ORIGINAL PAPER

Preferences of private forest owners regarding membership in Forest Owner Associations (FOAs)

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ABSTRACT

The social and cultural changes that have been taking place in European societies for over 30 years are also having an impact on forests and forestry. In Poland, there is still no dynamic development joint forms of management in agriculture including forest land. One of the main reasons for this situation seems to be the lack of activity in the still dormant social capital of rural residents in this area as well as insufficient knowledge about the best solutions. The purpose of this study was to determine the preferences of private forest owners regarding membership in Forest Owners Associations (FOA) as a case study for Poland. The objective was achieved by directly surveying a nationally representative sample of Polish farmers who own forests. The surveyed forest owners were offered to choose one of the four defined models of organising forest owners' associations in Poland with a fifth option allowing them to make their own proposal. The obtained distribution of preferences was analysed using two log-linear models. The models made it possible to explain the differences in the frequency of respondents' statements on the proposed models of forest association organisation in relation to selected content variables (answers to three closed questions of the survey) and variables from the respondents' statements (age, gender and education).

The survey was conducted on a representative large nationwide random sample of forest landowners who are farmers (1003 questionnaires). The computer-assisted personal interview (CAPI) method was used with a standardised interview questionnaire containing 16 factual questions and a survey metric.

This publication provides the results that indicate the preferred organisational form of associations in Poland as well as the results of a random typology of forest owners (farmers) based on the preferred organisational form of associations while taking into account aspects of wood commodity management and the social variables of owners (gender, age and education).

Based on the analysis carried out, it can be concluded that the most advantageous solution would be the establishment of an association of owners in a municipality cooperating at the district (powiat) level in Poland which would allow forest owners to take various initiatives at the municipal (local) level, including the joint sale of wood.

KEY WORDS

agriculture, cooperation, farmer, FOA, management, small scale

Introduction

The social and cultural changes that have been taking place in European societies for over 30 years are also having an impact on forests and forestry. One of these changes is the process of generational change among forest owners (Upton *et al*., 2019) which was triggered after 1989 Central--Eastern and Southern Europe countries with the emergence of 'new owners' as a result of the reprivatisation processes of forest assets (Hirsch *et al*., 2007; Schmithüsen and Hirsch, 2010; Weiss *et al*., 2019b) and the new group of owners who have taken advantage of the financial support of the Common Agricultural Policy (CAP) for land afforestation excluded from agricultural use (Haeler *et al*., 2023). A positive effect of these processes is an increase in private forest area, while a negative consequence is a further fragmentation of private forest area. The social phenomenon that accompanies the changes described is the weakening of the relationship between the 'new' owners and agriculture or rural areas (Hogl *et al*., 2005; Weiss *et al*., 2019a). A large proportion of owners are not interested in forest management (Kvarda, 2004) as it is not an important source of income to them (Häyrinen *et al*., 2017). Such a situation can not only be dangerous for the continued existence of a forest but can also reduce the supply of wood raw materials (Lieberherr *et al*., 2021).

One way to address this issue is to form owner communities that ensure knowledge transfer between their members (Stoettner and Ní Dhubháin, 2019), mobilise owners to procure and sell wood commodities (Schlüter, 2007), and support the provision of forest ecosystem services (Primmer, 2011; Bowditch *et al*., 2020). This process is taking place in many European countries (Lawrence *et al*., 2020). Forest management associations brings many benefits not only to the owners but also to the social and economic environment (Niskanen *et al*., 2007; Aurenhammer and Koch, 2015; Fabra-Crespo and Rojas-Briales, 2015). Association based forest management enables the development of entrepreneurship among private forest owners (Niskanen *et al*., 2007) including the marketing and sale of wood (Størdal, 2004; Elyakime and Cabanettes, 2009; Aurenhammer, 2017). Networking amongst forest owners can help to increase the economic importance of their forests (Koch *et al*., 2013) which also occurs between forest owners in Poland (Gołos, 2008, 2011; Wysocka-Fijorek *et al*., 2020a, b). However, such a process requires the activation of the social capital of rural residents (Moyes *et al*., 2015) which enables them to utilise resources owned by other entities thus improving the effectiveness of initiatives (Andersson and Johansson, 2010). Forest owners' associations (FOAs) that base their activities on the most important prerequisite which is trust can improve knowledge about forests not only among owners (Glück *et al*., 2010; Stoettner and Ní Dhubháin, 2019) but local people as well (Urquhart and Courtney, 2011). All these benefits are of particular importance in countries with small forests owned by a single owner on average which includes all Central and Eastern European countries (Glück *et al*., 2010; Põllumäe *et al*., 2016; Hrib *et al*., 2018; Sarvašová *et al*., 2019; Wysocka-Fijorek *et al*., 2020b).

Searching for answers to the interests of private forest owners in joint management forms is one of the elements of research on the typology of forest owners (Ficko *et al*., 2019) which aims to develop a profile of forest owners in Europe (Fabra-Crespo and Rojas-Briales, 2015). This allows us to learn about the attitudes, goals, motives and values of this social group although the scope is not yet sufficient to make complex forecasts (Kilham *et al*., 2019) which are necessary for the planning and implementation of forest policy instruments at EU and national levels.

In Poland, there is still no dynamic development in forms of joint management in agriculture (Krzyżanowska, 2017) including forest land. One of the main reasons for this seems to be

the lack of activity of the dormant social capital of rural residents as well as insufficient knowledge about the best solutions. Despite legal regulations (Ustawa, 1989) allowing owners of private forests in Poland to establish associations, they are not actively involved in creating forms of joint forest management. The following conditions identified in several studies (Gołos, 2008, 2011; Wysocka--Fijorek, 2013; Wysocka-Fijorek and Kaliszewski, 2017; Wysocka-Fijorek et al., 2020a; Gołos et al., 2021a, b) are responsible for the lack of success in this area:

    1) no national initiative of forest owners after 1989 which would draw attention to the existence of this form of forest ownership,

    2) dispersion of forest management supervision in private forests in 400 districts,

    3) lack of activity of forest owners in terms of creating committed and effective initiatives that enable and encourage association,

    4) marginalizing the social and economic importance of private forests due to public sector dominance,

    5) dominance of agricultural issues in rural development with marginalization of forest management issues,

    6) a small share of private forests in land use structures, a relatively small area, high fragmentation of forest plots and low profitability of forest management

    7) treating the forest as a convenient storage of wood used for farm and household purposes but not as a source of capital or significant income for farmers,

    8) lack of financial support for initiatives allowing owners to network besides the main program supporting farmers which is CAP,

    9) lack of legal possibilities to financially support initiatives to establish forest owners' associations from forest tax funds.

This publication provides results that indicate the preferred organisational form of associations in Poland as well as results of a random sample typology of forest owners (farmers) based on the preferred organisational form of associations while taking into account aspects of wood commodity management and the social variables of owners (gender, age and education).

    The aim of this study is to determine the preferences of private forest owners regarding membership in the Forest Owners Association (FOA). The intended goal was achieved by directly surveying a nationally representative sample of farmers who own forests. The surveyed forest owners were offered a choice based on the four defined models of forest association organisation in Poland as well as a fifth option allowing them to make their own proposal. The distribution of preferences obtained was analysed using two log-linear models. It made it possible to explain the differences on the proposed models of forest association organisation in relation to selected content variables (answers to three closed questions in the survey) and variables from the respondents' statements (age, gender, and education).

    The definitive opinions of forest owners presented in this publication, which identify and explain the preferences of forest owners in terms of organisational forms, are the first information of this kind that allows conclusions to be drawn about the entire population of farmers with forest ownership in Poland.

