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RESEARCH PAPER

Factors Hindering Forest Management Among Engaged and Detached Private Forest Owners: Slovenian Stakeholders' Perceptions

Peter Kumer[1] · **Špela Pezdevšek Malovrh**[2]

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Abstract

Small-scale properties are the prevailing ownership category in Slovenian private forests. Owners are becoming increasingly diverse with predominant multifunctional management orientation which has led to underutilisation of wood potentials over the past decades. We surveyed forest-related stakeholders (24) to understand their perceptions on factors affecting private forest management. We used their perceptions, as opposed to the actual barriers, to understand what needs to be changed in forest policy. This study is based on the latest (private forest owners) PFOs typology conducted in Slovenia which resulted in types of engaged and detached forest owners. A typology based framework for data collection and analysis was performed using six pre-set categories from operational environment. We followed the Simple Multiple-Attribute Rating Techniques method to evaluate the most important private forest management hindering factors. The results showed that stakeholders perceived only minor differences between owner types according to hindering factors. The psychological factors were perceived as the crucial category separating the two types, suggesting that detached owners are more substantially driven by personal decisions, which follow recent societal changes. The group of economic factors was recognized as the most important category for both types suggesting that forest policy should prioritize profit-oriented management strategies. The results imply that owner-specific forest policy may not be the priority for stakeholders and that the problems of private forest management can be solved with the implementation of innovative and active policy measures, which take into account multifunctional forest management orientation of PFOs, their characteristics and ownership trends.

Keywords Private forest owners' types · Forest management · Stakeholder perception · Simple multiple-attribute rating techniques technique · Multi-criteria framework

✉ Peter Kumer
peter.kumer@zrc-sazu.si

Extended author information available on the last page of the article

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Introduction

There is a growing recognition that the structural changes in forestry have contributed to increased diversity of private forest owners (PFO) (Boon et al. 2004; Ziegenspeck et al. 2004; Ní Dhubháin et al. 2007; Richnau et al. 2013; Häyrinen et al. 2015; Haugen et al. 2016; Kronholm 2016; Butler et al. 2017) in the last decades and also to the creation of new PFO types (Dayer et al. 2014; Živojinović et al. 2015; Côté et al. 2017). Such increased structural heterogeneity has been accompanied by changes in PFOs forest objectives (Kuuluvainen et al. 1996b; Karppinen 1998; Hogl et al. 2005; Wiersum et al. 2005; Takala et al. 2017), attitudes (Boon et al. 2004) and management practices (Emtage et al. 2007; Karppinen and Berghäll 2015) leading to the fact that PFOs are not exclusively driven by profit (Beach et al. 2005; Eggers et al. 2014).

In Slovenia, PFOs own a large share of the country's forests (76% of approximately 1.2 million ha) (Public Forestry Service 2016). The acreage is divided into 314,000 individual estates, owned by roughly half a million owners. Individual properties are mostly small scale (89% of owners have less than 5 ha) and fragmented, with individual PFOs having three parcels on average (Pezdevšek Malovrh 2010; Pezdevšek Malovrh et al. 2010). Moreover, PFOs are becoming less financially dependent on their forest, as the number of PFOs who are farmers and are financially dependent on their forestland has steadily declined and the vast majority of them have replaced farming activities with permanent jobs (Gabrovec and Kladnik 1997; Cunder 1999; Kumer 2017). Consequently, current PFOs have become urbanized and less attached to their forestland. They have moved to cities and loosened their ties with the land. Through generations they became city dwellers where they created families and found a new social environment. They stopped coming back to countryside. This loss of affective bond between owners and land is reflected in underutilized management of private forest (on average only two-third of the potential removal is harvested) (Public Forestry Service 2016; Feliciano et al. 2017).

