural Cooperatives*. Davis: University of California.

Smith, S.M. (2011). *Cooperatives 101 – An Introduction To Agricultural Cooperatives And The Federal Regulations And Legal Concerns That Impact Them*. Washington: US Department of Agriculture, 4. [Online] at: http://www.americanbar.org/content/dam/aba/publishing/rpte_ereport/2010/5/te_smith.authcheckdam.pdf [accessed: 04.05.2016].

Steinherr A., Thisse J. (1979). Are labour managers really perverse? *Economic Letters*, 2, 137–142.

Ton Z. (2009). *The Effect of Labour on Profitability: The Role of Quality*. Harvard Business School. Working Papers, 09–040, 1.

USDA (1991). *Advising People About Cooperatives. Cooperative Information Report*, 29, 3–11.

Ward B. (1958). The firm in Illyria: Market syndicalism. *American Economic Review*, *48* (4), 566–589.

Whittam G., Talbot S. (2014). *A review of Social and Employee-Owned Cooperative Business Models and their Potential to Reduce Poverty*. Report No. 2. UWS-Oxfam Partnership.

Zeuli K.A., Cropp R. (2004). *Cooperatives: Principles and practices in the 21st century*. Madison: University of Wisconsin Cooperative Extension Publishing.

Zasoby pracy w polskich gospodarstwach z perspektywy pracowniczych spółdzielni rolniczych

Streszczenie: W artykule skupiono się na porównaniu wielkości zasobów pracy pomiędzy spółdzielniami i innymi typami przedsiębiorstw w polskim rolnictwie. W szczególności celem artykułu było przeanalizowanie wynikających z tego różnic w kontekście zatrudnienia. Analiza empiryczna została wykonana na przykładzie polskich rolniczych spółdzielni produkcyjnych oraz innych podmiotów rolnych. Artykuł przynosi odpowiedzi na następujące pytania badawcze: czy rolnicze spółdzielnie produkcyjne zapewniają większe zatrudnienie niż pozostałe podmioty rolne? Jaki był i jaki będzie poziom zatrudnienia w rolniczych spółdzielniach produkcyjnych i innych podmiotach rolnych? Jak poziom zatrudnienia wpływa na rentowność rolniczych spółdzielni produkcyjnych i innych podmiotów rolnych?

Wnioski zostały opracowane na podstawie analizy „Lista 300 najlepszych przedsiębiorstw rolnych" przygotowanej przez Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej – Państwowy Instytut Badawczy. Podmiotami analizy były następujące przedsiębiorstwa rolne: rolnicze spółdzielnie produkcyjne, spółki skarbu państwa, indywidualne gospodarstwa rolne, spółki prywatne i inne podmioty rolne. Zakres czasowy badań obejmował lata 2009–2015. W porównaniach wykorzystano analizę wariancji, metodę ekstrapolacji oraz analizę korelacji.

Najważniejszy wniosek jest taki, że nie występują jasne, istotne różnice pomiędzy rolniczymi spółdzielniami produkcyjnymi i innymi podmiotami rolnymi w kontekście poziomu zatrudnienia, jego wpływu na rentowność oraz częściowo jego wzrostu. Jednak niektóre ze spółdzielni są zdolne do kreowania nowych miejsc pracy. Ponadto potrafią zwiększać rentowność sprzedaży wraz ze wzrostem zatrudnienia i utrzymywać dotychczasowe miejsca pracy nawet w czasach globalnego kryzysu.

Słowa kluczowe: rolnicze spółdzielnie produkcyjne, podmioty rolne, zatrudnienie, rentowność.