Materials and methods

RESEARCH OBJECT. Analysing the results of the survey requires a presentation of basic information about private forests in Poland. They cover an area of 1,788 thousand ha (19.2% of the forest area) including 1,683 thousand ha privately owned forests of which the largest group are farmers which is composed of 553 thousand individual farms covering 909 thousand ha of forest (Statistical

Yearbook of Agriculture, 2021). The average age of forest stands is 50 years, average volume is 249 m³·ha⁻¹, average current volume increment is about 9 m³·ha⁻¹, average volume of standing and dead fallen trees is about 6 m³·ha⁻¹, and the average for forests of all ownership types is 8 m³·ha⁻¹ (BULiGL, 2022). Farmers usually manage 2-3 forest plots the smallest of which have an average area of 0.21-0.35 ha and the largest around 1.92-2.83 ha (Gołos, 2008, 2011). Wood harvesting in private forests in 2021 amounted to about 1289 thousand m³ of wood (Statistical Yearbook of Forestry, 2022) which is 3% of the total wood harvest in Poland. The results of the National Forest Inventory (WISL) show that wood harvesting in private forests amounts to about 3.5 m³·ha⁻¹ per year (BULiGL, 2022), *i.e.* about 6 million m³. Only a small part of the harvested wood is sold with most of it being used by the owners as fuel or for agricultural needs (Gołos, 2011).

CHARACTERISTICS OF THE RESPONDENTS. The average agricultural area of the studied farms (Table 1) was lower than the Polish average which was 11.21 ha in 2020. In the case of forest and other land, the average of the studied farms was above the Polish average which in 2020 was 1.64 ha and 0.72 ha, respectively (Statistical Yearbook of Agriculture, 2021). The average monthly net income of the sampled farms with more than three persons was approximately PLN 3200 (Gołos *et al.*, 2021a). The sample included mostly men (61.07%) and the average age of the respondents was over 51 years. More than half of the respondents (57%) reported that they ran a farm. About 26% of the sampled farms had a larger forest area than agricultural land (average of 6.44 ha of forest).

SURVEY RESEARCH. The survey was conducted on a representative large nationwide random sample of forest landowners who were farmers (1003 questionnaires). The survey was conducted in April 2019 by the Kantar Agency on behalf of the Polish Forest Research Institute. The computer--assisted personal interview (CAPI) method was used with a standardised interview questionnaire containing 16 factual questions and a survey metric. The sample was quota sampling and random in nature and was selected from the Central Statistical Office (CSO) address database. Stratification took into account the presence of private forests in a given province. The stratification was based on data from the CSO collected as part of the 2010 General Census of Agriculture.

The surveyed population was stratified according to the criterion of territorial location (divided into 16 voivodeships; NUTS 2) taking into account the presence of forest, *i.e.* the share of respondents from a given voivodeship in the sample was proportional to the share of farms with private forest in a given voivodeship among all farms of this type in Poland. As part of the stratified allocation, counties were selected that later formed the units for selecting the addresses. This selection was done with a probability proportional to the number of farmers/owners of private forests, and the number of selected counties was determined on the assumption that the same number of interviews (corresponding to the size of the service bundle) were carried out in each

Table 1.

Characteristics of researched farms established through a survey conducted in April 2019 based on random representative nationwide sample of forest owners (farmers)

Research sample variables	Average [ha]	Median [ha]	SD [ha]	CV [%]	Min. [ha]	Max. [ha]	N (95ᵗʰ percentile) (number)
Agricultural land area	10.36	6.00	13.86	134	0.0	100	953
Forest land area	3.43	1.50	6.33	185	0.1	60	953
Other land area	1.30	0.00	3.44	264	0.0	40	953

county (5 respondents). The selection of the districts was carried out according to the scheme with return.

In the implementation phase, the interviewer started searching for a respondent at the starting point in the specified district and then searched for respondents (private forest owners) in the area of the selected district near this respondent. If a person who met the specified criteria lived on a farm in the plotted sample area and agreed to participate in the survey, an interview was conducted with that person. If the person was a private forest landowner and did not live on the farm or the interviewer did not receive permission to conduct an interview at that address, the search for a respondent continued with the next farm.

SCOPE OF SURVEY RESEARCH. The main axis of the results presented is a closed question that aimed to identify the form of association organisation preferred by forest owners (variable Q_FOA). The description of each of the four organisational forms of associations placed in the closed question canteen of the questionnaire took into account the Polish legal, historical and cultural conditions, as well as experiences from similar studies (Gołos, 2011). The surveyed forest owners could specify only one of the four defined organisational forms of forest associations. The format of the question also allowed respondents to make their own suggestion in the category 'other, what?' Two categories emphasised the importance of social capital (in the broader sense of rural residents) in the formation of forest owners' associations. They differed only in the vertical structure of the organisation: (1) an independent central organization and local and district branches, (2) an association of owners in the community working together at the district level. The next two categories took a leading role in the process of establishing associations which included two functioning institutions related to rural areas and known to the respondents. One referred to the organisational structures and experience of Agricultural Extension Centers, state organizational units providing agricultural extension services (Ustawa, 2004), while the other emphasised the leading role of farmers' self-government (Chambers of Agriculture), whose aim is to solve agricultural problems and represent the interests of affiliated farmers (Ustawa, 1995). The analysis of the results obtained aimed to explain the relationship between the information on the organisation of forest associations and the answers to the three questions of the survey as well as information from the records of the surveyed owners.

The explanatory variables were assumed to be the following:

1) The forest owners' preferred way of organising the support system for the sale of wood from private forests (variable Q_SAL). When answering the question, respondents could only indicate one of the five proposed support methods, such as: (1) sale to the State Forest National Forest Holding at the applicable prices, (2) sale through the statewide online sales portal, (3) joint sale with the help of forest owners' associations, (4) sale with the help of employees in the district office, (5) sale to a company that harvests wood with compensation for the cost of its acquisition. For the cafeteria question (list of possible answers), the category 'another way' was added allowing the respondent to describe their own proposal. Taking into account the requirements of log-linear analysis, the results obtained were transformed into a binary variable in which the information provided by the forest owners on the joint sale of wood using FOA was marked as '1' and the other four categories mentioned in the question were marked as '0'.

2) The type of use for the wood raw material obtained by the forest owners (variable Q_WOOD). The respondents task was to allocate 100% of the volume of wood extracted by the forest owner in his forest to three main types of use which were fuel, raw material for the farm (fences, repairs) and sale of wood. The answers had to be trans-

formed into a binary variable where the respondents who reported selling more than 20% of the harvested wood were marked with '1' and the respondents who reported selling less than 20% of the harvested wood were marked with '0'.

3) Occupational situation of the forest owner (variable Q_OCC). The information provided by forest owners on their occupational situation was transformed into a binary variable with 'I run a farm' marked as '1' or '0' as other categories listed in the question.

Variables such as age, education and gender of the forest owners surveyed were also used in the analysis.

STATISTICAL ANALYSES. In analysing the variables collected in the surveys, a log-linear analysis was performed using multiway contingency tables. Two models were defined in which the explanatory variables were the respondents' answers to three closed-ended questions and information from the respondents' personal data that made it possible to identify gender, age, and education of the respondents.

Using a single model for all variables was not possible because the analysis would have involved a seven-way contingency table with $2^6 \cdot 5 = 320$ cells (variable Q_FOA with five categories and six variables with two categories) and would result in empty cells in the contingency table. Therefore, two models were created. In the first model (Model 1), three variables were considered (Q_SAL, Q_WOOD, and Q_OCC) in addition to variable Q_FOA. In the second model (Model 2), the variable Q_OCC and three pieces of information from the respondents' personal data were again used as binary variables including: 1) age of respondents – division of respondents into respondents up to 60 (≥60) and over 60, 2) education of owners – respondents with secondary and lower education and with higher education (complete or incomplete), 3) gender.

We used hierarchical loglinear models, *i.e.* loglinear models with higher order effects. If class frequencies depend only on the main effects of the model, this indicates the mutual independence of the quality variables (Freeman, 1987). Significant interaction terms indicate the existence of conditional dependencies between variables. Hierarchical loglinear models are members of a family of models such that if any model term is set equal to 0, all effects at the same or higher order containing this term are also set to 0 (Bishop *et al.*, 1975). Thus, whenever a model contains higher-order effects, it also must contain the corresponding lower-order effects (Stokes *et al.*, 2012). An adequate log-linear model provides an efficient prediction of expected frequencies with as few interactions as possible included in the model.