Following the political and economic transition in the early 1990s, Slovenia has experienced changes in the national political system and institutional organization (Adam and Makarovič 2001). In the field of forestry, this has led to the establishment of public forest administration and reorganization of private and state forest management, as well as to the restitution and privatization of parts of state-owned forests (Winkler and Medved 1994; Weiss et al. 2012a, b). Following all these changes, management decisions and strategies are largely the responsibility of the PFOs. Therefore, understanding hindering factors related to private forest management is very important for policy decision makers and other forest-related stakeholders (i.e. researchers, forest inspections, interest organization for legal persons engaged in forestry, public forestry service, ministry, private forest owners associations).

In Europe, several studies related to PFOs involvement in forest management focused on objectives and values of PFOs (Kuuluvainen et al. 1996a; Karppinen 1998; Takala et al. 2017), their actual management practices (Novais and Canadas

2010; Nordlund and Westin 2011; Karppinen and Berghäll 2015; Feliciano et al. 2017), and factors affecting management strategy (Kurttila et al. 2001; Hujala et al. 2013; Eggers et al. 2014; Staal Wästerlund and Kronholm 2017). All these leading to the development of many different PFO typologies (Boon et al. 2004; Hogl et al. 2005; Ní Dhubháin et al. 2007; Ficko and Boncina 2013; Pezdevšek Malovrh et al. 2015). Additionally, different policy instruments have been suggested for many of the PFO types (Boon et al. 2004; Serbruyns and Luyssaert 2006; Boon and Meilby 2007; Pezdevšek Malovrh et al. 2015). These studies have shown that motives differ between PFOs, which can be seen in their management behavior (Feliciano et al. 2017). Moreover, comparison of PFO types has identified some analogies in PFOs' management orientation (Boon et al. 2004; Ní Dhubháin et al. 2007). The review of Ní Dhubháin et al. (2007) reveals that two types of PFOs exist, first type being production orientated that is most likely to be engaged in active forest management and second type being amenity consumption orientated, mainly for domestic purposes. Targeting PFOs who have diverse management objectives, changing life-style and a weak attachment to forests represents a challenge for policy makers who are in charge of preparing and implementing forest policy (Lawrence and Dandy 2014). As a consequence, it is suggested that small-scale forest management and forest policies, especially forest policy instruments, need to be adjusted for different PFO types to effectively engage diverse types of PFOs in forest management (Boon et al. 2004; Pezdevšek Malovrh et al. 2015; Hrib et al. 2017) to achieve financial and ecological sustainability (Weiss et al. 2011).

The policy instruments targeted to different PFOs types were suggested mainly on PFOs needs, taking into account different theoretical approaches, but often neglected forest-related stakeholders' perceptions. The complex and dynamic nature of private forest management requires flexible and transparent policy decision making that embraces the diversity of values and perceptions from all relevant stakeholders (Feliciano et al. 2017). To contribute to the improvement of private forest management, it is important to improve the understanding of the forest-related stakeholders' perceptions of the factors affecting private forest management in order to obtain a more solid basis for creating PFO targeted forest policy instruments.

Empirical studies on forest-related stakeholders' perceptions about private forest management are scare not only in Slovenia, but elsewhere. Therefore, this study, based on the latest PFOs typology done in Slovenia (Kumer and Štrumbelj 2017), provides a better understanding of forest-related stakeholders perceptions related to the factors that influence private forest management and contribute to the improvement of forest policy instruments, i.e., to be more targeted to different PFO types. Ideally, the results will contribute to the improvement of PFOs specific policies and programs, which will lead to more flexible and transparent decision-making agreements in forestry legislation. It will provide suggestions for adjustment of policies to serve the needs and objectives of small-scale PFOs and suggestions for innovative and active policy instruments which take into account multifunctional management orientation, PFOs demography and ownership trends.

