ARTUR OSTROMĘCKI, DARIUSZ ZAJĄC
University of Rzeszów
ANDRZEJ MANTAJ
University of Information Technology and Management
Rzeszów

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SOCIO-ECONOMIC BENEFITS FROM NON-AGRICULTURAL ECONOMIC ACTIVITY CONDUCTED BY FARMERS

Abstract

The paper aims at identifying and assessing the opinions of farmers concerning the socio-economic benefits from non-agricultural activity they conduct towards their agricultural holding, farming family and rural areas on the territory where these units operate. The empirical material for the paper was provided by surveys carried out in 2011-2012, i.e. questionnaire-based interview, among 210 farmers – owners of individual agricultural holdings – running additional non-agricultural economic activity from the area of south-eastern Poland, namely the following three voivodeships: Świętokrzyskie, Małopolskie and Podkarpackie. The classification of the surveyed farms into two groups, which was based on the conditions of the aforementioned opinions, and analysis of differences in the assessment of benefits between these groups, using the Mann-Whitney test, allowed to define the key determinants of farmers' opinions on the socio-economic significance of the non-agricultural economic activity they conduct. An important determinant was the share of income from non-agricultural economic activity of farmers in the structure of their family's sources of income. The surveys showed that, in the opinion of farmers, the higher the ratio for the share, the greater the significance of the analysed socio-economic benefits following from non-agricultural activity conducted by them.

Introduction

Economic activation in the field of non-agricultural functions of rural areas is the contemporary problem of rural and agriculture development. This process interblends with the concepts of sustainable development, which encounters especially complex conditions in rural areas. Underdevelopment of rural

infrastructure, limitation of non-agricultural forms of activity against income inefficiency of agricultural holdings causes imbalance between the social, economic and environmental systems. Unfavourable relations of factors of production in agriculture, especially, too abundant labour resources in relation to land, can change under the assumption that rural areas will takeover specialist new functions to an increasingly larger extent. This process has to be accompanied by rural population quitting agriculture and starting professional activity in other sectors of the economy, but with no alternative sources of livelihoods it often results in depopulation of rural areas. Depopulation, in turn, denudes the rural communities of incentives to economic activity, in consequence whipping up the unfavourable process. Because multifunctional development of rural areas has to face numerous constraints, the execution of the European Model of Agriculture should become its important strategic objective. This Model assumes side by side functioning of highly commercial farms, which are strongly tied to other links of the agribusiness chain, and family farms providing non-commercial goods, e.g., by keeping social and economic viability of rural areas, and conserving their landscape and natural assets. The second group of the aforementioned farms creates a model of agriculture termed in literature as multifunctional agriculture (Ziętara W. 2000; Czudec A. 2009; Zegar J.St. 2010; Sikorska A. 2013). Such farms are compliant with the concept of sustainable development and their growing number – in the face of the pressure of liberalising market – will guarantee execution of new functions of rural areas (Rizov M. 2006; Czudec A. 2009; Zegar J.St. 2011).

The European Model of Agriculture is, thus, very strongly imbedded in the concepts of agriculture development in the European Union and it is an important issue for the Community, individual Member States and the regions. The issue is still very poorly diagnosed, both from the perspective of research methods and the scale, needs and effects in different Member States of the European Union, even more so in different regions (Mardsen T., Murdoch J., Morgan K. 1999; Goodman D. 2004; Czudec A. 2009).

It should be added that multifunctionality of agriculture and rural areas is not only an effect of natural development processes in the economy but also it is largely determined by policy instruments concerning agriculture and rural areas. The Common Agricultural Policy of the European Union evolves and rural areas and environmental and social functions of agriculture are supported to an increasingly greater extent, thereby forming grounds for the development of multifunctionality. The concept of multifunctionality of agriculture and rural areas is connected to instruments influencing the raise in the quality of agricultural products, improvement in the status of the natural environment and pertaining to the improvement in the quality of life in rural areas and differentiation of their economy (Program Rozwoju… 2007; Czudec A. 2009; Grzelak A. 2010; Program Rozwoju… 2014).