The maximum likelihood method and the Newton-Rapson algorithm was used to estimate model parameters and expected cell abundances. The goodness of fit of our models was assessed using the likelihood ratio chi-squared statistic G2. This statistic can be used to test the hypothesis that the highest order interaction is nonsignificant and therefore the proposed model explains the relationships between variables. Contrasts were used to calculate expected odds ratios OR.

Calculations were performed using the CATMOD procedure of SAS/STAT® v. 14.3 software (SAS Institute Inc., 2017).

Results

THE PREFERENCE OF PRIVATE FOREST OWNERS REGARDING MEMBERSHIP IN A FOREST OWNERS ASSOCIATION (FOA). The majority of respondents (88.9%) indicated one of the four organizational forms of associations listed in the cafeteria of the question. Only 111 respondents (11.1%) indicated 'I don't know/difficult to say.' Most respondents (360 respondents – 35.8%) indicated that there are community-based associations that work together at the district level. The number of farmers (N) who indicated the other three forms of organization was similar (Table 2).

Table 2.

Characteristics of respondents by preference of private forest owners regarding membership in a Forest Owners Association (FOA)

Variables	Form of Forest Owners Association (FOA)									
	form 1 one independent central organization and local and regional offices (N=196)		form 2 an association of owners in a community working together at the district (powiat) level (N=360)		form 3 associations established at the Agricultural Extension Centers (N=159)		form 4 Chamber of Forestry of forest owners organized on the model of Chamber of Agriculture (N=166)		I don't know, hard to say (N=111)	
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD
Gender[1]	1.48	0.50	1.38	0.49	1.31	0.46	1.33	0.47	1.45	0.50
1 – male	52		62		69		67		55	
2 – female	48		38		31		33		45	
Age [years]	50.17	10.91	51.86	12.28	49.03	10.03	51.43	10.81	50.95	11.51
Education[2]	2.76	1.05	2.67	1.03	2.92	1.13	2.73	0.95	2.53	0.95
1 – primary	7		9		7		4		8	
2 – vocational	36		39		30		41		47	
3 – intermediate	43		39		43		45		36	
4 – higher, incomplete	2		3		4		1		2	
5 – higher	12		10		16		10		7	
Area of agricultural land [ha]	11.10	15.67	11.01	15.24	12.56	14.31	9.50	12.83	9.27	13.72
Area of forest land [ha]	3.85	8.65	3.27	5.53	4.19	6.76	3.78	5.77	2.00	3.19
Area of other land [ha]	1.28	3.36	1.13	2.95	1.99	5.06	1.20	3.09	0.79	1.63
Parcels [pieces]	1.44	0.50	1.42	0.49	1.30	0.46	1.33	0.47	1.39	0.49
Net income of the respondent [thousand PLN/month]	12.48	6.41	11.66	6.74	12.32	6.17	12.22	6.58	12.50	7.07
Net household income [thousand PLN/month]	14.23	4.98	13.24	5.45	13.85	5.13	13.83	5.15	14.67	5.12

[1] with regard to a synthetic presentation of the results which allows a comparison of the genders in the indicated forms of association, this variable was presented both as a mean, SD and the percentage of the category was given, where the value '1' stands for men and '2' for women;

[2] to compare the educational level of the respondents (ordinal variable) in the indicated forms of association, this variable was presented both as a mean, SD and the percentage of the category was given, where the value '1' denotes primary education, '2' denotes vocational education, '3' denotes intermediate education, and '4' incomplete, higher education and '5' higher education

THE PREFERENCE OF PRIVATE FOREST OWNERS REGARDING MEMBERSHIP IN A FOREST OWNERS ASSOCIATION (FOA RELATED TO THE USE OF HARVESTED WOOD AND ITS JOINT SALE – MODEL 1). The likelihood ratio test for Model 1 with all variables Q_FOA, Q_SAL, Q_WOOD, and Q_OCC as well as various interaction terms between them resulted in the rejection of the null hypothesis ($p<0.05$) which means that the tested model does not explain the relationships between the frequencies expected in the contingency table. Only the deletion of variable Q_OCC (farm) allowed the model to fit the other three variables (Table 3). The likelihood ratio of the goodness of fit statistic for the saturated model (*i.e.*, including the third-order interaction term and all second-order interactions) was G2=5.96 with 4 df ($p=0.202$), while G2 for the model without the interaction of three factors and a nonsignificant second-order interaction (Q_SAL×Q_WOOD) was 7.73 with 5 df ($p=0.172$; Table 3). The likelihood ratio test excluding the three-factor inter-

action is equal to 0 (G2=7.73-5.96, with 5-4 df, *p*=0.183), therefore the difference between these models is not significant and a model with the effects shown in the table (Table 3) was used.

A significant interaction between the variables Q_FOA×Q_SAL indicates that there were differences in the frequencies of people who reported selling wood using FOAs (Q_SAL), indicating different organizational forms of FOAs (Q_FOA). Forest owners (Table 4) who indicated selling wood commodities with the help of associations were more likely to do so than undecided individuals based on the following:

  – associations of owners in the community and cooperation at the district level (2.4 times more often),
  – organization of associations in the form of an independent central organization and local and regional branches (2.3 times more often)
  – associations located at agricultural extension centers (1.7 times more frequent),
  – Chamber of Forestry forest owners organized along the lines of agricultural chambers (1.8 times more frequent).

Among respondents who reported joint wood sales through FOAs, the frequency of reporting was 38% higher for the first form of association organization (an independent central organization and local and regional branches) than for the third form (associations established at agricultural extension centers) and 29% higher than for the fourth form (Chamber of Forestry forest owners organized along the lines of agricultural chambers). There was no difference in the frequency with which the first or second form of association organization was chosen. Among those who indicated joint selling, the frequency of choosing the second form was 32% higher than the third form and 32% higher than the fourth form. There was no difference between the percentage of people who chose the third or fourth form of association organization.

The significant interaction Q_FOA×Q_WOOD showed that the proportions of people who prefer different models of FOA differ among forest owners who report selling 20% or more harvested wood (Table 3). Among these forest owners, the frequency of explanations for the first form of association organization was about 45% higher than among respondents who did not indicate any of the proposed models (Table 4). The frequency of explanations for the third and fourth forms of association organization was also higher than among undecided respondents at 48% and 36%, respectively. The preponderance of explanations for the second form of association organization over the undecided (30%) was on the verge of significance (*p*=0.062).

PREFERENCE OF PRIVATE FOREST OWNERS REGARDING MEMBERSHIP IN A FOREST OWNERS ASSOCIATION (FOA) IN RELATION TO RESPONDENT CHARACTERISTICS – MODEL 2. The likelihood ratio goodness of fit statistic for Model 2 which contained all possible third-order interaction terms between 5 variables (LR statistic for the saturated model could not be counted because

Table 3.

Maximum Likelihood Analysis table for preferred forms of organization of Forest Owners Associations related to the use of harvested wood and its joint sale – Model 1

Model effects	DF	*Chi*-Square	*p*
Q_FOA	4	115.29	<0.001
Q_SAL	1	235.75	<0.001
Q_FOA×Q_SAL	4	24.49	<0.001
Q_WOOD	1	185.67	<0.001
Q_FOA×Q_WOOD	4	14.20	0.007
Likelihood ratio	5	7.73	0.172

of insufficient number of degrees of freedom) was $G2=7.44$ with 12 df ($p=0.827$), while $G2$ for the model without three or more interactions and non-significant second order interactions (Q_FOA×Q_OCC, Q_FOA×age, gender×education, gender×age) was 43.16 with 49 df ($p=0.708$; Table 5). The likelihood ratio test excluding that the three-factor interaction equals 0 ($G2=35.72$, with 37 df, $p=0.529$) is not significant, therefore the difference between these models is not significant and a model with the effects shown in the table (Table 6) was used.