Background Study

As a basis for this study we used the typology of PFOs in Slovenia developed in Kumer and Štrumbelj (2017). This is the latest existing typology comprising national level data based on a large sample size derived from a probability sample. They conducted web-based surveys that followed Dillman (2007) with randomly selected, small-scale PFOs, who owned properties smaller than 5 ha. The threshold of 5 ha was set based on the previous literature about private forest owners (Cimperšek 2016; Ficko and Boncina 2013). Data collection took place from March to May 2015. The survey was distributed via post to 2010 PFOs with an invitation and link to the survey. The response rate was 28.0% (561 replies). The non-response bias assessment was based on wave analysis (comparing online and papers responses) in which the cluster analysis was performed separately for each wave. The cluster analysis revealed that there are two types also in each of the waves. Further, the data acquired for entire population was compared with the same data for the sample. The conclusion was that there are no differences between the two groups. The survey asked PFOs about a range of issues, but the typology was based on seven variables: three values variables (environmental, social and production)[1] and the four long-term management objective variables[2] (production, preservation, economic revenue and amenity objectives) in order to see how they influence management behaviour and decision-making. The clustering method was based on the k-medoids hard clustering algorithm and the number of clusters was selected automatically, using the average silhouette criterion (see Norušis, 2008 for details). The identified clusters were characterized and compared in regards to socio-demographic, property and ownership characteristics using standard two-sample *t* tests and cross-tabulation. All statistical analyses were carried out using the *R* programming language (R Core Team 2014).

PFO Types

The clustering resulted in two types of PFOs, referred to as "engaged" and "detached". Engaged PFOs expressed high relevance in all management objectives, while for detached owners all objectives were less important, especially production and economic management objective. This means that engaged PFOs are more multi-objective orientated compared to detached PFOs who are "detached" from timber management and are amenity owners. Similarly, the value production is higher for engaged PFOs, while environmental and social values are higher for detached one. Engaged PFOs are on average more active and are more likely

[1] Multi-part questions were used to measure the importance of forest-related values, on 5-point Likert scale ranging from "strongly agree" to "strongly disagree". Values-related questions were grouped into three dimensions: environmental, social and production by averaging all questions into each group.

[2] Multi-part questions were used to measure the importance of forest management objectives, on 5-point Likert scale ranging from "strongly agree" to "strongly disagree". Objective variables were obtained as the average across all the questions in that objective.

to actively manage their forests in the future (production orientated), they are more likely to be born on a farm or to be currently working on a farm and are less educated. Moreover, they live closer to their forest parcels. Detached PFOs are on average less active compared to engaged, as they place the environmental (conservation) and social functions (recreation, aesthetic) as more important than the production one. They see their most important role in preserving forest landscape and its biodiversity for future generations and in achieving amenity objective. Women represent a larger share in this type. As the name suggests, the detached PFO contains a larger number of non-residential PFOs (PFOs who do not live close to their property) and they are less affiliated with agriculture (born or worked on a farm). Furthermore, detached PFOs are better educated and have a higher income. Larger share of respondents from the type of engaged owners (75%) confirmed our anticipation that active forest owners are more willing to participate in such survey.

Methods

Based on the background study (Kumer and Štrumbelj 2017), a two-phase framework for data collection and analysis was performed for the purpose of our study (Fig. 1) and is described in more details below.

Phase 1: Identification of Categories and Hindering Factors

To be able to recognize the main hindering factors associated with private forest management and its low utilization for different types of PFOs, forest-related stakeholders were offered six pre-determined categories. Categories were defined based on the modification of PEST(LE) analysis, which is commonly used to analyse operational environments (Aguilar 1967; Fahey et al. 1981). The stakeholders were asked to consider the forest management hindering factors from the perspective of the following categories: a) Policy Framework—PF (political drivers, policy making, forest-related legislation); b) Forest Characteristics—FC (factors affecting the potential use of forest); c) Socio—Demographic Characteristics—S&D (age, education, income); d) Economic factors–EF (timber market and trade, income, forest management costs); e) Ownership and Property Characteristics—O&P (size and location of property, co-ownership) and f) Psychological factors—PSF (PFOs' behaviour, objectives and socio-economics aspects affecting forest management).