Non-agricultural activity conducted by farmers and their family members is especially important in the process of multifunctional development of agri-

culture and rural areas. It creates non-agricultural jobs and livelihoods in rural areas, thereby improving the material situation of rural population and conditions of life. It also fosters better use of resources inherent in agricultural holdings and households. Non-agricultural economic activity of the rural population triggers many beneficial social, economic and agrarian processes, so far stagnated. However, this process has to face many barriers, both external and internal. The existing research shows that development of non-agricultural economic activity of the rural population depends mainly on: quality of the human factor, resources and quality of economic and production, and technical factors of an agricultural holding, development level of agricultural and farm surroundings, including above all institutional surrounding, degree of population concentration and its affluence, labour market situation, broadly-conceived infrastructure, including supra-regional, etc. Development of non-agricultural economic activity in rural areas, including also activity of farmers and their family members, is also largely determined by the macroeconomic conditions (inflation rate, economic growth rate, foreign trade balance, access to and interest on loans, taxation, exchange rates, customs tariff and regulations, policy of the state and the European Union (Kołodziejczyk D. 1998; Hybel J. 2000; Pietrzyk I. 2006; Czudec A. 2009; Duczkowska-Małysz K. 2009).

Research objective, empirical material and methods

The aim of this paper is to identify and asses the conditions of the opinions of farmers concerning socio-economic benefits for a farm and rural areas from non-agricultural economic activity conducted by them on the areas on which these units operate.

The empirical evidence used in the paper comes from surveys held in 2011--2012 (i.e. questionnaire-based interview among 210 farmers, owners of individual farms carrying out additional non-agricultural economic activity). Surveys had the character of partial – representative research (non-probability and random sample). The sample unit is an individual farm conducting non-agricultural economic activity from the area of three voivodeships of south-eastern Poland: Świętokrzyskie, Małopolskie and Podkarpackie[1]. The research area was selected based on the division of Poland into agricultural regions according to W. Michna (Michna W. 1998; Michna W. 1999). It encompasses the macroregion I, subregion b, namely the region of overpopulated rural areas and fragmented agrarian structure of agriculture. Such spatial scope of the research was purposeful, because it was assumed that in the area of agriculture of fragmented farm structure, multifunctional development of rural areas and agriculture, with special role of non-agricultural economic activity of framers and rural population, is necessary and coveted.

The benefits from non-agricultural economic activity streamlining the work of an agricultural holding enumerated in the opinions of farmers included: bet-

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ter use of labour resources and agricultural assets, rise in volume of agricultural production, increased labour productivity and greater investment possibilities of an agricultural holding, implementation of innovations and specialisation in an agricultural holding, taking up new agricultural production, reduction in costs of farming in agriculture, improved occupational health and safety conditions, organisation of more efficient sale of agricultural products. Living conditions of farming families also improved because of a growth in income of a household and funding investments for its sake, and maintenance and education of family members. The benefits pertaining to rural areas, emphasised in the survey, include: creation of new jobs for rural residents, growth in the income of local self-government units, possibility to exert pressure on the development of business institutional environment, social, technical and tourist infrastructure of rural areas, development of other non-agricultural forms of economic activity, counteracting depopulation of rural areas, modernisation of rural areas, improvement of the aesthetics of farm surroundings, improvement of the quality of the natural environment in rural areas and conservation of cultural heritage of rural areas and development of rural culture.

All of the above-presented benefits were assessed by farmers on the scale from 0 to 10 points; hence they were measured on an ordinal scale. They were analysed at the background of age and education of farmers, number of family members, land resources and quality, type of agricultural production pursued at the farm and its marketability index, and also share of agricultural production and non-agricultural activity in the generation of income of a farmer's family. These variables were taken as determinants of the aforementioned benefits. The properties considered in the research, which describe the benefits from non-agricultural economic activity conducted by farmers, as well as their determinants are compatible with characteristics of phenomena analysed in this paper most often considered in similar situations (see Pierścionek Z., Jurek-Stępień S. 2006).

The properties describing the type of agricultural production dominant at a farm (i.e. livestock, crop and mixed) were zero-one in character, while the analysis of other determinants showed that they do not have a normal distribution. Then, the benefits from non-agricultural economic activity, expressed on 11-point rating scale, were marked by high volatility and often repeating values, also in case when the considered benefit in definite majority took on low values. In this situation, it was decided to select two groups of farms given all the researched determinants. This allowed comparison of their strength of conditioning benefits and simultaneous consideration of zero-one variables concerning the type of agricultural production.

Table 1

Limit values of determinants of benefits from non-agricultural economic activity

Specification	Values			Size of subgroups	
	minimum	maximum	dividing value	1.	2.
Age of a farmer	28	46	63	106	114
Education of a farmer	primary	higher agricultural	secondary non-agricultural	120	100
Number of family members	2	9	4	110	110
Area of an agricultural holding (ha of UAA)	1.7	85.0	19.2	105	105
Soil valuation index	0.50	2.92	1.54	105	105
Dominance of agricultural crop production	no	yes		128	82
Dominance of agricultural livestock production	no	yes		147	63
Dominance of agricultural mixed (i.e. crop and livestock) production	no	yes		145	65
Marketability of agricultural production (%)	5	95	70	111	99
Share of income from an agricultural holding in the structure of family livelihoods (%)	5	95	65	105	105
Share of income from non-agricultural economic activity in the structure of family livelihoods (%)	5	95	20	106	104

Source: own study based on surveys of agricultural holdings.