Table 4.

Estimated odds ratios with standard errors SE (both in original scale – *i.e.*, exponentiated) for respondents who reported joint sales Q_SAL_1 or sales above 20% Q_WOOD_1 for comparisons of forest association model preferences (0 is group 'other' or 'I do not know'); OR>1 indicates a higher percentage of the given group relative to the reference group, OR<1 indicates a lower percentage of the given group relative to the reference group

Contrast	Estimated OR	Standard Error	*Chi*-Square	p
Q_SAL_1×Q_FOA_1 ver Q_FOA_0	2.33	0.49	15.96	<0.001
Q_SAL_1×Q_FOA_2 ver Q_FOA_0	2.40	0.49	18.39	<0.001
Q_SAL_1×Q_FOA_3 ver Q_FOA_0	1.68	0.38	5.34	0.021
Q_SAL_1×Q_FOA_4 ver Q_FOA_0	1.81	0.41	13.81	<0.001
Q_SAL_1×Q_FOA_1 ver Q_FOA_2	0.97	0.10	0.08	0.782
Q_SAL_1×Q_FOA_1 ver Q_FOA_3	1.38	0.19	5.41	0.02
Q_SAL_1×Q_FOA_1 ver Q_FOA_4	1.29	0.08	9.10	0.003
Q_SAL_1×Q_FOA_2 ver Q_FOA_3	1.42	0.18	7.66	0.006
Q_SAL_1×Q_FOA_2 ver Q_FOA_4	1.32	0.07	15.66	<0.001
Q_SAL_1×Q_FOA_3 ver Q_FOA_4	0.93	0.10	0.53	0.469
Q_WOOD_1×Q_FOA_1 ver Q_FOA_0	1.45	0.21	6.29	0.012
Q_WOOD_1×Q_FOA_2 ver Q_FOA_0	1.30	0.18	3.48	0.062
Q_WOOD_1×Q_FOA_3 ver Q_FOA_0	1.48	0.23	6.53	0.011
Q_WOOD_1×Q_FOA_4 ver Q_FOA_0	1.36	0.23	8.66	0.003
Q_WOOD_1×Q_FOA_1 ver Q_FOA_2	1.12	0.11	1.21	0.272
Q_WOOD_1×Q_FOA_1 ver Q_FOA_3	0.98	0.12	0.02	0.875
Q_WOOD_1×Q_FOA_1 ver Q_FOA_4	1.07	0.07	0.74	0.389
Q_WOOD_1×Q_FOA_2 ver Q_FOA_3	0.88	0.09	1.45	0.228
Q_WOOD_1×Q_FOA_2 ver Q_FOA_4	0.95	0.06	0.58	0.447
Q_WOOD_1×Q_FOA_3 ver Q_FOA_4	1.09	0.08	1.08	0.298

Table 5.

Maximum Likelihood Analysis table for preferred organizational forms of Forest Owners Association (FOA) in relation to respondent characteristics – Model 2

Model effects	DF	*Chi*-Square	p
Q_FOA	4	64.63	<0.001
Gender	1	33.72	<0.001
Q_FOA×gender	4	16.18	0.003
Education	1	171.86	<0.001
Q_FOA×education	4	9.12	0.058
Q_OCC	1	7.51	0.006
Age	1	115.06	<0.001
Q_OCC×age	1	42.5	<0.001
Q_OCC×gender	1	6.77	0.009
Q_OCC×education	1	15.77	<0.001
Age×education	1	4.01	0.045
Likelihood ratio	49	43.16	0.708

Table 6.

Estimated odds ratios with SE (both in the original scale – *i.e.*, exponentiated) for forest association model preferences (0 is the group of 'others' or 'I don't know') with respect to the data from the metric; OR>1 indicates a higher percentage of the given group relative to the reference group, OR<1 indicates a lower percentage of the given group relative to the reference group

Contrast	Estimated	Standard	*Chi*-Square	*p*
GENDER 2×Q_FOA_1 ver Q_FOA_0	1.05	0.24	0.04	0.839
GENDER 2×Q_FOA_2 ver Q_FOA_0	0.69	0.15	3.18	0.075
GENDER 2×Q_FOA_3 ver Q_FOA_0	0.52	0.13	6.86	0.009
GENDER 2×Q_FOA_4 ver Q_FOA_0	0.64	0.12	5.30	0.021
GENDER 2×Q_FOA_1 ver Q_FOA_2	1.53	0.27	5.61	0.018
GENDER 2×Q_FOA_1 ver Q_FOA_3	2.02	0.45	9.88	0.002
GENDER 2×Q_FOA_2 ver Q_FOA_3	1.32	0.27	1.87	0.172
GENDER 2×Q_FOA_1 ver Q_FOA_4	1.64	0.27	8.92	0.003
GENDER 2×Q_FOA_2 ver Q_FOA_4	1.07	0.15	0.22	0.640
GENDER 2×Q_FOA_3 ver Q_FOA_4	0.81	0.15	1.30	0.254
Vocational education×Q_FOA_1 ver Q_FOA_0	0.75	0.27	0.64	0.422
Vocational education×Q_FOA_2 ver Q_FOA_0	0.66	0.25	1.22	0.270
Vocational education×Q_FOA_3 ver Q_FOA_0	0.42	0.16	5.30	0.021
Vocational education×Q_FOA_4 ver Q_FOA_0	0.81	0.26	0.42	0.519
Vocational education×Q_FOA_1 ver Q_FOA_2	0.66	0.25	1.22	0.270
Vocational education×Q_FOA_1 ver Q_FOA_3	1.78	0.45	5.20	0.023
Vocational education×Q_FOA_2 ver Q_FOA_3	1.56	0.45	2.39	0.122
Vocational education×Q_FOA_1 ver Q_FOA_4	0.93	0.19	0.13	0.718
Vocational education×Q_FOA_2 ver Q_FOA_4	0.66	0.25	1.22	0.270
Vocational education×Q_FOA_3 ver Q_FOA_4	0.42	0.16	5.30	0.020
Q_OCC_1×age ≤60 ver age >60	2.96	0.04	42.50	<0.001
Q_OCC_1×GENDER1 ver GENDER2	1.41	0.03	6.77	0.009
Q_OCC_1×vocational ver higher education	2.13	0.05	15.77	<0.001
Higher education×age ≤60 ver >60	1.78	0.07	4.01	0.045

In Model 2, the significant interactions were Q_FOA×gender; Q_FOA×education and the interactions between the variables from the data set: Q_OCC×age, Q_OCC×gender, Q_OCC× education, and age×education. A significant interaction of Q_FOA×gender means that there are differences by gender in the frequency with which individuals prefer different organisational forms of forest associations. Among females, the frequency of choosing the third and fourth forms of organization was 93% (1/0.52) and 56% (1/0.64) lower, respectively, than among the undecided (Table 6). Among women, the first form of association was more common than the second, third and fourth forms by 53%, 102%, and 64%, respectively. Among men, there were similarly significant associations between the choice of association forms with the frequency of choosing the third form of association being 93% (1/0.52) higher than the undecided and the percentage choosing the fourth form being 56% (1/0.64) higher than the undecided. Among men, the choice of the first form was about half as large (1/2.2=0.49) as that of the third form and about two-thirds smaller than the choice of the second form.

The significant interaction of Q_FOA×education indicates an uneven explanation of association forms as a function of education (Table 6). Significant differences occurred between the choice of the first and third form. Among respondents with schooling up to and including secondary school, the frequency of responses to the first form of association was 78% higher than among those who preferred the third form. Among respondents with higher school education who

chose the first form, 56% (1/1.78) of respondents chose the third form. Respondents with higher education who chose the third form again accounted for a 2.3 times higher percentage than the undecided (1/0.42), while this ratio was reversed in the group of respondents with secondary education with the frequency with which the third form of association organization was chosen was 42% of the frequency of the undecided.

