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NEEDED SUPPORT FOR FEMALE PRIVATE FOREST OWNERS (SOME RESULTS OF A SURVEY OF DANUBE COUNTRIES)⁴

The aim of the study is to identify needed support for increasing the productivity of private forestry, focusing on the decision-making process in the case of women – private forestry owners in countries of the Danube region. The data used is from a survey in the frame of the project “Forest in Women’s Hands”.

The methods applied are Regression Ordinary Least Squares (OLS) model and logistic regressions. Statistical correlations are measured to check the impact of some factors affecting female management decisions in turn to outline the needed support.

The results, along with others, show that women involve friends, family members, and spouses in the forest to support them in decision-making, but the requested support is not directed explicitly to increasing productivity. The support provided by the forest associations and government institutions is not effective enough for forest utilisation and productivity. The conclusion that could be drawn is that the needed support is training the private female owners. On the other hand, the study identifies some differences between countries with prevailing private ownership and others.

*Keywords: Female forest owners; questionnaire; forest management; decision-making
JEL: M11; Q23*

1. Introduction

According to data from Eurostat, the EU accounts for almost 5% of the total forests in the world by calculating 159 million hectares of forests (Eurostat, 2022). For the countries in the Danube Region, the share of forest cover is between 30% and 63% (Georgieva et al., 2021, p. 286). In 2019 the Gross value added of the forestry and logging industry represented 0.18

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% of the EU GDP, which according to Eurostat data, is 15 % less than the share in 2000 (Eurostat, 2020). The loss of competitiveness is considered by Chobanova (2016, p. 61) as a factor leading to some negative consequences, such as slowing down the economic growth and inefficient use of timber in a country.

Women's participation in forestry is seen as a factor in improving governance, sustainable use and management of forests, and enhancing livelihood benefits and opportunities (Coleman, Mwangi, 2013, p. 193). They have an important role in forest protection and sustainable forest management (Nhem, Lee, 2019, p. 106). For the purposes of utilisation and sustainability, forestry ownership has a significant impact (Weiss et al., 2019). The link between ownership and forest management is essential for improving competitiveness and economic productivity in forestry. However, female participation in forestry could be divided into:

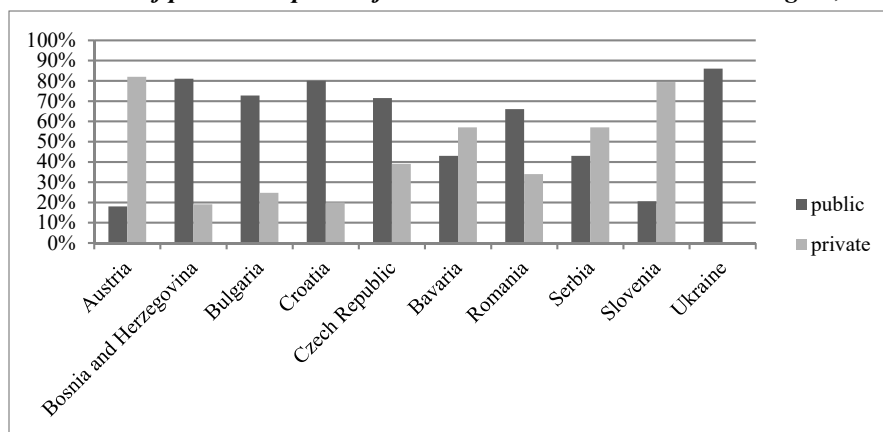
- (1) female professionals who work in the sector – as administrators, managers, foresters and etc.;
- (2) female professionals who work in the sector and own private forests;
- (3) female who has a private forest but has no professional background in the field of forestry.

Those target groups have differences in their managerial behaviour primarily related to the knowledge and skills they have from their professional forestry background. Without belittling the importance of specific forest knowledge, the main target group of the present research is females owning a private forest without having a professional background and, thus, specific utilisation skills. The main focus is to outline some key factors affecting women who have private forests when they take a decision related to the management of the land and its utilisation. Even though the theme is not new, there is not much research related to female management of private forests, especially in some of the Danube region countries like Bulgaria, where there is no data for a previous study in the field.