The farms were classified into subgroups based on the type of agricultural production conducted at a farm, and in the case of other variables values were set which divided the observations into two groups as far as possible equal in number. In case of permanent features, i.e. for area of farms and soil valuation index, medians were fixed. For other properties, the assumed limit value was to allow obtaining two subgroups as similar in number as possible. Table 1 presents the lowest and the highest values and values which had to be taken as values dividing the researched farms into two subgroups and number of units included in them.

Between groups of farms thus formed it was possible to assess the differences in opinions of farmers concerning the benefits, for an agricultural holding, farming family and rural areas, from non-agricultural economic activity conducted by them on the area on which these units operate. The tools for researching these differences can be different. The paper uses the statistics of the Mann-Whitney

(M-W) test, which makes it possible to assess the statistical significance of differences in properties expressed at least at the ordinal scale of measurement in two independent samples (Aczel A.D. 2000). As a test of equality of distributions of two populations (z) it is the most useful to examine their averages and it is only slightly weaker than the t-Student test. Calculations conducted under the test, use ranks of values from samples and not only size of the sample, like, e.g., the $\chi 2$ test.

The statistics of the z test was calculated from the formula (Ferguson G.A., Takane Y. 2003):

$$z = \frac{| R_1 - \overline{R} | - \frac{1}{2}}{\sqrt{\frac{N_1 N_2}{N(N-1)}\left(\frac{N^3 - N}{12} - \sum T\right)}},$$

where:

R_1 – sum of ranks for the smaller of the two samples,

$\overline{R}$ – average for ranks,

$^1/_2$ – adjustment for continuity of a variable,

N – total number of samples,

N_1, N_2 – size of the samples,

T – adjustment for standard deviation due to tied ranks, while:

$$T = \frac{t^3 - t}{12},$$

where t is the number of values of the same rank.

Statistical null hypotheses, assuming their accuracy, were rejected in the analysed cases, taking on the level of significance of $\alpha = 0.05$.

Under the null hypothesis it was assumed that in the two groups of farms, selected due to the researched conditions, their owners did not differ in terms of opinions concerning benefits from non-agricultural economic activity conducted by them. In case when the hypothesis was rejected, it was, thus, possible to state the statistical significance of differences between these opinions at different conditions considered in the research and this, in turn, proved ties between the analysed variables.

Conditions of opinions of farmers concerning benefits for a farm from non-agricultural economic activity conducted by them

The differences in ranks, as regards individual benefits in the two groups of farms selected on account of examined conditions, were verified by the statistics of the Mann-Whitney test. Positive values of these statistics pointed to an advantage of the first of the selected groups against the other, given the analysed assessment of benefits, while negative values meant advantage of the second

group. In the first group the values of variables describing the researched conditions were always lower than their medians (the value dividing the set into two subsets), or for zero-one variable meant that the property described by the variable was lacking.

In case when the education of a farmer, number of family members, soil valuation index and mixed (i.e. crop and livestock) agricultural production pursued by a farmer was taken as the farm classification criterion, there were no statistically important differences in assessments of significance of analysed benefits for a farm from non-agricultural economic activity conducted by farmers between the two selected groups of farms. Apart from the variables describing the researched conditions there were no statistically significant differences in assessments of farmers, also in the case of significance of some benefits. These concerned: better use of agricultural assets, rise in volume of agricultural production, implementation of innovations and specialisation in an agricultural holding, taking up new agricultural production and improved occupational health and safety conditions.

The assessments of benefits for an agricultural holding from non-agricultural economic activity pursued by a farmer presented below differentiate, in a statistically significant manner, the two selected groups of farms in terms of the benefits. First, analysis concerned benefits consisting in a possibility to sustain an agricultural holding owing to co-financing from income obtained by a farmer from non-agricultural activity. Table 2 presents values of the Mann-Whitney test statistics corresponding to these differences and their test probabilities *p*.