Interactions of variables from the data show that individuals leading households of pre--retirement age (≤60) form a group almost three times as large (2.96) as individuals leading households over 60. There were 41% more males than females managing a farm, while those managing a farm with secondary education constituted more than twice as many individuals (2.13) as those managing a farm with higher education. In addition, respondents with higher education up to the age of 60 formed a group 78% larger than respondents with higher education over the age of 60.

Discussion

The process of creating social units that manage forests is influenced by a variety of structural factors including the following: the forest area and its distance from the owner's home, the goals of the owners, and the influence of the social environment (von Willert and Krott, 2019). Due to the complexity of these phenomena, there is not yet a theoretical concept that attempts to integrate all the important differing factors in a way that can explain the behaviour of forest owners. One of the most important factors, however, seems to be the lack of financial support for these processes (Hrib *et al*., 2018). This factor also plays a major role in Poland, although it should be noted that the problem presented has not yet been studied in detail in Poland. The second most important factor seems to be the lack of regulations enabling the establishment of forest communities or the limited possibilities (the income from the association's business activities is used to achieve its statutory objectives and cannot be distributed among its members) for forest associations to run a business (Wysocka-Fijorek, 2013).

The results presented complement the general questions raised by research on social innovation in rural areas (Ludvig *et al*., 2018) which in this case refer to the willingness to mobilise social capital or involve other organisations in the process of establishing forest associations. For the first time in Poland, the results of social research on a representative random sample of forest owners (farmers) confirmed the high level of interest in creating organised forms of forest management with almost 89% of respondents expressing interest. This result is confirmed in American research according to which 36% of respondents would also be willing to consider joint planning of future forest management with their neighbours (Vokoun *et al*., 2010). Interestingly, this organizational model points to associations of owners who can be described as 'economically committed,' *i.e.*, who see an economic benefit (Helles *et al*., 2010; Deuffic *et al*., 2018). These expectations are consistent with the results of previous studies in Poland (Gołos, 2011, 2008) according to which the most important benefits of involvement in associations are the reduction of management costs (31% of respondents) and the joint sale of wood (22% of respondents). The results of a survey conducted on a large, random and representative sample of 1,200 Polish forest owners (Gołos, 2011) confirm the expectations regarding the interest in a reduction of management costs and an increase of revenues from wood sales. Based on this survey, 54% of respondents indicated willingness to jointly manage forests in order to reduce forest management costs, 49% of respondents indicated sale of wood raw materials, and 35% of respondents expressed willingness to actively participate in setting the forest tax. In these surveys, owners also pointed to economic initiatives

related to wood processing (23% of respondents) or other activities to obtain a joint certificate for private forests (22%). In addition to the legal shortcomings, the factors that limit association formation unfortunately also include the limited historical experience with joint management and the risk that the costs arising from participation in a FOA are higher than the income generated from being part of it.

The issue of creation and functioning of common forms of management by non-industrial forest owners is widely discussed in the literature. The specifics of this problem in Estonia are presented by Põllumäe *et al.* (2014), in the Czech Republic by Hrib *et al.* (2018), detailed information on the development and current situation of FOA in selected countries of Central and Eastern Europe is provided by Sarvašová *et al.* (2015), the situation in Bosnia and Herzegovina, Croatia, Macedonia and Serbia is discussed by Glück *et al.* (2010), and the situation in Baden-Württemberg was discussed by Kilham *et al.* (2019). Useful information on possible organisational models and an assessment of the scope of joint initiatives within private forest owner organisations in Spain is provided by Górriz-Mifsud *et al.* (2019). Despite cultural and social differences, as well as different conditions of forest management, experiences in Europe show that any form of joint management and/or joint governance can be a source of benefits for owners including improving the profitability of forests thanks to economies of scale (Elyakime and Cabanettes, 2009; Aruga *et al.*, 2013; Koch *et al.*, 2013; Wysocka-Fijorek, 2013; Wysocka-Fijorek and Kaliszewski, 2017). In addition, Swedish forest owners would consider associations as an institution that could be responsible for the planning, management, and information flow between forest owners (Bjärstig and Kvastegård, 2016). This applies to facilitating market access for suppliers of small volumes of wood which is difficult due to the limited possibilities of using effective logistics and technology in wood harvesting (felling, harvesting and export) (Hansmann *et al.*, 2016). This is confirmed by the results of Aurenhammer (2017) who identifies the most important goals of Bavarian associations such as supporting wood marketing (16%), implementing joint logging and road building (15%), and close cooperation of forest management in consulting (11%). The willingness to harvest wood jointly with neighbours, *i.e.* to cooperate in some way, is confirmed by the results of Vokoun *et al.* (2010) according to which 44 % of respondents would use the forest in this way if the price of wood increased by 20 % as a result of joint harvesting.

Issues related to forest ownership and forest owner stakeholders are essential for the formulation and implementation of public policy (Sarvašová *et al.*, 2015). The source of such information is the results of forest owner typology which reveals the different goals and motivations of forest owners (economic and environmental) as well as their actual behaviour (logging or degree of participation in the formation and development of FOAs) (Weiss *et al.*, 2019a). Another issue is the diversity of goals and motives for forest ownership which has been noted in numerous survey-based studies to create typologies and classifications of forest owners (Mizaraite and Mizaras, 2005; Hujala *et al.*, 2013; Malovrh *et al.*, 2015; Silver *et al.*, 2015; Ficko *et al.*, 2019) or in the meta-analysis of studies on forest owner typology presented by Blanco *et al.* (2015) and Deuffic *et al.* (2018). These studies suggest that the strategy of recruiting owners for forest groups can be more targeted if the owner's level of education and the size of the forest property are taken into account (Van Gossum *et al.*, 2005).

When observing the preferences of forest owners regarding the choice of FOA forms in the cases we presented the aforementioned phenomenon could be observed. Younger people who are supported by the AEC, for example, would be willing to join an organisation not organised at this level if they were given the appropriate incentives. Older owners with smaller, less specialised operations would be more likely to join a community or district level organization.

When choosing their preferred FOA forms, the forest owners appear to have focussed primarily on the possibility of contact with each other and opted for association forms that enable active action at the local level. It appears that the way in which the association is managed at a central level is less important to forest owners than the possibility of local cooperation. Therefore, a form of association of forest owners that undertakes activities exclusively related to forest management at the local level and is responsible for shaping policy and representing the interests of small forest owners at higher organisational levels seems to be advantageous.

Conclusions

♣ The owners of private forests in Poland agree to organize into FOAs. The preferred form of FOA depends, among other things, on the intended use of the harvested wood, and the willingness to sell it as well as the gender, age, and education of the forest owner. The financial situation of the owner, on the other hand, plays no role.

♣ Owners who would like to sell the wood from their forest with the help of associations would like to do so in associations that are organised in communities (municipalities) that cooperate with each other at the district level or in three-level organizations (local, regional, and a central organization). Much less frequently, a group of owners see the possibility of supporting wood sales with the help of associations located at Agricultural Extension Centers or Chambers of Agriculture.

♣ Based on the analyses carried out, it can be concluded that the most advantageous solution would be the establishment of an association of owners at the community level and working together at the district (powiat) level in Poland which would allow forest owners to take various initiatives at the commune (local) level including the joint sale of wood.

♣ Top-down solutions (at the national level) are needed so that forest owners can organise themselves collectively and carry out forest management (including profit-making). The current legal provisions do not provide all the available possibilities to establish new forest communities that can carry out business activities.

♣ There is a need for action at the national, regional and local levels to promote the benefits of joint management. It would be beneficial to develop a system of incentives for forest owners in relation to FOA formation.

Authors' contribution

Conception – P.G., E.W.-F., literature review – E.W.-F, P.G., acquisition of data – P.G., E.W.-F., J.U., analysis and interpretation of data – J.U., E.W.-F., P.G.