In terms of ownership of Europe's forests, about 53.5% are public, while 46.5% are private forests. Most of the private forests are small-scale of size class from 11 to 500 ha. (Forest Europe, 2020). There is a distinction between public (state and municipal forests) and privately owned forests (by individuals and legal persons such as churches, NGOs, and communities) in Danube Region countries (see Figure 1). Bavaria (Germany), Slovenia, and Austria are the only countries showing data that the bulk of the forests is privately owned.

The data from the project does not meet the reliability criteria to be used for the assumption of state-of-the-art conclusions. However, this data could be used to identify new problems in the sector. The common ones that concern managers are market prices, land-owner type, bequest motives, forest property size, environmental preferences, and management objectives.

Figure 1. Share of public and private forests in countries in the Danube Region, 2021 (%)



Source: Bavarian State Ministry of Agriculture, Food and Forestry (StMELF), 2021; Hastreiter, H., 2020; Ministry of Agriculture, Water Management and Forestry of the Federation of Bosnia and Herzegovina; Executive Forest Agency in Bulgaria; Eurostat; National Strategy for Development of the Forest Sector 2013-2020; SFS, 2021; State Agency of Forest Resources of Ukraine, 2021; RAS; National Institute of Statistics of Romania, 2021; General Forest Management Plan of Croatia; Croatian Bureau of Statistics; State Administration of Land Surveying and Cadastre in the Czech Republic; UNECE, 2020; UNECE, 2018.

There is no official data in some of the Danube Region countries, regarding the share of female forest owners. Some assumptions could be drawn taking into account the ownership structure by countries (see Figure 1):

- There is a distinction between public and privately owned forests in the analysed countries. The public includes state and municipal forests, while private forests are owned by individuals and legal entities such as churches, NGOs, cooperatives and etc. The data show that the majority of the forest lands are public, and particularly state-owned forests (which is prevalent in many former socialist countries).
- The bulk of forests in Slovenia and Austria are privately owned. In Romania and Serbia, the process of restituting public forests to private entities was less transformational. There, however, logging and wood processing have to turn into key economic activities in rural areas. In the Czech Republic, the church has become a major beneficiary of forest restitution, while private individuals own 17.5%.
- In the Danube Region, the privatisation of forests affects the nature of work in the forest sector. This, in hand, reflects to the decision-making process and the needed support from internal and external factors. The changes he management (public management reforms, ecosystem-based management and etc.) have changed the way male and female are engaged in it and work with forests and forestry.

These assumptions have a significant impact on women owning forests as the private forest land is less and mostly small-scale. In some Danube countries, like Bulgaria, the forests are fragmented which is an additional obstacle to female wanting to manage forests and live near big cities.

Taking the above considerations into account, according to recent project data (Georgieva et al., 2021, p. 293), the share of women owning private forests in some of the Danube countries is highest in Slovenia (35%), followed by Bavaria (31%), Czech Republic (30%) and Austria (23%). The presented data is based on official data from the Eurostat, Statistical institutions of the targeted countries, and own calculations of the project team members from reliable national sources such as Public reports of the State Agencies and other official reports. Female forest owners in those countries have smaller parcels of forests, primarily between 1 and 2 ha up to 5 ha. Still, the sector is considered male-dominated, which negatively affects female participation in it (Georgieva et al., 2021). Lower participation of women in forestry is confirmed in other European countries, including Bulgaria as well (Food and agriculture organisation of the United Nations, 2006, p. 13). However, the stated studies focus only on female professional participation, gender equality issues, and the motivation for working in forest administration (legal, social and economic) and they are not focused on female private forest management.

According to Eggers et al. (2014, p. 1696), “an increase in the share of female forest owners could lead to a change in forest management”. According to the same authors, the size of the forest is the most important factor in terms of management strategy. In this respect, improving women’s participation in forestry and supporting the more active role of female forest owners, could improve the competitiveness of the forest-based sector. Males and female forest owners have different values and opinions in terms of forest decision-making and business income opportunities (Umaerus et al., 2019). This makes the question regarding the factors influencing female forest utilisation and managerial decisions still debatable.