Table 2

Statistical assessment of differences in ranks assigned to the significance of the possibility to sustain an agricultural holding owing to co-financing from income obtained by a farmer from non-agricultural activity in selected groups of researched farms

Specification	Area of an agricultural holding	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	2.04[a]	2.01[a]	2.183[a]	2.73[b]	-2.80[b]
Probability *p*	0.041	0.044	0.029	0.006	0.005

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Research showed that higher rank to the significance of sustaining a farm from conducted non-agricultural economic activity was assigned by owners of smaller holdings, with no dominance of livestock production and of lower marketability index of agricultural production, lower share of income from an agri-

cultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods. The negative value of statistics of the Mann-Whitney test appeared only in case of greater share of income from non-agricultural activity in the structure of farming family livelihoods. This means that farmers from holdings of smaller share of income, at the same time, assign to it lower significance for sustaining an agricultural holding. These are farms characterised by greater marketability of agricultural production whose functioning is funded mainly from income obtained from agriculture (Table 2).

Then, the analysis covered difference in ranks assigned to the benefit consisting in the possibility to organise a more efficient sale of agricultural products in selected groups of researched farms. Results of statistical calculations thereof are given in Table 3. On their basis, it can be stated that greater significance to the benefit was assigned by older farmers, owners of smaller holdings, of lower marketability of agricultural production and of lower share of income from agriculture in the structure of farming family livelihoods.

From this it follows that farmers pursuing agricultural production at a smaller scale, thus to a greater extent benefiting from other family livelihoods (including also non-agricultural activity), faced greater difficulties in sale of manufactured agricultural products and non-agricultural activity, due to which they established stronger ties with the market, made it possible to them.

Bearing in mind the next benefit for an agricultural holding from non-agricultural economic activity conducted by farmers, the assessment covered differences in ranks assigned to the significance of investment possibilities of a farm. Table 4 presents the values of statistical tests. Results of calculations included in the Table indicate that farmers from holdings with dominance of agricultural crop production or agricultural mixed production and with higher share of income from non-agricultural activity in the structure of farming family livelihoods assign greater significance to support to investments in an agricultural holding from conducted non-agricultural activity. Therefore, farmers from holdings where agricultural livestock production dominates do not rely on co-financing of investments in an agricultural holding from non-agricultural activity, which in their case is conducted at a smaller scale.

Table 3

Statistical assessment of differences in ranks assigned to the significance of the possibility to organise a more efficient sale of agricultural products in selected groups of researched farms

Specification	Age of a farmer	Area of an agricultural holding	Marketability of agricultural production	Share of income from agriculture
M-W test statistics	-3.47[a]	3.37[a]	3.80[a]	3.37[b]
Probability *p*	0.001	0.001	0.000	0.001

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Table 4

Statistical assessment of differences in ranks assigned to the significance of investment possibilities of an agricultural holding in selected groups of researched farms

Specification	Dominance of agricultural crop production	Dominance of agricultural livestock production	Share of income from non-agricultural activity
M-W test statistics	-2.05[a]	3.61[b]	-2.66[b]
Probability *p*	0.040	0.000	0.008

[a] Significance at probability of p=0.05.
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

As follows from the research, investments in the last units usually concerned purchase of agricultural machines and tools, which are used also in non-agricultural economic activity consisting in agricultural services rendered with the use of own equipment.

Further benefits for an agricultural holding from non-agricultural activity indicated by farmers and benefits, the assessments of which showed statistically significant differences between the selected groups of farms included: better use of labour resources, increase in its productivity and reduction in costs of farming in agriculture. The significance of all these benefits differed between holdings selected only because of the criterion expressed by the share of income from non-agricultural activity in the structure of farming family livelihoods (Table 5).

Table 5

Statistical assessment of differences in ranks assigned to the significance of benefits in groups of researched farms selected because of the share of income from non-agricultural activity in the structure of farming family livelihoods

Specification	Better use of labour resources	Increased labour productivity	Reduced costs of farming in agriculture
M-W test statistics	-2.39[a]	-2.37[a]	-1.99[a]
Probability *p*	0.017	0.018	0.047

[a] Significance at probability of p=0.05.
Source: own study based on surveys of agricultural holdings.

Negative values of test statistics show that there is an advantage of significance of all benefits considered here in these agricultural holdings, where the share of income from non-agricultural activity in the structure of farming family livelihoods is higher (Table 5). This means that in the discussed units there was the phenomenon of surplus of labour resources, which was limited due to taking up non-agricultural activity by farmers, thereby reducing the costs of farming in agriculture.

