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ORIGINAL PAPER
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ARE ORGANIC FARMS A PANACEA FOR THE STRUCTURAL PROBLEMS OF POLISH AGRICULTURE?

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ABSTRACT

Motives: The article combines the problems of Polish agriculture in terms of its fragmentation and its negative impact on the environment.
Aim: The article's purpose is to characterise the relationship between the widely promoted land consolidation and the number of organic farms.
Results: The statistical analysis was performed on the basis of data published by the Polish Central Statistical Office and Eurostat. The basic measures of descriptive statistics, the Pearson correlation coefficient and the log-linear form regression for the share of organic farms in the general structure were used. The article proposes a synthetic index of agricultural fragmentation. Based on the analyses, it was found that there is a statistically significant relationship between land consolidation (both in the EU and in Poland) and the number of organic farms.

Keywords: consolidation, fragmentation, synthetic index of fragmentation, organic farms

INTRODUCTION

Polish agriculture is constantly trying to solve ever-growing problems. One of them being the strong fragmentation of farms. The dominance of small agricultural entities significantly affects the production and efficiency in macroeconomic terms, which in turn also contributes to disagrarisation. The solution to this problem is to be land consolidation, which means to increase the productivity and profitability of farms, and at the same time eliminate unprofitable entities.

Another category is environmental problems. Progressing climate change is having an increasingly greater impact on arable land, which in turn contributes to the reduction of agricultural production. An additional threat is the use of artificial fertilizers and pesticides to combat pests and diseases, the effects of which are already visible in the Baltic Sea. Land consolidation and economies of scale in conventional production can only exacerbate these effects. Unfortunately, far-reaching changes cannot be undone, but it is possible to implement measures that will stop further environmental degradation. These include organic farming.

The article combines the problems of Polish agriculture in terms of its fragmentation and its negative impact on the environment. Its purpose

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is to characterise the relationship between the widely promoted land consolidation and the number of organic farms. The statistical analysis was performed on the basis of data published by the Polish Central Statistical Office and Eurostat.

The paper will proceed as follows: the first part presents a review of the literature on the structure of Polish agriculture and the factors determining the implementation of organic farming. Then, the research methods and statistical tools used in the conducted analysis are presented. The article ends with "Discussion and Conclusions", containing a summary of the conducted analysis as well as recommendations and premises for further research.

LITERATURE REVIEW

The literature on the subject is dominated by the position of the unfavourable area structure of Polish agriculture (Józwiak et al., 2018; Poczta & Rowiński, 2019; Szymańska & Maj, 2019; Bożek & Szewczyk, 2020; Czekaj et al., 2020). In Poland, the dominant group is still farms with an area of up to 5 ha, which accounts for over 50% of all farms (GUS, 2021). Some authors (Poczta & Rowiński, 2019) see the reasons for the fragmentation in informal leases, although the scale of this phenomenon has not been recognised thus far. Unfortunately, the highly fragmented agrarian structure may favour the phenomenon of disagrarisation, which is most often occurs in the subregions of south-eastern Poland (Wojewodzic, 2014; Stanny et al., 2018). The situation is additionally made more difficult by the fragmentation of agricultural land. Poland is at the forefront of the group of countries whose LF (*land fragmentation*) indicators are particularly unfavourable (Hartvigsen, 2014). Since the implementation of the consolidation procedure in Poland in 1982 (Act on land consolidation, 1982), excessive fragmentation has not changed much, and the actual changes in the development of rural areas are practically unnoticeable. The procedure itself is additionally long and costly and includes mandatory development after the plots are merged (Janus & Markuszewska, 2019), which does not motivate farmers to undertake such activities. Nevertheless, some changes are noticeable in the structure of farms at the turn of this decade. According to the data published by the Central Statistical Office as part of the General Agricultural Census in 2020 (GUS, 2021), the number of agricultural entities with an area of up to 15 ha decreased by about 16%, with a simultaneous increase in the number of farms with an area of 15 ha and more by about 6%. The same report informs that the total number of farms in 2020 amounted to approximately 1,317,000 and within a decade it decreased by about 190 thousand, i.e., nearly 13%. It should be noted that, at the same time, no significant decrease in the area of agricultural land was observed, which is reflected in an increase in the area of agricultural land per farm by approx. 13% (from 9.8 ha in 2010 to 11.1 ha in 2020).