Total: P.G. (40%), E.W.-F. (30%), J.U. (30%).

Conflicts of interest

All authors declare that they have no conflicts of interest.

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References

Andersson, M., Johansson, S., 2010. Human capital and the structure of regional export flows. *Technology in Society*, 32, 230-240. DOI: https://doi.org/10.1016/J.TECHSOC.2010.07.006.

Aruga, K., Hiyamizu, G., Nakahata, C., Saito, M., 2013. Effects of aggregating forests, establishing forest road networks, and mechanization on operational efficiency and costs in a mountainous region in Japan. *Journal of Forestry Research*, 24: 747-754. DOI: https://doi.org/10.1007/s11676-013-0414-1.

Aurenhammer, P.K., 2017. Forest land-use governance and change through Forest Owner Associations – Actors' roles and preferences in Bavaria. *Forest Policy and Economics*, 85: 176-191. DOI: https://doi.org/10.1016/J.FORPOL.2017.09.017.

Aurenhammer, P.K., Koch, M., 2015. SIMWOOD – nachhaltige und innovative Mobilisierung von Holz. *AFZ--Der Wald*, 21.

Bishop, Y.M.M., Fienberg, S.E., Holland, P.W., 1975. Discrete multivariate analysis theory and practice. New York: Springer-Verlag, 559 pp. DOI: https://doi.org/10.1007/978-0-387-72806-3.

BULiGL, 2022. Wielkoobszarowa inwentaryzacja stanu lasów. Biuro Urządzania Lasu i Geodezji Leśnej, Warszawa. Available from: https://www.bdl.lasy.gov.pl/portal/wisl. [accessed: 06.06.2023].

Bjärstig, T., Kvastegård, E., 2016. Forest social values in a Swedish rural context: The private forest owners' perspective. *Forest Policy and Economics*, 65: 17-24. DOI: https://doi.org/10.1016/J.FORPOL.2016.01.007.

Blanco, V., Brown, C., Rounsevell, M., 2015. Characterising forest owners through their objectives, attributes and management strategies. *European Journal of Forest Research*, 134: 1027-1041. DOI: https://doi.org/10.1007/S10342-015-0907-X/METRICS.

Bowditch, E., Santopuoli, G., Binder, F., del Río, M., La Porta, N., Kluvankova, T., Lesinski, J., Motta, R., Pach, M., Panzacchi, P., Pretzsch, H., Temperli, C., Tonon, G., Smith, M., Velikova, V., Weatherall, A., Tognetti, R., 2020. What is climate-smart forestry? A definition from a multinational collaborative process focused on mountain regions of Europe. *Ecosystem Services*, 43: 101113. DOI: https://doi.org/10.1016/j.ecoser.2020.101113.

Deuffic, P., Sotirov, M., Arts, B., 2018. 'Your policy, my rationale'. How individual and structural drivers influence European forest owners' decisions. *Land Use Policy*, 79: 1024-1038. DOI: https://doi.org/10.1016/J.LANDUSEPOL.2016.09.021.

Elyakime, B., Cabanettes, A., 2009. How to improve the marketing of timber in France? *Forest Policy and Economics*, 11: 169-173. DOI: https://doi.org/10.1016/J.FORPOL.2009.01.001.

Fabra-Crespo, M., Rojas-Briales, E., 2015. Comparative analysis on the communication strategies of the forest owners' associations in Europe. *Forest Policy and Economics*, 50: 20-30. DOI: https://doi.org/10.1016/J.FORPOL.2014.06.004.

Ficko, A., Lidestav, G., Ní Dhubháin, Á., Karppinen, H., Zivojinovic, I., Westin, K., 2019. European private forest owner typologies: A review of methods and use. *Forest Policy and Economics*, 99: 21-31. DOI: https://doi.org/10.1016/j.forpol.2017.09.010.

Freeman, D.H., 1987. Applied categorical data analysis. CRC Press, 336 pp.

Glück, P., Avdibegović, M., Čabaravdić, A., Nonić, D., Petrović, N., Posavec, S., Stojanovska, M., 2010. The preconditions for the formation of private forest owners' interest associations in the Western Balkan Region. *Forest Policy and Economics*, 12: 250-263. DOI: https://doi.org/10.1016/J.FORPOL.2010.02.001.

Gołos, P., 2008. Stan lasów prywatnych w Polsce. (The status of privately owned forests in Poland). *Leśne Prace Badawcze*, 69 (4): 321-335.

Gołos, P., 2011. Private forests in Poland – The results of the questionnaire surveys covering the network of test forest holdings. *Folia Forestalia, Series A – Forestry*, 51 (3): 25-42. DOI: https://doi.org/10.5281/zenodo.30730.

Gołos, P., Ukalska, J., Wysocka-Fijorek, E., Gil, W., 2021a. How much is the abandonment of forest management in private forests worth? A case of Poland. *Forests*, 12 (9): 1138. DOI: https://doi.org/10.3390/F12091138.

Gołos, P., Wysocka-Fijorek, E., Gil, W., Wójcik, R., 2021b. Jakość nadzoru nad gospodarką leśną w lasach prywatnych oraz wiedza ich właścicieli w zakresie gospodarki leśnej. (Quality of forest management supervision in private forests and the knowledge of their owners in the field of forest management). *Sylwan*, 165: 91-100. DOI: https://doi.org/10.26202/sylwan.2020129.

Górriz-Mifsud, E., Olza Donazar, L., Montero Eseverri, E., Marini Govigli, V., 2019. The challenges of coordinating forest owners for joint management. *Forest Policy and Economics*, 99: 100-109. DOI: https://doi.org/10.1016/j.forpol.2017.11.005.

Haeler, E., Bolte, A., Buchacher, R., Hänninen, H., Jandl, R., Juutinen, A., Kuhlmey, K., Kurttila, M., Lidestav, G., Mäkipää, R., Rosenkranz, L., Triplat, M., Vilhar, U., Westin, K., Schueler, S., 2023. Forest subsidy distribution in five European countries. *Forest Policy and Economics*, 146: 102882. DOI: https://doi.org/10.1016/J.FORPOL.2022.102882.

Hansmann, R., Kilchling, P., Seeland, K., 2016. The effects of regional forest owner organizations on forest management in the Swiss Canton of Lucerne. *Small-scale Forestry*, 15: 159-177. DOI: https://doi.org/10.1007/S11842-015-9315-9.

Häyrinen, L., Mattila, O., Berghäll, S., Närhi, M., Toppinen, A., 2017. Exploring the future use of forests: Perceptions from non-industrial private forest owners in Finland. *Scandinavian Journal of Forest Research*, 32: 327-337. DOI: https://doi.org/10.1080/02827581.2016.1227472.

Helles, F., Nielsen, P.S., Leppänen, J., 2010. Finnish family forest owner 2010 survey. Scandinavian Forest Economics: Proceedings of the Biennial Meeting of the Scandinavian Society of Forest Economics 2010, pp. 184-195. DOI: https://doi.org/10.22004/AG.ECON.199260.

Hirsch, F., Korotkov, A., Wilnhammer, M., 2007. Private forest ownership in Europe. *Unasylva*, 58: 23-25. Available from: https://www.fao.org/3/a1346e/a1346e06.pdf [accessed: 10.05.2022].

Hogl, K., Pregernig, M., Weiss, G., 2005. What is new about new forest owners? A typology of private forest ownership in Austria. *Small-scale Forest Economics, Management and Policy*, 4: 325-342. DOI: https://doi.org/10.1007/s11842-005-0020-y.

Hrib, M., Slezová, H., Jarkovská, M., 2018. To join small-scale forest owners' associations or not? Motivations and opinions of small-scale forest owners in three selected regions of the Czech Republic. *Small-scale Forestry*, 17: 147-164. DOI: https://doi.org/10.1007/s11842-017-9380-3.