The main goal of the study is to outline and analyse some factors (in terms of involved stakeholders and needed tangible and intangible support) that affect women’s ownership, which has a key role in forest utilisation and managerial decisions. The subject of the analysis is female – private forest owners in some countries in the Danube Region, more precisely – Slovenia, Austria, Croatia, Czech Republic, Bulgaria, and Bavaria (Germany). The adopted research methods are logical, deductive, and comparative methods. Primary data is presented from the Fem4Forest project with information from online questionnaires. The main authors’ hypothesis is that throughout a combination of external and internal factors, women are more engaged in decision-making when it comes to the utilisation and productivity of their forest as forest owners. Even though the support of relatives and friends has influence over women’s decisions, it has not had a significant impact in terms of forest management. As main female managerial goals are harvesting, recreation and scientific use of the forests. The main research tasks are:

- To outline specific internal and external factors affecting the managerial decisions of women in terms of forest productivity and utilisation.
- Throughout the use of the Regression Ordinary Least Squares (OLS) model and logistic regressions to check the statistical relationships between the selected factors and the managerial decisions of women to utilise their forests.

The logical construction of the study begins with a literature review related to some internal and external factors affecting forest management, where specific variables are outlined. The

articles continue by presenting information on the methodology used, collected data, results, and conclusions.

2. Literature Review

Managerial decisions of the private forest owners depend mainly on factors related to market prices, land-owner type, bequest motives, forest property size, environmental preferences, and management objectives. In addition, socio-demographic and forest management characteristics as cited as factors influencing forest management (Kuuluvainen et al., 1996; Novais, Canadas, 2010; Poje et al., 2016). According to Beach et al. (2005), there are four main categories influencing forest management behaviour-market drivers (where timber price has the most influence), policy variables (regulatory instruments and information), owner characteristics (income, education level, age, and owner proximity), and plot and resource conditions (property size and growing stock). It is believed that younger forest owners are more active when managing their forest (Lidestav, Ekström, 2000) as well as those who have bought it rather than inherited it (Eriksson, 2008). However, newly forest owners have less education and skills related to forest management and because of that, they outsource the forest work to companies or become members of forest owners' associations (UNECE, 2018).

The objective of owning the forest, financial and technical support to the implementation of innovative practices, the existence of illegal logging practices in the region, inheritance laws, information and advisory programs, and fragmentation of forests could also be stated as factors for the managerial decisions as well (UNECE, 2018). In this respect, recreation, family legacy, and nature protection are cited by some researchers as the main goals of the forest owners of small-scale forests (Eggers et al., 2014).

There are cases where the original forest owners, who got back their forest land, have issues carrying out the forest operations. In such cases, most of the forest operations in timber harvesting are carried out by contractors (Ambrušová, Šulek, 2014, p. 177). Such a possibility should not be neglected as it is a way of forest management as well. Furthermore, medium to large-private forest owners are usually outsourcing the management of their forests. According to Georgieva (2022), women often rely on the support provided by their family, close friends, and neighbours, rather than from experts, government institutions, and NGOs when it comes to managing their forests.

Taking into account the fact that the topic is still highly debated and without neglecting all factors having an impact on female forest management, the following factors will be more in-depth analysed in the current study:

- External and internal stakeholders affect the decision-making process of female private forest owners. For the purposes of the internal stakeholders, the ones with the strongest impact are chosen to be family members, husband (partner), and close friends. As external ones are – foresters of state forest administration, private foresters or forest professionals, and experts from forest associations or non-profit organisations.

- Needed support in terms of effective management of the forest by female private forest owners. In this respect, the following kind of support is under analyses that have a direct and indirect impact on the productivity and utilisation of forests – information and know-how (training, literature), used machinery, people to help with manual work, government funding, forest contractors, used networks, used information from Internet/social media, motivation, and support that comes from female role models, the knowledge offered by forest experts.