Fragmentation of rural areas is presented as a predictor of technical inefficiency and loss of productivity (Blaikie & Sadeque, 2000; Wan & Cheng, 2001; Rahman & Rahman, 2009). It also indicates a higher consumption of inputs and work units per hectare in small farms (Thapa, 2007). However, fragmentation is not a problem in many regions of the world, examples being Malaysia and the Philippines (Hooi, 1978; Wong & Geronimo, 1983) as well as Africa (Blarel et al., 1992). In addition, farmers are reluctant to join plots of land as new land may yield lower yields (Lisec et al., 2014; Abubakari et al., 2016). In Central Eastern countries such as Poland, there is also a strong emotional attachment to the land that may have been owned by the family for centuries (van Dijk, 2004). For this reason, land consolidation may be a difficult activity and arouse much greater social opposition than in Western European countries. Sometimes land consolidation may simply be impossible due to unfavourable topography (Wollni & Andersson, 2014; Wojewodzic et al., 2021;).

In view of the opposition of farmers and specific biogeographic and topographic conditions, solutions should be sought that will allow, for example, users to maintain a given level of productivity and efficiency, and allow for any future increase. Therefore, more attention should be paid to the advantages

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of fragmentation, as in times of a food shortage threat and of global population growth, it can prove to be an excellent tool for maintaining food diversity, quality and availability, and for sustainable development for food security (Ntihinyurwa & de Vries, 2021), even in the context of organic farming. Such a solution may be particularly important in the unfavourable Polish agrarian conditions, where the fragmented structure of farms prevails. The domination of agricultural entities with a small and medium-sized area may constitute a strong point of the region particularly for the development of organic farming (Komorowska, 2006). This is confirmed, for example, by the work of the German team Heinrichs (2021), according to which the incentives to switch to organic production are stronger when the size of plots is limited and connecting plots with larger fields is difficult. Moreover, under German conditions, organic farms have an advantage when bidding for smaller plots of land further away from the farms.

In order to maximise the effects of the ecological transformation of rural areas, there is a need to act in two ways. On the one hand, fragmentation must be used in regions where land consolidation for various reasons (mainly those mentioned above) is not possible. On the other hand, it is necessary to intensify the continuation of activities aimed at the consolidation of agricultural land with a simultaneous focus on organic production. Undoubtedly, larger plots of land increase economic efficiency by reducing labour and plant production costs (Hiironen & Riekkinen, 2016; Heinrichs et al., 2021), increase in income (Demetriou et al., 2012) or a production area (Louwsma et al., 2017). This also applies to organic farming. In some cases, such as Germany or the USA, organic farms are even larger than conventional farms (Wernick & Lockeretz, 1977; Boeckenhoff et al., 1986; Dabbert, 1990; Offermann & Nieberg, 2000), which results in financial benefits (Heinrichs et al., 2021).

Activities consisting of the consolidation of agricultural land with simultaneous conversion into ecological activities may be difficult to adapt, for example due to the attachment of Polish farmers to conventional agriculture and to the land (previously mentioned in the article). Therefore, special attention should be paid to good practices of European countries in the field of agricultural transformation, as well as factors determining the implementation of ecology on farms. Besides, Poland has the potential to develop organic farming because of the low degree of soil degradation, the farmers' agriculture skills, the surplus labour force etc. (Śpiewak & Jasiński, 2020).

A frequent motive for abandoning conventional farming is low farm profitability (Henning et al., 1991; Molder et al., 1991; Svensson, 1992), which may solve the problem of inefficiency of small agricultural entities (assuming, of course, that conversion will bring the expected results). At the same time, it makes it possible to use the resources of the labour force located in agriculture and to activate the rural population from the environment of organic farms (Komorowska, 2015). The high quality of production (Koesling et al., 2008) combined with the growing demand for organic products (Wier et al., 2008; O'Doherty et al., 2011), despite lower yields compared to conventional agriculture, may result in an increase in profitability (Crowder & Reganold, 2015). Greater profitability of production and increased profits can be an excellent incentive for farmers to engage in organic farming (Vasile et al., 2015; Łuczka & Kalinowski, 2020). It should be noted, however, that the efficiency of organic farms depends, among others, on the type (Szeląg-Sikora & Kowalski, 2012; Komorowska, 2012a; Krupa et al., 2016; Zuba-Ciszewska & Bojarszczuk, 2017; Nachtman, 2018) and the size of the entity (Komorowska, 2012b; Nachtman, 2013).