A preliminary list of factors under each category was prepared (Fig. 2). They were based on the topics recognized in the Slovenian National Forest Programme as the main problems of private forest management and a review of private forest management literature (Beach et al. 2005; Eggers et al. 2014; Petucco and Abildtrup 2015; Poje et al. 2016). The list of factors was discussed among researchers and a private forest management expert from the public forestry service and it was further modified in order to clarify the factors. Finally, the research team and the expert

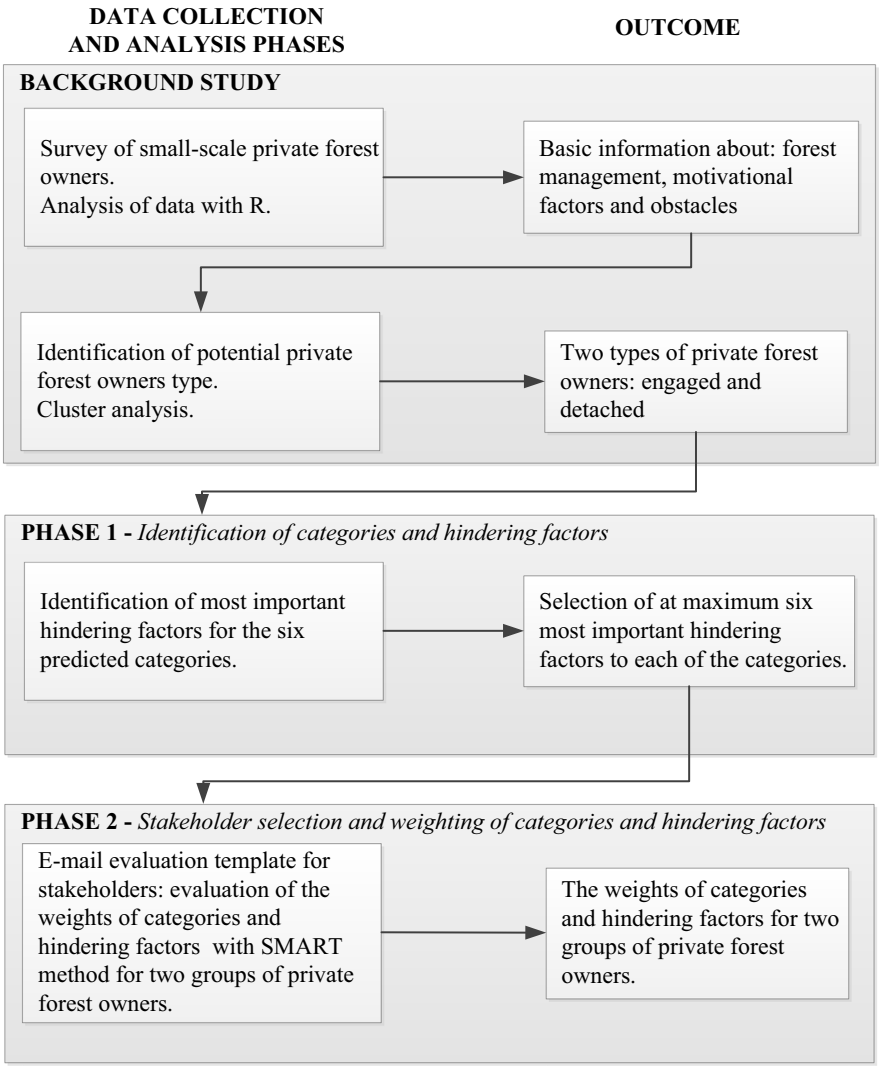

Fig. 1 The two-phase framework of the research consisting of identification of categories and hindering factors

selected a maximum of six factors for each category based on their importance within forest management and included them in the analysis.