Based on the above analysis of research results it can be stated that one, out of all seven statistically significant conditions of six considered types of benefits for an agricultural holding from non-agricultural economic activity conducted by farmers, appeared five times, namely the share of income from non-agricultural economic activity in the structure of farming family livelihoods. In all these cases the statistics of the Mann-Whitney test assumed a negative value, which means that in the group of holdings having a higher share of income from non-agricultural activity the significance of benefits for agricultural holding was greater as compared to holdings for which the share of the income was lower. It should be added that these holdings were, at the same time, characterised by smaller area, no dominance of agricultural livestock production, lower index of marketability of agricultural production, lower share of income from an agricultural holding, advantage of agricultural crop production and they were owned by younger farmers. Moreover, the following have statistical significance two times: area of an agricultural holding, marketability index of agricultural production and share of income from an agricultural holding in the structure of farming family livelihoods, whose lower values are linked to higher assessments for the possibility to sustain an agricultural holding by its co-financing from income obtained from non-agricultural activity and possibility to organise a more efficient sale of agricultural products. At the same time, no dominance of agricultural livestock production increases the significance of non-agricultural economic activity in sustaining a farm and providing additional contributions thereto.

Conditions of opinions of farmers concerning benefits for their family from non-agricultural economic activity conducted by farmers

Among the seven considered assessments of benefits for farming families from non-agricultural economic activity conducted by farmers, two did not differ in statistically significant manner between the two groups selected due to determinants of division. They covered the use of housing area and acquirement of new skills. In turn, among the farm division criteria, education of a farm owner, number of family members, soil valuation index and agricultural mixed (i.e. crop and livestock) production pursued by the farmers proved to be statistically insignificant as regards their importance for the analysed benefits.

At the beginning, the increase in household income was considered out of the differences in assessments of benefits for farming family from non-agricultural economic activity conducted by the farmer. Table 6 presents the values of the Mann-Whitney test statistics and their test probabilities *p* for differences between ranks for the benefit.

Based on results included in the Table it has to be stated that younger farmers, owners of smaller agricultural holdings, of lower marketability index of agricultural production, with dominance of agricultural crop production, of lower share of income from agricultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods assign greater significance to a growth in household income of farmers from non-agricultural economic activity.

Table 6

Statistical assessment of differences in ranks assigned to the significance of increase in household income in selected groups of researched farms

Specification	Age of a farmer	Area of an agricultural holding	Dominance of agricultural crop production	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	1.97[a]	2.67[b]	-2.63[b]	3.29[b]	2.67[b]	2.86[b]	-2.20[a]
Probability *p*	0.049	0.007	0.009	0.001	0.008	0.004	0.028

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Another benefit for the farming family from non-agricultural activity conducted by the farmer was improvement of the living conditions. Table 7 includes results of calculations describing it.

Table 7

Statistical assessment of differences in ranks assigned to the significance of improvement of the living conditions of a farming family in selected groups of researched farms

Specification	Age of a farmer	Area of an agricultural holding	Dominance of agricultural crop production	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	2.76[b]	2.77[b]	-2.04[a]	3.32[b]	2.67[b]	3.31[b]	-3.57[b]
Probability *p*	0.006	0.006	0.04	0.001	0.007	0.001	0.000

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Comparing the results with the results obtained before, it should be noted that they attest to (except for one case) slightly stronger ties of a similar direction between variables. Thus, it can be stated that greater significance to the benefit is assigned by younger farmers, owners of smaller holdings, with dominance of agricultural crop production and no dominance of livestock production, of lower marketability index of agricultural production, of lower share of income from an agricultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods.

Next, the assessment covered differences in ranks assigned to the significance of the possibility to sustain a farming family from non-agricultural economic activity conducted by farmers in groups of farms selected according to the researched conditions. Table 8 presents the results of statistical tests used for their assessment.

Table 8

Statistical assessment of differences in ranks assigned to the significance of sustaining a farming family in selected groups of researched farms

Specification	Age of a farmer	Area of an agricultural holding	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	2.82[b]	2.93[b]	2.57[a]	2.73[b]	3.53[b]	-2.71[b]
Probability *p*	0.005	0.003	0.011	0.006	0.000	0.007

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

The results of calculations point to similar links between variables as before, the main difference is that in this case dominance of agricultural crop production at a farm has no statistically significant impact (see Tables 6, 7 and 8). Hence, it has to be noted that lower significance of the analysed benefit for the farming family from non-agricultural economic activity is assigned by older farmers, conducting larger agricultural holdings, with dominance of agricultural livestock production, of greater marketability of agricultural production and of higher share of income from an agricultural holding in the structure of farming family livelihoods, i.e. owners of farms more focused on agricultural than non-agricultural activity.