A common motive for abandoning conventional farming is also concern for the environment (Best, 2010; Mzoughi, 2011; Blaće et al., 2020). For many, the production of healthy food and the protection of the environment is even more important than financial factors (Pejnovi´ et al., 2012; Kociszewski, 2014; Zraki´ et al., 2017). Furthermore, in times of ever faster climate changes and the demand for healthy food, ecological development in agriculture must happen much faster than before.

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An interesting motive for converting farms are spatial features that may be manifested in the neighbourhood effect (Nyblom et al., 2003; Lewis et al., 2011; Schmidtner et al., 2012; Bjorkhaug & Blekesaune, 2013) or the presence of clusters (Eades & Brown, 2006). Wollni and Andersson (2014) noted that farmers who meet neighbourly expectations and have greater access to information in their neighbourhood network are more inclined to adopt organic farming. Knowledge and access to information play an extremely important role in the process of making decisions about conversion and during its implementation (Burton et al., 1999; Genius et al., 2006; Morone et al., 2006). Ecological agricultural activity is a risky business for a layman due to a number of unknowns, including uncertainty as to the size of future production in relation to the inputs and prices that farmers will be able to provide in return for production and incurred inputs (Genius et al., 2006). Therefore, access to reliable information, based on empirical aspects, can help farmers make the final decision to abandon conventional activities and support the conversion process.

Unfortunately, Polish farmers face many barriers to the conversion of organic production. On the basis of their own research, Łuczka and Kalinowski (2020) mainly point to low yields, agri-technical barriers and a lack of access to organic seeds and fertilizers. The above-mentioned barriers may be the reason for the poor development of organic farms in Poland. The increase in the number of organic farms is not reflected in the volume of production that could fulfil, for example, the needs of the domestic market (Smoluk-Sikorska et al., 2020).

MATERIALS AND METHODS

Concerning the purpose of the work, as well as the arguments collected and based on reading the cited research papers, the following hypothesis was formulated:
H1: Consolidation of land is associated with an increase in the number of organic farms.

The publication is based on data collected from the Polish Central Statistical Office database (variable: *number of organic farms with certificate and during the registration process*) and Eurostat (variables: *number of farms*, *number of organic farms*). Data from the Eurostat database were collected for 26 Member States (including the United Kingdom, which was still an EU member in 2016–2018), excluding Ireland and Malta, for which data gaps were identified in the database (Table 1). Data on the structure of farms in Eurostat and the Central Statistical Office are published in three-year time intervals, and the latest data concern 2016 (both for Eurostat and for the Central Statistical Office). Therefore, the verification of the hypothesis was made on the basis of data from 2016. In order to confirm the model formulated on the basis of data for EU countries, the same calculation process (the synthetic fragmentation index, correlation and linear regression model) was conducted for Polish organic farms, using regionalisation, i.e., division by voivodship.

The actual assessment of the impact of fragmentation on the number of organic farms was made possible by reducing the structure of farms to one indicator. The synthetic disintegration index W_R is based on the weighted average formula and was calculated using the following formula:

$$W_R = \frac{\sum_{i=1}^{n}(s_i \cdot w_i)}{\sum_{i=1}^{n} w_i} \qquad (1)$$

where:
s_i – share of farms in a given size group;
w_i – weight for each of 9 groups (from 1 for a group of farms with an area of 0 ha, to 9 for a group of farms with an area of more than 100 ha).

The index is interpreted as follows: the higher the value of W_R, the smaller the share of groups of agricultural entities with a small area. Thus, it can be presumed that the high value of the index may indicate advanced processes of rural areas consolidation in a given country/voivodship. In the analysed sample, the value of W_R is in the range of 0.05–0.15 for EU Member States, and 0.06–0.11 for Poland within voivodships.

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Table 1. Descriptions of variables

Specification		W_R	U_{eco}
Variable description		the synthetic disintegration index	the percentage share of organic farms (certified and in conversion) in the overall structure of farms in a given country/voivodship
Year		2016	2016
Time intervals of publication		3–4 years	3–4 years
EU	Source	Eurostat	Eurostat
	Number of observations	26 Member States	
	Source variables used to determine the variable	*number of farms by size* (by land area)	*number of farms*, *number of organic farms*
	Limitations	excluding Ireland and Malta (gaps in data)	
	Link to data	https://ec.europa.eu/eurostat/databrowser/view/ef_m_farmleg/default/table?lang=en	
Poland	Source	Polish Central Statistical Office	Polish Central Statistical Office
	Number of observations	16 voivodeships	
	Source variables used to determine the variable	*number of farms by size* (by land area)	*number of farms*, *number of organic farms with certificate and during the registration process*
	Limitations	-	
	Link to data	https://bdl.stat.gov.pl/BDL/dane/podgrup/tablica	

Source: own study.