Based on the final list of categories and factors, an evaluation template was created and sent by e-mail to all identified stakeholders. The evaluation template included basic information about identified PFOs types from the background study and their characteristics. Moreover, a brief explanation of each category

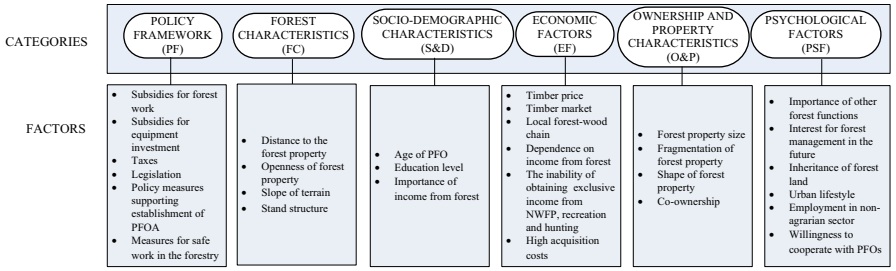

Fig. 2 Factors under each category

and factor was included in the evaluation template to ensure a common understanding among the stakeholders.

Phase 2: Stakeholder Selection and Weighting of Categories and Hindering Factors

When selecting the stakeholders, a priority was given to those who have expertise related to private forest management or have institutional influence on forest policy formulation. Stakeholders from different institutions (i.e. ministry, public forest administration, research institutions, PFOs associations) were identified by the research team and invited to participate. In order to gain a comprehensive picture of the factors hindering forest management and to create legitimacy of the final decision (Kangas et al. 2010) a snowball technique was adopted in order to validate the selection and to identify other stakeholders. In total 24 stakeholders were identified and included in the research. If the contacted stakeholder did not want to participate, another person from the same institution was invited to participate in evaluation.

Stakeholders were classified into four groups: ministry and inspection (representatives of governmental institutions including Ministry of Agriculture, Forestry and Food, Forestry inspection, that affect forest policy decision directly), public forest administration (representatives of Slovenian Forest Service that are responsible for forest management planning and extension for PFOs and shape forest policy indirectly), academia (representatives of research and educational institutions including University of Ljubljana,[3] Forestry Institute, Research Centre of the Slovenian Academy of Sciences and Art and Slovenian Institute for Adult Education that provide decisions makers with knowledge) and associations (representatives of local and regional PFOs associations and Chamber of Agriculture and Forestry that try to represent PFOs interest and shape forest policy indirectly). The numbers of stakeholders per category are presented in Table 1.

The weighting of the categories and factors was done using the SMART method (Simple Multiple-Attribute Rating Techniques), which is a simple and practical tool to evaluate and rank alternatives (Edwards and Barron 1994; Kajanus et al.

[3] Biotechnical Faculty, Department of Forestry; Biotechnical Faculty, Department for Agriculture; Faculty of Arts, Department of Geography.

Table 1 The number of stakeholders per stakeholders' category

Institution	Number
Ministry and inspection	5
Public forest administration	9
Educational-research institutions	5
Associations	5
Total	24