Next, analysis covered differences in ranks assigned to the significance of investment possibilities of a household of farmers and their families from non-agricultural economic activity conducted by them (Table 9). In this case it turns out that statistically significant differences appear between ranks indicated for groups of agricultural holdings selected due to their area size, dominance of agricultural livestock production, marketability of agricultural production and share of income from agricultural activity in the structure of farming family livelihoods. When values of variables describing these factors are low, the non-agricultural economic activity had greater significance for investment possibilities of a household of farmers and their families.

Table 9

Statistical assessment of differences in ranks assigned to the significance of investing in a household in selected groups of researched farms

Specification	Area of an agricultural holding	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	2.68[b]	2.50[a]	3.08[b]	3.27[b]	-3.79[b]
Probability *p*	0.007	0.013	0.002	0.001	0.000

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

The share of income from non-agricultural economic activity in the structure of farming family livelihoods also had a statistically significant impact on these possibilities – the higher was the share the greater importance farmers' assigned to it. Thus, four of the analysed factors are linked to the analysed benefit in a negative manner, and one – in a positive manner, stimulating investments in their agricultural holdings (Table 9).

The last analysed benefit from non-agricultural activity conducted by farmers for their family was the possibility to educate members of the farming family. The differences between the ranks set for this variable in groups of farms selected due to the researched conditions proved to be statistically significant in cases stated in Table 10.

Table 10

Statistical assessment of differences in ranks assigned to the significance of education of farming family members in selected groups of researched farms

Specification	Age of a farmer	Area of an agricultural holding	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	3.25[b]	2.18[a]	2.95[b]	-2.71[b]
Probability *p*	0.001	0.03	0.003	-0.007

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

From the Table it follows that younger farmers, owners of smaller holdings, of lower share of income from an agricultural holding and of higher share of income from non-agricultural economic activity in the structure of farming family livelihoods point to a greater significance of this benefit.

Based on the above-presented analysis of research results, it can be stated that the following three out of the statistically significant conditions of assessments of farmers concerning benefits from non-agricultural activity appeared all the time: area of an agricultural holding, share of income from an agricultural holding and from non-agricultural activity in the structure of farming family livelihoods. In four out of five cases age, marketability of agricultural production and dominance of agricultural livestock production of farms determined the differences in the opinions of farmers regarding the analysed benefits, and in two cases – dominance of agricultural crop production. The statistics of the Mann-Whitney test took on positive values in all cases except for conditions concerning the share of income from non-agricultural activity in the structure of farming family livelihoods and dominance of agricultural crop production in an agricultural holding. This means that greater significance to non-agricultural economic activity for the analysed benefits was assigned by younger farmers, owners of smaller holdings, of lower marketability index of agricultural pro-

duction, no dominance of agricultural livestock production and of lower share of income from an agricultural holding in the structure of farming family livelihoods. For farms with lower share of income from non-agricultural activity in the structure of farming family livelihoods and showing no dominance of agricultural crop production, the negative test statistics mean assigning smaller significance to the analysed benefits.

Conditions of opinions of farmers concerning benefits for rural areas from non-agricultural economic activity conducted by them

Given the twelve considered assessments of benefits for rural areas from non-agricultural economic activity conducted by farmers, all of them differed in a statistically significant manner between the two – selected due to adopted division determinants – groups of farms. Among the division criteria, education of farmers and dominance of agricultural crop production of an agricultural holding proved to be statistically insignificant in terms of their importance for the analysed benefits.

Out of statistically proven differences in ranks, in the beginning the paper will consider those which are conditioned by the same set of diagnostic variables. These are the following benefits: creation of new jobs for rural residents, growth in income of local self-government units, development of other non-agricultural forms of economic activity in rural areas, counteracting depopulation of rural areas and improvement of the aesthetics of farm surroundings. Table 11 presents values of the Mann-Whitney test statistics and their test probabilities p.

On the basis of the data, it can be stated that the significance of all of the above-mentioned benefits is greater according to owners of smaller holdings, with dominance of agricultural mixed (i.e. crop and livestock) production, of lower marketability index of agricultural production, lower share of income from an agricultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods. Thus, these are farmers more strongly oriented at non-agricultural activity that they conduct, which – in their opinion – brings more benefits for the rural areas they live in.

Further benefits linked to the same set of diagnostic variables include: the possibility to exert pressure on the development of social infrastructure of rural areas and modernisation of rural areas. Table 12 gives results of their statistical assessment.