The linear regression function was used to verify the hypothesis, but the author is aware of the limitations of the method used. Interpreting a linear regression model in terms of causation is challenging and requires strong assumptions. In addition, the specification of a linear regression model is not always straightforward because it has no fixed rules. The specification of the model always requires care and the use of statistical tests (to ensure the reliability of the calculations (Verbeek, 2017). However, the main advantages of this method are (Verbeek, 2017): simplicity and convenience in assessing the relationship between two and more variables; using the least squares method (the method works quite well, even if the model is not precisely defined); provides a quick reference for more advanced methods. Linear regression is used in the works on the discussed subject (Thapa, 2007; Möhring et al., 2020; Heinrichs et al., 2021), although the authors also willingly use logarithmic regression (Burton et al., 1999; Koesling et al., 2008). The type of model used depends on the variables used to create it, mainly the dependent variable.

To verify the hypothesis a log linear regression function was used in the form:

$$\ln U_{eco} = \beta_0 + \beta_1 \ln W_R \tag{2}$$

The dependent variable U_{eco} is a quantitative variable, calculated as the percentage share of organic farms (certified and in conversion) in the overall structure of farms in a given country/voivodship. The independent variable is the unitless synthetic fragmentation index W_R. Basic statistics of the distribution of U_{eco} and W_R variables are presented in Table 2.

Both the U_{eco} dependent variable and the independent W_R were checked with the Shapiro-Wilk test for normal distribution (Table 3). Due to the values of $p < \alpha$, the variables were transformed using the natural logarithm (hence the use of the log form of a linear regression function). The values of the determination coefficient allowed for the conclusion that the relationship between the analysed variables is approximately linear.

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Table 2. Basic measures of descriptive statistics for W_R i U_{eco}

Parameters	Statistics (EU countries)*		Statistics (Poland-voivodships)**	
	W_R	U_{eco}	W_R	U_{eco}
$\bar{x}$	0.09926	0.05563	0.0876	0.0242
Me	0.09383	0.04276	0.0903	0.0104
S_x	0.03091	0.04565	0.0141	0.0300
A_S	0.03106	1.34108	0.0454	0.0934
K	-1.49770	1.59430	-0.8732	1.6922

$\bar{x}$ – mean; *Me* – median; S_x – standard deviation; A_S – coefficient of skewness; *K* – kurtosis.
*$N = 26$; **$N = 16$
Source: own calculations based on Eurostat and GUS data.

Table 3. Assessment of the distribution of variables *lnUeco* and *lnWR* using the Shapiro-Wilk test in the EU countries and in Poland

Parameters	Statistics (EU countries)		Statistics (Poland-voivodships)	
	lnW_R	lnU_{eco}	lnW_R	lnU_{eco}
Statistic	0.929	0.961	0.927	0,928
df	26	26	16	16
p-value	0.045	0.406	0.220	0.225

df – the number of degrees of freedom; *p* – probability in the Shapiro-Wilk test
Source: own calculations based on Eurostat and GUS data.

RESULTS

In the first stage of the analysis, the Pearson's correlation coefficient was used to assess the strength of the relationship between the logarithmic variables of U_{eco} and W_R for the EU countries and Polish voivodships. On this basis, it can be concluded that there is a statistically significant positive correlation between the percentage of organic farms and the synthetic fragmentation index (Table 4). This means that the increase in the number of large agricultural entities is accompanied by an increase in the number of organic farms (with a constant number of conventional farms). However, it is worthwhile to carefully characterise the relationship using the simple regression method.