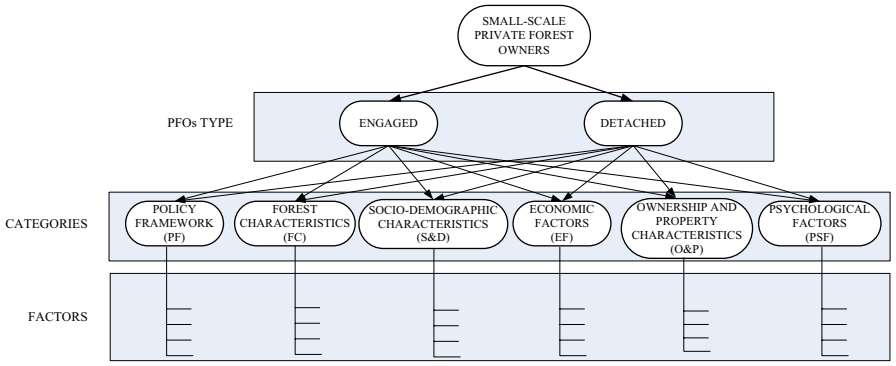

Fig. 3 Hierarchical presentation of the analysis

2004; Kangas et al. 2008, 2015). In the SMART method, the dimensions (factors) are hierarchically ordered based on the stakeholders' subjective preferences (Kangas et al. 2015). For each weighting phase, the stakeholders were asked to give an importance rating for the presented categories and factors, on a scale from 0 to 100. First, they had to select the most important dimension and assign an importance of 100. Smaller numbers were then assigned to the other dimensions reflecting relative importance to the most important one. The stakeholders were asked to round their numbers to the nearest 10 to avoid discrepancy in accuracy among stakeholders. Multiple items can get the same values if the stakeholder thinks that they are equally important. This weighting process was repeated for all hierarchical levels (Fig. 3). The comparisons and weighting continued in a top-down order separately for both types of PFOs, i.e., the stakeholders were asked to start with the process at the top of the decision hierarchy. It was expected that different individuals in the group would have different relative ratings. The stakeholders were asked to weight each of the six categories. After that, they were asked to weight the factors within the policy framework category. After this the stakeholder weighted the factors within the remaining categories (forest characteristics, socio-demographic characteristics, economic factors, ownership and property characteristics and psychological factors).

Once the stakeholders returned their weightings, relative global and local priorities[4] were calculated for them (Kangas et al. 2015), so that the points are summed

[4] The term local priority (in contrast to global) means that the priority has been scaled with other priorities in the same category.

and the final weights are the points of each criterion divided by the sum. This resulted in weights between 0 and 1 by considering factors inside each of the category (local priorities) and factors across all categories (global priorities).

Results

Weights of Hindering Categories from Stakeholders

The stakeholders perceive only minor changes in categories between the two PFOs types (Fig. 3). Economic factors and ownership and property characteristics areestimated to be the most important factors for engaged and detached PFOs, followed by forest characteristics. For both PFO types, the policy framework and socio-demographic categories are estimated to be of approximately equal importance. The differences between PFO types are largest in psychological factors, because stakeholder perceived psychological factors to be more important for detached PFOs (Fig. 4).

Weights of Hindering Factors from Stakeholders

In the following section, global weights (w_g) exceeding the threshold of 0.05 are reported to see the most important hindering factors regardless any categories, while the local weights (w_l) of the most important hindering factors within each category are reported in more detail (Table 2).

The stakeholders perceive minor differences between PFOs types related to hindering factors (see global weights (w_g) in Table 2). In terms of PFO socio-demographic and ownership and property characteristics, a number of factors have been perceived as hindering factor. For both PFO types, stakeholders share