Based on data included in this Table it is clear that, just like before, also in the case of considered benefits they are more highly appreciated by owners of smaller holdings, with dominance of agricultural mixed (i.e. crop and livestock) production, of lower marketability of agricultural production, and also of lower share of income from an agricultural holding and higher share of income from non-agricultural activity in the structure of farming family livelihoods.

The remaining five of the analysed benefits for rural areas from non-agricultural economic activity conducted by farmers have different conditions and thus they will be considered separately. The statistical assessment of benefits

consisting in the possibility to exert pressure on the development of business institutional environment in rural areas is presented in Table 13. From the above it follows that greater significance to the benefit is assigned by owners of farms with the dominance of agricultural mixed (i.e. crop and livestock) production, of low marketability of agricultural production and of lower share of income from an agricultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods.

Table 11

Statistical assessment of differences in ranks assigned to the significance of creation of new jobs for rural residents, growth in income of local self-government units, development of other non-agricultural forms of economic activity, counteracting depopulation of rural areas and improvement of the aesthetics of farm surroundings in selected groups of researched farms

Specification	Area of an agricultural holding	Dominance of agricultural livestock production	Dominance of agricultural mixed production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
Creation of new jobs for rural residents						
M-W test statistics	3.14[b]	2.85[b]	-2.73[b]	3.09[b]	3.15[b]	-5.23[b]
Probability *p*	0.002	0.004	0.006	0.002	0.002	0.000
Growth in income of local self-government units						
M-W test statistics	3.21[b]	4.50[b]	-3.07[b]	3.23[b]	3.58[b]	-5.99[b]
Probability *p*	0.001	0.000	0.002	0.001	0.000	0.000
Development of other non-agricultural forms of economic activity						
M-W test statistics	2.61[b]	3.30[b]	-2.75[b]	2.83[b]	3.25[b]	-5.06[b]
Probability *p*	0.009	0.001	0.006	0.005	0.001	0.000
Counteracting depopulation of rural areas						
M-W test statistics	2.87[b]	3.21[b]	-2.12[a]	2.51[a]	2.96[b]	-4.81[b]
Probability *p*	0.004	0.001	0.034	0.012	0.003	0.000
Improvement of the aesthetics of farm surroundings						
M-W test statistics	4.59[b]	2.85[b]	-2.69[b]	3.72[b]	4.41[b]	-3.97[b]
Probability *p*	0.000	0.004	0.007	0.000	0.000	0.000

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Table 12

Statistical assessment of differences in ranks assigned to the significance of the possibility to exert pressure on the development of social infrastructure of rural areas and modernisation of rural areas in selected groups of researched farms

Specification	Area of an agricultural holding	Dominance of agricultural mixed production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
Possibility to exert pressure on the development of social infrastructure in rural areas					
M-W test statistics	2.18[a]	-2.87[b]	2.51[a]	2.40[a]	-3.64[b]
Probability *p*	0.029	0.004	0.012	0.017	0.000
Modernisation of rural areas					
M-W test statistics	2.20[a]	-2.22[a]	2.18[a]	2.0[a]	-3.64[b]
Probability *p*	0.028	0.026	0.029	0.045	0.000

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Table 13

Statistical assessment of differences in ranks assigned to the significance of the possibility to exert pressure on the development of business institutional environment in rural areas in selected groups of researched farms

Specification	Dominance of agricultural mixed production	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	-2.93[b]	2.0[a]	2.22[a]	2.02[a]	-3.8[b]
Probability *p*	0.003	0.045	0.026	0.044	0.000

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Another analysed benefit is the possibility to exert pressure on the development of technical infrastructure of rural areas (Table 14). The data in the Table attest to the fact that more significance is put on the benefit by farmers conducting agricultural holdings with dominance of agricultural mixed (i.e. crop and livestock) production and of higher share of income from non-agricultural economic activity in the structure of their family livelihoods.

Table 14

Statistical assessment of differences in ranks assigned to the significance of the possibility to exert pressure on the development of technical infrastructure of rural areas in selected groups of researched farms

Specification	Dominance of agricultural mixed production	Dominance of agricultural livestock production	Share of income from non-agricultural activity
M-W test statistics	-2.77[b]	2.23[a]	-2.92[b]
Probability *p*	0.006	0.026	0.004

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Another of the analysed benefits is the possibility to exert pressure on the development of tourist infrastructure of rural areas. The statistical assessment presented in Table 15 shows that greater significance to the benefit is assigned by owners of smaller holdings, without dominance of agricultural livestock production, of low marketability of agricultural production and of lower share of income from an agricultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods. As evident, the researched conditions are highly alike those found before.