The results of the parameter estimation of the log linear regression function for lnU_{eco} in the EU countries are presented in Table 5. The lnW_R variable was included in the model based on the results of the Student's t-test. The estimated log linear regression equation is as follows:

$$ln\, U_{eco} = 1.009 + 1.803 \cdot \ln W_R$$

The random component obtained in the estimation of the regression function parameters was verified with the Shapiro-Wilk normality test, for which $p = 0.616$. Thus, the distribution of the random component can be considered as convergent to the normal distribution. The scatter plot of the

Table 4. Assessment of the correlation between lnU_{eco} and lnW_R in the EU countries and in Poland

Parameters	Statistics (EU countries)		Statistics (Poland-voivodships)	
	lnW_R	lnU_{eco}	lnW_R	lnU_{eco}
r_{yx}	1	0.627	1	0.547
p-value		0.001**		0.028*
N	26	26	16	16

r_{yx} – Pearson's correlation coefficient; *p* – probability in the test of the significance of the correlation coefficient, *N* – numbers
* Correlation significant at the level α = 0.05
** Correlation significant at the level α = 0.01
Source: own calculations based on Eurostat and GUS data.

Table 5. The results of the estimation of the parameters of the linear regression function for the *lnUeco* variable (EU countries)

Specification	*B*	*S(B)*	*Beta*	*t*	*p-value*	*r*	r_{cz}
Constant	1.009	1.089		0.926	0.364		
lnWR	1.803	0.457	0.627	3.943	0.001**	0.627	0.627
ANOVA	$F(1;24) = 15.550$; $p = 0.001$**						
R^2	0.393						
Se	0.753						

B – non-standardised regression coefficient; *S(B)* – standard error of estimate; *t* – value of Student's t-statistic; *p* – the probability of the significance of the coefficient of determination in the F-test or the Student's t-test of the significance of the regression coefficients; *r* – correlation coefficient; r_{cz} – partial correlation coefficient; R^2 – coefficient of determination; *Se* – mean error of estimate
** Correlation significant at the level *α* = 0.01
Source: own calculations based on Eurostat and GUS data.

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standardised residuals and the dependent variable showed that the assumption of homogeneity of variance and linearity of the relationship was not violated. The determined model allows for the explanation of the shaping of the share of organic farms in the overall structure of EU agricultural entities in almost 40%. Based on the results of the log linear regression function model estimation, it is concluded with the *ceteris paribus* principle that the increase in the synthetic fragmentation index in the EU by 1% is associated with an increase in the share of organic farms in the overall structure of farms by 1.80%.

The parameters of the linear log function were also estimated for Polish voivodships, and the estimated equation has the following form:

$$ln\, U_{eco} = 4{,}477 + 3{,}600 \cdot \ln W_R$$

The model assumptions were checked, including the normal distribution of the random component ($p = 0.610$ in the Shapiro-Wilk test) and homoscedasticity (no disturbances were found on the basis of the scatter plot). In this case, the model explains the shaping of the share of organic farms in the overall structure of agricultural entities in Poland in 30%. Based on the estimation results of the log linear regression function model (Table 6), it is concluded,

Table 6. The results of the estimation of the parameters of the linear regression function for the *lnUeco* variable (Poland – voivodeship)

Specification	*B*	*S(B)*	*Beta*	*t*	*p-value*	*r*	r_{cz}
Constant	4.477	3.608		1.241	0.235		
lnWR	3.600	1.471	0.547	2.447	0.028*	0.547	0.547
ANOVA	$F(1;14) = 5.988$; $p = 0.028^*$						
R^2		0.300					
Se		0.960					

B – non-standardised regression coefficient; *S(B)* – standard error of estimate; *t* – value of Student's t-statistic; *p* – the probability of the significance of the coefficient of determination in the F-test or the Student's t-test of the significance of the regression coefficients; *r* – correlation coefficient; r_{cz} – partial correlation coefficient; R^2 – coefficient of determination; *Se* – mean error of estimate

* Correlation significant at the level$\alpha = 0.05$

Source: own calculations based on Eurostat and GUS data.

assuming the ceteris paribus principle, that an increase in the synthetic fragmentation index in Poland by 1% is related to an increase in the share of organic farms in the overall structure of farms by 3.6%. It is, therefore, a two-fold increase compared to the EU countries.

The conducted analysis did not provide grounds for rejecting the hypothesis formulated at the beginning. There is a statistically significant relationship between land consolidation (both in the EU and in Poland) and the number of organic farms. The linear regression analysis showed that the decrease in the fragmentation of entities in agriculture is accompanied by an increase in the percentage of organic farms. The results find their justification in the works of Demetriou et al. (2012), Hiironen and Riekkinen (2016) and Heinrichs et al. (2021), where larger plot sizes significantly affect economic efficiency, reduce production costs, and increase income. Many scientists, such as the team of Boeckenhoff et al. (1986) or Offermann and Nieberg (2000) also proved that organic farms larger than conventional ones are increasingly common. In addition, organic production is characterised by lower productivity per hectare than in the case of conventional entities, so the increase in the production area may have a positive effect on the increase in its profitability.