3. Used Methodology and Data Collection

Before the start of data collection, a methodology for identifying the target groups and their needs regarding effective and efficient forest management was made. The methodology is based on (1) country reports and (2) in-deep interviews and focuses group surveys. Based on the country reports, an overall picture of the situation in each country was presented that includes data for the land ownership, the share of women in the sector, forest-focused interest groups, public and private forest management, labour market, education, training, and initiatives supporting women participation in forestry (Georgieva et al., 2021). The second part of the methodology is based on the results and summarised key findings from the in-depth interviews with women forest owners and professionals, and an overview of the stakeholder roundtables made in each project's Danube country (Krajnc et al. 2021). Based on the stated data and project outcomes, a questionnaire for checking the hypothesis was developed and distributed among the target groups in the Danube countries under analysis. The following information presents some results of the mentioned questionnaires' survey.

3.1. Data collection

To identify female forest participation as female private forest owners and motivation for managerial decisions, an online survey was conducted using The Lime Survey tool. It is a part of the collection data activities related to the Fem4Forest project (DTP3-500-1.2 Fem4Forest). The survey was carried out during 22 March – 15 April 2021 based on snowball sampling. The target group is female private forest owners from the countries Austria, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Germany (Bavaria), Romania, Serbia, Slovenia, and Ukraine. However, for the purposes of the current study, only countries from the EU were selected for further analysis. The questionnaire used has five main sections related to:

- Socio-demographic data;
- Views of women regarding female participation in the sector;
- Forest condition and status;
- Forest use and management;
- Training needs and interests.

The collected data contains 185 answered questionnaires from female private forest owners. Taking into account the study limitations (only EU countries in the Danube Region to be a target group), 171 are the final number of analysed questionnaires. However, the demographic distribution of the female participating in the survey is uneven. The majority of female owners own less than 10 ha of forest land. Primarily women have inherited their forests or have them as a gift, which is very common in Austria, Bulgaria, and Germany. The majority of the respondents can be described as young as they were born between 1980 and 1999. Still, in some countries (like Bulgaria), female forest owners are mainly in the age group between 60 and 75.

3.2. Regression Ordinary Least Squares (OLS) model for harvesting as utilisation of self-owned forests

The present study uses a multifactor linear model to analyse the impact of different elements of forest management on their productivity. From data derived throughout the conducted survey, dichotomous variables were used as explanatory variables and the annual harvesting of round wood as a continuous dependent variable. As Abdullahi et al. (2015), multiple regression models are frequently implemented in different aspects of life. Similar to Næsset (2007), Bintang et al. (2001) and Ferede (2020) in the study was used multiple linear regression with dummy variables. It is very suitable for the data available and directly reflects the answers in the questionnaire. The model is following:

$$y_i = \sum_{j=1}^{15} \beta_j D_{i,j} + \beta_0 + e_i, \quad (1)$$

where:

y_i is the observation i for harvested m^3 round wood per 1 ha during the last 5 years;

β_j – the regression coefficient for each dummy variable D_j ;

e_i – the error term for each observation.

The dependent variable (y_i) presents the productivity that women in the sample achieved for the period of 5 years up to the moment of doing the questionnaire. The number of explanatory variables is 15. From all the questions were chosen these with two discrete answers Yes or No, which avoids the restrictive requirement of equal spacing of levels of the independent variables (Oyeka, Nwankwo, 2012) if any ordinal variables are used. The questions in the survey that are included as explanatory variables, in fact, are among the ones that directly explain the motivation factors and support, that women who participated in the questionnaire received from their families, friends, etc. A list of variables is presented in Table 1.

The first six variables (D_1 - D_6) present the personal involvement in forest management of any relatives, friends, and professionals. This kind of support defines the motivation that appeared in women through sharing problems with somebody or taking the advice they need. The statistical significance of these six variables reveals the social environment of women in the sample that facilitates decisions. Dummies from 7 to 15 (D_7 - D_{15}) describe the external factors of support. The significance of each of them reveals the resources that women use in order to increase harvesting or another purpose of forest utilisation they have chosen.