Hujala, T., Kurttila, M., Karppinen, H., 2013. Customer segments among family forest owners: Combining ownership objectives and decision-making styles. *Small-scale Forestry*, 12: 335-351. DOI: https://doi.org/10.1007/s11842-012-9215-1.

Kilham, P., Hartebrodt, C., Schraml, U., 2019. A conceptual model for private forest owners' harvest decisions: A qualitative study in southwest Germany. *Forest Policy and Economics*, 106: 101971. DOI: https://doi.org/10.1016/j.forpol.2019.101971.

Koch, S.P., Schwarzbauer, P., Stern, T., 2013. Monthly wood supply behavior of associated forest owners in Austria – Insights from the analysis of a micro-econometric panel. *Journal of Forest Economics*, 19: 331-346. DOI: https://doi.org/10.1016/J.JFE.2013.06.003.

Krzyżanowska, K., 2017. Organizowanie się rolników w grupy i organizacje producentów w obszarze rolnictwa. (Farmers organizing into groups and producer organizations in the area of agriculture). *Zeszyty Naukowe SGGW – Ekonomika i Organizacja Gospodarki Żywnościowej*, 119: 141-153. DOI: https://doi.org/10.22630/EIOGZ.2017.119.30.

Kvarda, M.E., 2004. 'Non-agricultural forest owners' in Austria – A new type of forest ownership. *Forest Policy and Economics*, 6: 459-467. DOI: https://doi.org/10.1016/J.FORPOL.2004.01.005.

Lawrence, A., Deuffic, P., Hujala, T., Nichiforel, L., Feliciano, D., Jodlowski, K., Lind, T., Marchal, D., Talkkari, A., Teder, M., Vilkriste, L., Wilhelmsson, E., 2020. Extension, advice and knowledge systems for private forestry: Understanding diversity and change across Europe. *Land Use Policy*, 94: 104522. DOI: https://doi.org/10.1016/j.landusepol.2020.104522.

Lieberherr, E., Deuffic, P., Jandl, R., Foldal, C., Lidestav, G., Westin, K., Weiss, G., Živojinović, I., Pecurul--Botines, M., Koller, N., Haltia, E., Sarvašová, Z., Sarvaš, M., Curman, M., Zabel, A., Riedl, M., Jarský, V., Wilkes-Allemann, J., 2021. Communication campaigns to engage (non-traditional) forest owners: A European perspective. *Forest Policy and Economics*, 133: 102621. DOI: https://doi.org/10.1016/J.FORPOL.2021.102621.

Ludvig, A., Weiss, G., Sarkki, S., Nijnik, M., Živojinović, I., 2018. Mapping European and forest related policies supporting social innovation for rural settings. *Forest Policy and Economics*, 97: 146-152. DOI: https://doi.org/10.1016/J.FORPOL.2018.09.015.

Malovrh, Š.P., Nonić, D., Glavonjić, P., Nedeljković, J., Avdibegović, M., Krč, J., 2015. Private forest owner typologies in Slovenia and Serbia: Targeting private forest owner groups for policy implementation. *Small-scale Forestry*, 14: 423-440. DOI: https://doi.org/10.1007/s11842-015-9296-8.

Mizaraite, D., Mizaras, S., 2005. Afforestation of agriculture land as a tool of rural forestry development in Lithuania. Enviromental Science, Economics, Sociology, pp. 305-311. Available from: https://www.fao.org/fileadmin/user_upload/rome2007/docs/Afforestation_agriculture_land_Lithuania.pdf [accessed: 06.06.2023].

Moyes, D., Ferri, P., Henderson, F., Whittam, G., 2015. The stairway to Heaven? The effective use of social capital in new venture creation for a rural business. *Journal of Rural Studies*, 39: 11-21. DOI: https://doi.org/10.1016/j.jrurstud.2015.02.004

Niskanen, A., Pettenella, D., Slee, B., 2007. Barriers and opportunities for the development of small-scale forest enterprises in Europe. *Small-scale Forestry*, 64 (6): 331-345. DOI: https://doi.org/10.1007/S11842-007-9035-X.

Põllumäe, P., Korjus, H., Kaimre, P., Vahter, T., 2014. Motives and incentives for joining forest owner associations in Estonia. *Small-scale Forestry*, 13: 19-33. DOI: https://doi.org/10.1007/S11842-013-9237-3/.

Põllumäe, P., Lilleleht, A., Korjus, H., 2016. Institutional barriers in forest owners' cooperation: The case of Estonia. *Forest Policy and Economics*, 65: 9-16. DOI: https://doi.org/10.1016/J.FORPOL.2016.01.005.

Primmer, E., 2011. Policy, project and operational networks: Channels and conduits for learning in forest biodiversity conservation. *Forest Policy and Economics*, 13: 132-142. DOI: https://doi.org/10.1016/J.FORPOL.2010.06.006.

Sarvašová, Z., Ali, T., Đorđević, I., Lukmine, D., Quiroga, S., Suárez, C., Hrib, M., Rondeux, J., Mantzanas, K.T., Franz, K., 2019. Natura 2000 payments for private forest owners in Rural Development Programmes 2007-2013 – A comparative view. *Forest Policy and Economics*, 99: 123-135. DOI: https://doi.org/10.1016/j.forpol.2017.08.019.

Sarvašová, Z., Zivojinovic, I., Weiss, G., Dobšinská, Z., Drăgoi, M., Gál, J., Jarský, V., Mizaraite, D., Põllumäe, P., Šálka, J., Schiberna, E., Šišák, L., Wolfslehner, B., Zalite, Z., Zalitis, T., 2015. Forest owners associations in the Central and Eastern European Region. *Small-scale Forestry*, 14: 217-232. DOI: https://doi.org/10.1007/S11842-014-9283-5/.

SAS/STAT ® 14.3 User's Guide High-Performance Procedures, 2017. Available from: https://support.sas.com/documentation/onlinedoc/stat/143/stathpug.pdf. [accessed: 04.06.2022].

Schlüter, A., 2007. Institutional change in the forestry sector-The explanatory potential of New Institutional Economics. *Forest Policy and Economics*, 9: 1090-1099. DOI: https://doi.org/10.1016/J.FORPOL.2006.11.001.

Schmithüsen, F., Hirsch, F., 2010. Private forest ownership in Europe, Geneva Timber and Forest Study Paper 26. Geneva: United Nations Economic Commission for Europe/Food and Agriculture Organization of the United Nations.

Silver, E.J., Leahy, J.E., Kittredge, D.B., Noblet, C.L., Weiskittel, A.R., 2015. An evidence-based review of timber harvesting behavior among private woodland owners. *Journal of Forestry*, 113: 490-499. DOI: https://doi.org/10.5849/JOF.14-089.

Stoettner, E.M., Ní Dhubháin, Á., 2019. The social networks of Irish private forest owners: An exploratory study. *Forest Policy and Economics*, 99: 68-76. DOI: https://doi.org/10.1016/j.forpol.2017.09.008.

Stokes, M.E., Davis, Ch.S., Koch, G.G., 2012. Categorical data analysis using SAS, Third Edition. North Carolina: SAS Institute Inc., 589 pp.

Størdal, S., 2004. Efficient timber pricing and purchasing behavior in forest owners' associations. *Journal of Forest Economics*, 10: 135-147. DOI: https://doi.org/10.1016/J.JFE.2004.07.003.

Upton, V., Ryan, M., Heanue, K., Dhubháin, N., 2019. The role of extension and forest characteristics in understanding the management decisions of new forest owners in Ireland. *Forest Policy and Economics*, 99: 77-82. DOI: https://doi.org/10.1016/j.forpol.2017.09.016.

Urquhart, J., Courtney, P., 2011. Seeing the owner behind the trees: A typology of small-scale private woodland owners in England. *Forest Policy and Economics*, 13: 535-544. DOI: https://doi.org/10.1016/J.FORPOL.2011.05.010.