Table 15

Statistical assessment of differences in ranks assigned to the significance of the possibility to exert pressure on the development of tourist infrastructure of rural areas in selected groups of researched farms

Specification	Area of an agricultural holding	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	2.67[b]	2.05[a]	3.0[b]	2.67[b]	-2.25[a]
Probability *p*	0.008	0.04	0.003	0.008	0.024

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Table 16 gives results of statistical assessment of a benefit consisting in the improvement of the quality of the natural environment in rural areas.

Table 16

Statistical assessment of differences in ranks assigned to the significance of the improvement of the quality of the natural environment in rural areas in selected groups of researched farms

Specification	Age of a farmer	Soil valuation index	Area of an agricultural holding	Dominance of agricultural mixed production	Dominance of agricultural livestock production	Marketability of agricultural production	Share of income from agriculture	Share of income from non-agricultural activity
M-W test statistics	-2.79[b]	2.44[a]	3.75[b]	-3.35[b]	2.50[a]	3.79[b]	3.75[b]	-2.77[b]
Probability *p*	0.005	0.015	0.000	0.001	0.013	0.000	0.000	0.006

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

From the data included therein it follows that this benefit is more significant for older owners of smaller holdings, of poorer soil quality, with dominance of agricultural mixed (i.e. crop and livestock) production, of lower marketability index of agricultural production and of lower share of income from an agricultural holding and of higher share of income from non-agricultural activity in the structure of farming family livelihoods.

The last of the analysed benefits for rural areas from non-agricultural economic activity conducted by farmers is conservation of cultural heritage of rural areas and development of rural culture. Table 17 presents results concerning their statistical assessment. As clear, greater significance is placed on this benefit by older farmers conducting smaller holdings, with dominance of agricultural mixed (i.e. crop and livestock) production, of lower marketability index of agricultural production and of lower share of income from an agricultural holding in the structure of farming family livelihoods.

Table 17

Statistical assessment of differences in ranks assigned to the significance of conservation of cultural heritage of rural areas and development of rural culture in selected groups of researched farms

Specification	Age of a farmer	Area of an agricultural holding	Dominance of agricultural mixed production	Marketability of agricultural production	Share of income from agriculture
M-W test statistics	-2.59[b]	2.19[a]	-1.96[a]	2.28[a]	2.20[a]
Probability *p*	0.009	0.029	0.049	0.022	0.029

[a] Significance at probability of p=0.05,
[b] Significance at probability of p=0.01.
Source: own study based on surveys of agricultural holdings.

Based on the above analysis of research results it should be noted that four, out of statistically significant researched conditions of twelve considered benefits for rural areas from non-agricultural economic activity conducted by farmers, appeared as determinants of all (apart from one case) of the analysed benefits. Moreover, two of the researched conditions turned out to be statistically significant, respectively, for ten and nine of the analysed benefits. On these grounds the six factors can be considered as decisive, given the significance of benefits for rural areas from non-agricultural economic activity conducted by farmers. The Mann-Whitney test statistics took on positive values for the area of an agricultural holding, dominance of agricultural livestock production, marketability of agricultural production and share of income from an agricultural holding in the structure of farming family livelihoods. This means that at low values of variables describing these conditions, the significance of the analysed benefits is greater. These benefits were assessed also higher in case of dominance of agricultural mixed (i.e. crop and livestock) production and higher share of income from non-agricultural economic activity in the structure of farming family livelihoods.

It needs to be added that statistically significant dependence between better assessments of the considered 23 benefits, both for farms and farming families and for rural areas, were observed in 21 cases among agricultural holdings of higher share of income from non-agricultural economic activity, which proves a very strong impact of the fact on their situation and the opinions.

Conclusions

The conducted research showed that the significance of benefits from non-agricultural economic activity conducted by farmers for their agricultural holding and their family is greater for younger owners of smaller holdings, with dominance of agricultural crop production, of lower marketability index of agricultural production and of higher share of income from non-agricultural activity in the structure of farming family livelihoods. Whereas the analysis concerning benefits for rural areas from non-agricultural economic activity, conducted by farmers on the area where they operate and act, proved that greater significance is placed on them by older owners of smaller holdings, with dominance of agricultural mixed (i.e. crop and livestock) production and of higher share of income from non-agricultural activity in the structure of farming family livelihoods. In general, it needs to be stated that the share of income from non-agricultural activity of farmers in the structure of their family livelihoods as a statistically significant determinant is a consequential factor deciding on the significance of benefits analysed in the paper. The higher the share, the more important, according to farmers, are all of the analysed socio-economic benefits stemming from the non-agricultural activity conducted by them.

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