Table 1. List of dummy variables D_j included in the model (1)

Variable number j	Question from the questionnaire presented by the variable	Answer and coding
1	Who do you involve when making decisions on your forest? [My husband/partner]	[My husband/partner]=1, otherwise 0
2	Who do you involve when making decisions on your forest? [Male family members]	[Male family members]=1, otherwise 0
3	Who do you involve when making decisions on your forest? [Family and friends (female, male)]	[Family and friends (female, male)]=1, otherwise 0
4	Who do you involve when making decisions on your forest? [Forester of state forest administration]	[Forester of state forest administration]=1, otherwise 0
5	Who do you involve when making decisions on your forest? [Private forester or Forest professional]	[Private forester or Forest professional]=1, otherwise 0
6	Who do you involve when making decisions on your forest? [Forest owner association]	[Forest owner association]=1, otherwise 0
7	What kind of support would you opt for when managing your forest? [Information and know how (trainings, literature)]	[Information and know how (trainings, literature)]=1, otherwise 0
8	What kind of support would you opt for when managing your forest? [Machinery]	[Machinery]=1,
9	What kind of support would you opt for when managing your forest? [People to help with manual work]	[People to help with manual work]=1, otherwise 0
10	What kind of support would you opt for when managing your forest? [Government funding]	[Government funding]=1, otherwise 0
11	What kind of support would you opt for when managing your forest? [Forest contractors]	[Forest contractors]=1, otherwise 0
12	What kind of support would you opt for when managing your forest? [Networks]	[Networks]=1, otherwise 0
13	What kind of support would you opt for when managing your forest? [Internet/social media]	[Internet/social media]=1, otherwise 0
14	What kind of support would you opt for when managing your forest? [Female role models]	[Female role models]=1, otherwise 0
15	What kind of support would you opt for when managing your forest? [Experts]	[Experts]=1, otherwise 0

Source: data from Fem4Forest project.

3.3. Regression model for utilisation choice of owned forests

The previous regression model presents the external factors to maintain the harvesting-like type of utilisation. Internal factors like the personal understanding of how other important are types of utilisation like recreation, hunting, nature conservation etc. In the manner of Rasool & Al-Zwainy (2016) in the study were combined two approaches in analysing the productivity factors – multinomial logistic regression for nominal outcomes and individual logistic regressions for each outcome. In this way, there could be estimated a model for statistically every significant variable from the multinomial logistic model.

The multinomial logistic model (MLM) is in the following double logarithmic form (Stamelos, 2003):

$$\ln\left(\frac{\text{prob}(\text{category } j)}{\text{prob}(\text{category } q)}\right) = b_0^j + \sum_{i=1}^m b_i^j D_i, \quad (2)$$

where:

j is the index of each category in nominal outcome (dependent variable);

b_j^i – the individual regression coefficient for category j of dummy variable I ;

m – number of variables.

By q is denoted the basic event or outcome that other outcomes compare to.

In equation (3) again are used the variables – expressed in Table 1. The dependent variables include answers of the question “Please specify for which purposes you are using your forest” – Rank1, which is part of the questionnaire used in the survey. By this way, women who participated in the survey define the most important purpose for utilisation of their forests. Following possible events (E) can occur:

- Harvesting/Selling timber: E_1
- Timber and/or Fuel wood for own use: E_2
- Nature conservation: E_3
- Recreation: E_4
- Other: E_5
- Hunting: E_6

4. Results and Discussions

4.1. Preliminary analysis of data

All the data in the questionnaire that are used for regression estimation have been preliminary summarised and described in order to reveal the structure of the answers. It is useful to understand the share of women who have given positive answers (Table 2).

The table shows that with the largest relative share in personal support, women meet in their spouses/partners. The least important for the women are “Forest owner association” and the “Private forester or Forest professional”. The most important external help sources are “Information and know-how“, “People to help with manual work”, and “Government funding”.

Considering each country, the shares vary significantly for some of the categories. For Slovenian women, husband and forest administration are reliable and highly involved factors in forest management. This is the only country on the list in which the family is not so important for the forest management of women in favour of state forest administration.