The analysis of the relationship between land consolidation and the number of organic farms brings a kind of novelty to the discussion on the development of organic farming in Poland. There is still a widespread belief that land consolidation to increase the production area is necessary (Louwsma et al., 2017). It should be noted that the share of organic farms in Poland is twice as low as compared to the EU average (Table 2). Therefore, actions in this area are obligatory.

Linking land consolidation to the number of farms may be a response to low farm productivity in Poland (Smoluk-Sikorska, 2020). Moreover, the size of an ecological farm is a factor that determines its productivity (Komorowska, 2012b; Nachtman, 2013).

It should be emphasised that the author of the work is not in opposition to this type of action. However, in a world of progressive climate change, more

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attention should be paid to agricultural production that is compatible with environmental protection. The presented results of the analyses clearly show a relationship between the reduction of fragmentation and an increase in the share of ecological entities. Thus, spatial activities can be combined with activities for the promotion and development of ecology in agriculture. The development of organic farming in Poland is all the easier because the country has the conditions for it (Śpiewak & Jasiński, 2020).

CONCLUSIONS

The aim of the article was to characterise the relationship between land consolidation and the number of organic agricultural entities with a strong focus on the situation of Polish agriculture. The use of correlation and regression analysis made it possible to achieve this goal. However, it should be noted that both the aim of the article and the hypothesis concern only one factor related to the number of organic farms. The author is aware (and the results of the regression analysis also indicate this) that there are other variables that determine, to a greater or lesser degree, the number of organic farms. Broader analyses will be carried out in the future, based on the results obtained and presented in this article.

As a general conclusion, the potential and possibilities of Polish agriculture should be indicated, which, unfortunately, are not effectively used by the policy-makers. During the progressive climate change, the growing demand for food, the transition to a plant-based diet and the total or partial abandonment of meat, the demand for organic products continues to increase. If at this point, measures to encourage and support organic farming are not taken, Poland may lose its potential in this regard, and food imports from other countries may become costly due to its deficit. The guarantee of constant and high-quality production can be provided by large and stable ecological farms. Farmers should not only be encouraged to join plots of land, but also to shift to ecological activities at the same time, which in the long term may become more profitable than conventional production. In this regard, the Operational Groups created as part of the Network for Innovation in Agriculture and Rural Areas (SIR) are an excellent basis. Consolidation, development, and changing the type of production are not possible without capital. The new EU financial perspective provides special funds for organic farming. However, it should not be the only source of financing for environmental entities. It is also necessary to provide support from the state, for example in the form of compensations, as the conversion of activities is a long-term process, and profits from ecological products may only be realised after several years.

Referring to the title of the article, organic farms, with appropriate financial support from the state and the EU, can become large agricultural entities in Poland providing high-quality products. A literature review showed that large organic farms can be even more profitable than conventional farms. This may therefore be a valid argument for farmers who may not be overly concerned about environmental protection.

It should be emphasized again that the author of the work does not only oppose land consolidation. Agricultural activities in Poland as well as agrarian regions are characterized by a high degree of diversification. Each case of consolidation should be considered individually. In many regions it will simply not be possible, and defragmentation will be more effective. In order to increase the efficiency and competitiveness of Polish agriculture, various tools and methods should be used, but adapted to the conditions in which the changes are carried out.

Undoubtedly, the added value of the article is the proposed synthetic fragmentation index, which can be used in every aspect of agriculture analysis at the macro level. In addition, the analysis of the relationship between the degree of fragmentation in agriculture and the number of organic farms provides additional arguments for the promotion of pro-environmental activities in agriculture.

However, the limitation in further conclusions is the general view on agriculture, i.e., the failure to distinguish the types of farm activity that may be important for the interpretation of the analysed

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relationship. It is also a premise for further research with the distinction of plant, animal, and mixed entities. It should also be emphasized that the method used does not allow for the assessment of the cause-and-effect relationship. Thus, it does not make it possible to assess whether one variable affects the other. On its basis, it is only possible to determine how the phenomena interact with each other. Linear regression has several drawbacks and is not 100% perfect. This work is a prelude to further research on the connection of consolidation and dispersion with the development of organic farming in Poland. Therefore, any uncertainties related to method-based inference will be checked in the future with statistical methods alternative to regression.

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