Ustawa, 1989. Ustawa z dnia 7 kwietnia 1989 r. Prawo o stowarzyszeniach. Dz.U. 1989 nr 20 poz. 104. Available from: https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdu19890200104 [accessed: 06.06.2023].

Ustawa, 1995. Ustawa z dnia 14 grudnia 1995 r. o izbach rolniczych. Dz.U. z 2022 r. poz. 183. Available from: https://isap.sejm.gov.pl/isap.nsf/download.xsp/WDU20220000183/O/D20220183. [accessed: 06.06.2023].

Ustawa, 2004. Ustawa z dnia 16 kwietnia 2004 r. o ochronie przyrody. Dz.U. 2004 nr 92 poz. 880. Available from: https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=wdu20040920880 [accessed: 06.06.2023].

Van Gossum, P., Luyssaert, S., Serbruyns, I., Mortier, F., 2005. Forest groups as support to private forest owners in developing close-to-nature management. *Forest Policy and Economics*, 7: 589-601. DOI: https://doi.org/10.1016/j.forpol.2003.10.003.

Vokoun, M., Amacher, G.S., Sullivan, J., Wear, D., 2010. Examining incentives for adjacent non-industrial private forest landowners to cooperate. *Forest Policy and Economics*, 12: 104-110. DOI: https://doi.org/10.1016/j.forpol.2009.08.008.

Weiss, G., Lawrence, A., Hujala, T., Lidestav, G., Nichiforel, L., Nybakk, E., Quiroga, S., Sarvašová, Z., Suarez, C., Živojinović, I., 2019a. Forest ownership changes in Europe: State of knowledge and conceptual foundations. *Forest Policy and Economics*, 99: 9-20. DOI: https://doi.org/10.1016/J.FORPOL.2018.03.003.

Weiss, G., Lawrence, A., Lidestav, G., Feliciano, D., Hujala, T., Sarvašová, Z., Dobšinská, Z., Živojinović, I., 2019b. Research trends: Forest ownership in multiple perspectives. *Forest Policy and Economics*, 99: 1-8. DOI: https://doi.org/10.1016/J.FORPOL.2018.10.006.

Willert, M., Krott, M., 2019. IT-based mobilization of milieu-bound forest owners: Bi-production of innovative tools by research and practice. *Forest Policy and Economics*, 104: 139-145. DOI: https://doi.org/10.1016/J.FORPOL.2019.04.011.

Wysocka-Fijorek, E., 2013. Koncepcja prywatno-państwowej spółki leśnej. (Concept of private-public forest company). *Sylwan*, 157 (11): 803-810. DOI: https://doi.org/10.26202/sylwan.2013044.

Wysocka-Fijorek, E., Gil, W., Gołos, P., 2020a. Realizacja zalesień w latach 2001-2018 w różnych regionach Polski. (Afforestation in 2001-2018 in various regions of Poland). *Sylwan*, 164 (9): 726-735. DOI: https://doi.org/10.26202/sylwan.2020059.

Wysocka-Fijorek, E., Gil, W., Gołos, P., Dobrowolska, E., 2020b. Who applies for afforestation subsidies? Analysis of the age of beneficiaries of the Rural Development Program from 2004-2018. *Folia Forestalia, Series A – Forestry*, 62: 279-287. DOI: https://doi.org/10.2478/ffp-2020-0027.

Wysocka-Fijorek, E., Kaliszewski, A., 2017. Przyczyny i kierunki przeklasyfikowywania gruntów nieleśnych na leśne w świetle badań ankietowych. (Causes and directions of reclassification of non-forest lands into forest lands according to the survey results). *Sylwan*, 161 (6): 460-466. DOI: https://doi.org/10.26202/sylwan.2017041.

STRESZCZENIE

Preferencje prywatnych właścicieli lasów dotyczące członkostwa w zrzeszeniach właścicieli lasów (FOA)

Zmiany społeczne i kulturowe, które mają miejsce w społeczeństwach europejskich od ponad 30 lat, dotyczą również lasów i gospodarki leśnej. Jedną z takich zmian jest trwały proces pokoleniowej zmiany właścicieli lasów. Sposobem rozwiązania tego problemu jest np. tworzenie grup właścicieli, które mogą zapewnić transfer wiedzy wśród swoich członków. Niniejsza publikacja dostarcza wyników umożliwiających wskazanie preferowanego sposobu organizacji zrzeszeń w warunkach Polski, jak również zawiera wyniki typologii losowej reprezentatywnej próby właścicieli lasów (rolników) ze względu na preferowaną formę organizacyjną zrzeszeń, uwzględniając aspekty gospodarki surowcem drzewnym, jak również zmienne społeczne właścicieli (płeć, wiek i wykształcenie).

Celem niniejszego badania jest określenie preferencji prywatnych właścicieli lasów odnośnie do członkostwa w organizacjach zrzeszających właścicieli lasów (FOA). Cel został osiągnięty w bezpośrednich badaniach ankietowych reprezentatywnej ogólnopolskiej próby rolników będących właścicielami lasów. Ankietowanym właścicielom lasów zaproponowano wskazanie jednego z czterech zdefiniowanych modeli organizacji zrzeszeń leśnych w Polsce, pozostawiając wskazanie własnej propozycji jako piątą możliwość. Uzyskany rozkład preferencji analizowano z wykorzystaniem dwóch modeli log-liniowych. Pozwoliły one wyjaśnić zróżnicowanie częstości wskazań respondentów na zaproponowane modele organizacji zrzeszeń leśnych w powiązaniu z wybranymi zmiennymi merytorycznymi (odpowiedziami na trzy zamknięte pytania ankiety) oraz zmiennymi z metryczki ankietowanych (wiek, płeć i wykształcenie).

Przedstawione w publikacji deklaratywne opinie właścicieli lasów identyfikujące oraz wyjaśniające preferencje wobec form organizacyjnych właścicieli lasów to pierwsza tego rodzaju informacja umożliwiająca wnioskowanie dla całej populacji rolników będących właścicielami lasów w Polsce (tab. 1). Właściciele lasów prywatnych w Polsce deklarują chęć organizowania się w FOA. Preferowana forma FOA zależy m.in. od przeznaczenia pozyskiwanego drewna, chęci jego sprzedaży oraz płci, wieku i wykształcenia właściciela lasu. Nie ma natomiast znaczenia sytuacja materialna właściciela (tab. 2).

Właściciele, którzy planują sprzedaż drewna ze swojego lasu z pomocą zrzeszeń, chcieliby to robić w zrzeszeniach zorganizowanych w gminach, które współpracują ze sobą na poziomie powiatów, lub w zbudowanych z podziałem trójstopniowym (poziom lokalny, regionalny oraz jedna organizacja centralna) (tab. 3). Właściciele lasów (tab. 4), którzy deklarowali sprzedaż surowca drzewnego z pomocą stowarzyszeń, wskazywali częściej niż osoby niezdecydowane na: a) zrzeszenia skupiające właścicieli w gminie i współpracujące na poziomie powiatu (2,4 razy częściej), b) organizację zrzeszeń w formie jednej niezależnej organizacji centralnej i oddziałów lokalnych oraz regionalnych (2,3 razy częściej), c) zrzeszenia powstające przy Ośrodkach Doradztwa Rolniczego (1,7 razy częściej), d) Izby Leśne właścicieli leśnych zorganizowane na wzór Izb Rolniczych (1,8 razy częściej). Wybór preferowanych form zrzeszania się właścicieli lasów zależał również od takich czynników jak płeć, wykształcenie czy prowadzenie gospodarstwa rolnego (tab. 5 i 6).

Najkorzystniejszym rozwiązaniem byłoby powstanie w Polsce zrzeszeń właścicieli lasów (FOA) na poziomie gminy, współpracujących ze sobą na poziomie powiatu, które umożliwiałyby właścicielom lasów podejmowanie różnych inicjatyw na poziomie gminy (poziom lokalny), w tym także wspólnej sprzedaży drewna.