Table 2. Factors affecting female private forest management decisions (%)

	In all countries	Slovenia (n=38)	Austria (n=67)	Croatia (n=6)	Czech Rep. (n=18)	Bulgaria (n=9)	Germany (n=33)
My husband/partner	52.05	63.16	52.24	33.33	50.00	33.33	48.48
Male family members	23.98	23.68	26.87	16.67	22.22	11.11	24.24
Family and friends	21.05	7.89	25.37	16.67	22.22	33.33	24.24
Forester of state forest administration	35.67	63.16	23.88	33.33	38.89	22.22	30.30
Private forester or Forest professional	20.47	10.53	28.36	16.67	22.22	11.11	18.18
Forest owner association	15.79	0.00	16.42	16.67	0.00	0.00	45.45
Information and know-how	48.54	34.21	67.16	16.67	11.11	22.22	60.61
Machinery	32.16	39.47	34.33	16.67	33.33	11.11	27.27
People to help with manual work	47.37	47.37	55.22	33.33	66.67	22.22	30.30
Government funding	49.12	52.63	44.78	16.67	50.00	22.22	66.67
Forest contractors	31.58	28.95	34.33	66.67	22.22	11.11	33.33
Networks	18.71	5.26	25.37	50.00	16.67	0.00	21.21
Internet/social media	4.09	2.63	5.97	0.00	0.00	0.00	6.06
Female role models	8.77	5.26	10.45	33.33	0.00	0.00	12.12
Experts	23.98	7.89	35.82	16.67	16.67	11.11	27.27

Source: Own calculations, Based on FEM4FOREST survey data.

Austrian women, as the greatest part of the sample, define the level of husband/partner involvement. For them, the most important are information and knowledge. Austrian women do not rely on forest state administration, but they are likely to steer their forests with a more personal role - as a management style. This, along with husband participation, is a profile of a leader. Austrian women combine resources by themselves – they involve government funding, information, work, and machinery until other women do it through the help of something or someone. They use experts the most among the countries.

Croatian women involve husbands at the same level as forest state administration. They, like Austrian ones, seem to rely on themselves for the decisions. Maybe this is the reason Croatian women to use “Female role models” as an important factor for support. Croatian women participate in networks and enter into contracts with forest contractors. They seem to be the leader in decisions, but do not organise the factor of production in the manner the Austrian or Slovenian women do.

Czech women rely on their husbands more than Croatian, Bulgarian and German ones. They do not use such information or know-how. Maybe they are among the conservative women in the sample – they combine labour, funding, and machinery with less knowledge. Czech women do not use female roles in management as a model for behaviour or management.

Bulgarian women do involve neither any associations nor networks. These women rely on their husbands and families. The most important to them is to find people to work in forests and funding to pay for these people in collaboration with the forest administration. Some of them enter into contracts for harvesting and steering the forests.

Women in Germany involve their spouses for personal help. They use knowledge and funding. The forest management of German women relies on innovativeness and financial resources for that. After the Croatian ones, German women owners of forests use female role models for inspiration. They, in difference from other respondents, are more collaborative in the meaning of forest associations.

4.2. Results for OLS regression

The model in expression (1) is implemented under the constraint of participants harvesting. All the participants with zero (0) harvesting have been excluded. The logic behind this is that if a certain respondent has not harvested any quantities in the last five years, there should be a reason for that. The model will present the results for non-productive forests if all these zero records are included in the model. In order to clarify the productivity factors among the answers in the questionnaire, only positive nonzero records are included. The number of records is slightly reduced and is following:

- Slovenia – 38
- Austria – 65
- Croatia – 2
- Czech Rep. – 18
- Bulgaria – 4
- Germany – 30

Results for model (1) of linear OLS regression are presented in Table 3. There is no multicollinearity presented.

The results presented in the table show that the combined action of the factors is not statistically significant. Breusch-Pagan's (Halunga et al., 2017) test for heteroscedasticity presents $\text{Prob} > F = 0.52$, which means the results are homoscedastic. The only factor that has statistical significance is "Forest owner association" ($p=0.048$).

It was interesting that the influence of this factor has not contributed to the increment of harvesting volumes. It influences the harvesting in a negative direction. The reasons for this could be various and from the data available is not possible to make hard conclusions about them. We can only place a hypothesis that these associations are more focused on forest preservation, but not on harvesting. In order to clarify the individual influence of forest associations, we examined individual OLS regression with individual explanatory variables. Table 4 presents the results.

The model in Table 4 slightly corrected the coefficient for "Forest owner association" from -30.94 to -23.94. The meaning of it is that inclusion in associations of forest owners reduces the 5 years' harvesting volume by 23.94 m³ per hectare. Results are statistically significant, but with very low R². This reveals that associations have a negative effect on a very small range of cases in reality. In other words, forest owner associations would have a negative

impact on harvesting volumes when it happens to have any influence on women's forest management.

Table 3. OLS multiple regression for all countries and model (1), $\alpha=0.05$

Prob > F				0.76
R-squared				0.09
Root MSE				87.85
Variable	Coef.	Std. Err.	T	P>t
My husband/partner	6.59	9.66	0.68	0.5
Male family members	-1.3	15.81	-0.08	0.94
Family and friends	-9.09	17.12	-0.53	0.6
Forester of state forest administration	-16.11	12.84	-1.25	0.21
Private forester or forest professional	2.52	14.9	0.17	0.87
Forest owner association	-30.94	15.47	-2	0.05
Information and know-how	-20.26	18.22	-1.11	0.27
Machinery	8.19	17.39	0.47	0.64
People to help with manual work	-11.07	12.66	-0.87	0.38
Government funding	11.73	14.68	0.8	0.43
Forest contractors	3.81	14.84	0.26	0.8
Networks	43.69	41.26	1.06	0.29
Internet social media	-24.59	33.08	-0.74	0.46
Female role models	38.16	31.5	1.21	0.23
Experts	-5.27	11.67	-0.45	0.65
cons	48.64	19.59	2.48	0.01

Source: Own calculations, Based on FEM4FOREST survey data.

Table 4. Results for OLS simple regression for all countries, $\alpha=0.05$

Prob > F				0.01
R-squared				0.01
Root MSE				87.31
Variable	Coef.	Std. Err.	t	P>t
Forest owner association	-23.94	11.16	-2.15	0.03
cons	46.19	9.86	4.68	0.00

Source: Own calculations, Based on FEM4FOREST survey data.

4.3. Results from logistic regressions

For the purpose of the logistic model, all the cases have been included in the equation. The decision-making or the women's understanding of the purpose of their forests are not directly correlated to positive harvesting during the last 5 years. The forests might were at an early age when the survey was conducted. Results are summarised in Table 5.

Table 5. Results for multinomial logistic regression, $\alpha=0.05$

Number of obs	171									
LR chi2(75)	107.35									
Prob > chi2	0.0085									
Pseudo R2	0.2376									
	Harvesting		Nature conservation		Recreation		Other		Hunting	
	RRR	P>z	RRR	P>z	RRR	P>z	RRR	P>z	RRR	P>z
My husband/partner	0.89	0.81	0.76	0.64	17.55	0.10	0.26	0.27	3.38	0.35
Male family members	1.37	0.53	0.91	0.90	0.79	0.90	3.20	0.32	0.00	1.00
Family and friends	0.79	0.67	0.79	0.75	0.49	0.71	6.46	0.10	2.23	0.63
Forester of state forest administration	1.29	0.56	2.86	0.06	2.45	0.45	1.01	0.99	0.00	0.99
Private forester or forest professional	2.33	0.13	3.36	0.09	1.78	0.72	4.00	0.35	0.00	1.00
Forest owner association	0.68	0.49	0.15	0.10	0.60	0.80	0.82	0.87	0.67	1.00
Information and know-how	3.56	0.00	1.84	0.28	3.15	0.37	0.36	0.39	0.20	0.41
Machinery	0.66	0.36	0.53	0.31	1.83	0.63	0.32	0.44	1.12	0.94
People to help with manual work	1.08	0.84	0.84	0.76	0.63	0.71	0.09	0.10	3.44	0.36
Government funding	0.46	0.07	0.31	0.06	0.86	0.90	1.69	0.60	0.25	0.35
Forest contractors	3.96	0.00	2.24	0.18	6.21	0.15	0.64	0.73	0.00	1.00
Networks	0.33	0.06	1.85	0.41	0.00	1.00	2.34	0.48	0.00	1.00
Internet social media	0.29	0.28	0.00	1.00	0.00	1.00	0.00	0.99	285.09	1.00
Female role models	1.36	0.73	1.61	0.72	17.04	0.15	21.80	0.02	0.00	1.00
Experts	1.49	0.44	0.50	0.39	21.75	0.01	14.94	0.54	9.45	0.32
cons	0.32	0.03	0.28	0.06	0.00	0.00	17.95	0.56	0.05	0.07

Source: Own calculations, Based on FEM4FOREST survey data.

The presentation of results is in Relative Risk Ratios (RRR). Everything is compared to “Timber and/or Fuel wood for own use”, which has been defined as the base category by Stata. Statistically significant variables are:

- Information and know-how R=3.56, p=0.00, which means that if the information has one unit increase, it is 3.56 times more likely for women to use the forest for harvesting than using timber for their own use if all other factors remain constant.
- Forest contractors – RRR=3.96, p=0.00, which means that if forest contractors have one unit increase, it is 3.96 times more likely for women to use the forest for harvesting than using timber for their own use, if all other factors remain constant.
- Female role models – RRR=28.80, p=0.02, which means that if women increase the influence of female role models in their management with one unit, it is 28.80 times more likely for women to practice other types of forest utilisation than using timber for their own use if all other factors remain constant.
- Experts – RRR=21.75, p=0.01, which means that if women increase the influence of experts in their management by one unit, it is 21.75 times more likely for women to use

forests for recreation than using timber for their own use if all other factors remain constant.

The abovementioned results are narrowly statistical in interpretation. In real life, results present that women are willing to harvest timber from their forests according to the availability of information and contractors. If they plan to harvest by themselves, they will search for certain information. It is a very interesting result, which reveals the nature of women-forest owners to take information-based decisions. Women do not like to harvest like amateurs, so they enter into contracts with people, or enterprises, who are professionals. Female role models do not inspire women to harvest timber. Possibly, they see at these roles more like environmentally of research-focused examples. Experts are a factor for the utilisation of forests as a recreation centre. Women place such purpose if they keep experts in touch. In other words, if a woman likes to use her forests for recreation, she will find an appropriate expert. Generally, results reveal, that the significant explanatory variables in the model (3) are factors to be chosen for one or another purpose for forest management and vice versa – if women choose one or another purpose, they will use these factors in the management.

5. Conclusions

The present study confirmed that female forest owners need support for increasing productivity, as limitations of the recent practice and lack of such in some of the countries of the Danube region are taking place. It identifies some factors influencing decision-making in the forest management of women private forest owners, affecting productivity and utilisation associated with the protection of forests. It is confirmed this is not accidental and women support their decisions with appropriate resources, provided by different forest associations. For example, discussing the negative influence of the increased volumes being harvested.

Despite the fact that women involve family members and spouses in the business, they do not play any significant role for success in the meaning of better economic indicators. The results from the OLS regression proved that there are no any other significant factors except forest associations.

The results from the logistic regression revealed that most of the factors do not directly influence the harvested volumes, but form attitudes to the forest management. None of the factors of involvement (the first six dummies) plays an important role in forest management decisions. Respondents that answered to these questions positively, in fact, did not gain any benefit from this involvement. It is interesting that government support neither influences the decisions for the purpose of forest utilisation nor the productivity of harvesting. The same is with manual work. This type of work has been involved for various purpose of forests, but have not contributed to any effect. The women forest owners use the information and forest contractors to improve harvesting. This is a result from the logistic regression, which means that women from attitudes toward better harvesting as a result of available information and consultancies with contractors. This means that the information sources and availability of contractors will boost the harvesting in forests owned by women. The results also suggest that women are likely to trust contractors for harvesting. The logistic regression results also

revealed that women tend to use their forests for other purposes along with harvesting. They are inspired by female role models to look for something else for their forests. It is very interesting result that the experts play an important role in the women's attitudes toward using the forests for recreation. This can be used by the forest authorities to improve the diversification of forest utilisation.

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