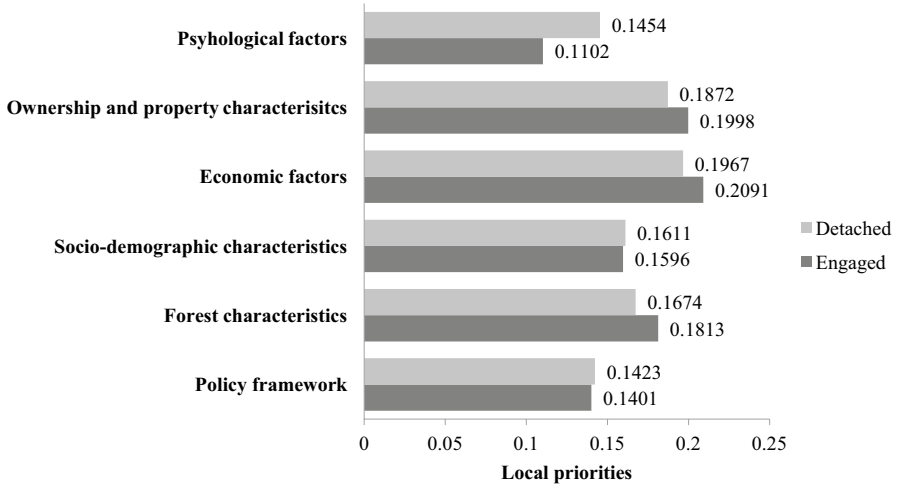

Fig. 4 The local weights of categories for engaged and detached PFO types

Table 2 The global and local weights of hindering factors

Categories	Factors	Types of PFOs			
		Engaged (w_g)	Detached (w_g)	Engaged (w_l)	Detached (w_l)
PF	Subsidies for forest work	0.0221	0.0243	0.1579	0.1707
	Subsidies for equipment investments	0.0222	0.0153	0.1591	0.1077
	Taxes	0.0244	0.0300	0.1743	0.2107
	Legislation	0.0283	0.0293	0.2023	0.2058
	Policy measures supporting establishment of private forest owners' associations	0.0262	0.0245	0.1871	0.1719
	Systematic measures for safe work in the forest	0.0167	0.0189	0.1193	0.1332
FC	Distance between the PFO's residence and the forest property	0.0366	0.0456	0.2021	0.2725
	Openness of forest property	0.0527	0.0481	0.2912	0.2877
	Slope of terrain	0.0471	0.0363	0.2600	0.2172
	Stand structure	0.0447	0.0373	0.2467	0.2227
S&D	Age of PFO	0.0648	0.0574	0.4065	0.3563
	Educational level	0.0380	0.0427	0.2385	0.2649
	Importance of income from forest	0.0566	0.0610	0.3550	0.3787
EF	Timber price	0.0456	0.0448	0.2185	0.2277
	Timber market in Slovenia	0.0372	0.0368	0.1784	0.1871
	Local forest-wood chain	0.0326	0.0288	0.1561	0..1466
	Dependence on income from forest	0.0363	0.0349	0.1739	0.1776
	The inability of obtaining exclusive income from NWFP, recreation and hunting	0.0219	0.0239	0.1048	0.1216
	High acquisition costs	0.0351	0.0274	0.1683	0.1395
O&P	Forest property size	0.0520	0.0494	0.2604	0.2636
	Fragmentation of forest property	0..0574	0.0508	0.2876	0.2715
	Shape of forest property	0.0377	0.0345	0.1888	0.1841
	Co-ownership	0.0525	0.0526	0.2632	0.2808

Table 2 (continued)

Categories	Factors	Types of PFOs			
		Engaged (w_g)	Detached (w_g)	Engaged (w_l)	Detached (w_l)
PSF	Importance of other forest functions	0.0167	0.0181	0.1524	0.1246
	Interest for forest management in the future	0.0210	0.0252	0.1911	0.1736
	Inheritance of forest land	0.0201	0.0240	0.1831	0.1651
	Urban lifestyle	0.0174	0.0330	0.1581	0.2268
	Employment in non-agrarian sectors	0.0164	0.0274	0.1490	0.1885
	Willingness to cooperate with PFOs	0.0183	0.0177	0.1662	0.1214

PF, policy framework; FC, forest characteristics; S&D, socio-demographic characteristics; EF, economic factors; O&P, ownership and property characteristics; PSF, psychological factors; w_g, global weights; w_l, local weights

the view that the relatively high age of owners, high fragmentation of forest property, low income from forest and co-ownership are the main hindering factors. Additionally, for engaged PFOs the openness of forests with forest roads and small size of forest properties are also recognized as hindering factors.

The differences in factor weights within each category between PFO type are also rather minor according to stakeholders' perceptions (see local weights (w_l) in Table 2).

In the *policy framework category* legislation and policy measures supporting PFO associations are perceived by stakeholders as the most important hindering factors for engaged PFOs. Stakeholders perceive that detached PFOs are mainly hindered by taxes (property tax and fee for maintenance of forest roads) as well as legislation, which is not supporting active forest management. Stakeholders believe that funding and co-funding of different kinds of investments in forests from state budgets will continue to be important factors, which will enable the implementation of forest management to come closer to the planned goal.

In the *forest characteristics category* the most important hindering factor for both PFOs type is inadequate openness of forest property, followed by large distances between the PFO's residence and their forest property for detached PFOs and steepness of terrain for engaged PFOs. The stakeholders also perceive that stand structure is one of the hindering factors, regardless of PFO type. The least important hindering factor according to the stakeholders is for engaged PFOs distance between their residence and their forest property, but for detached PFO it is slope of terrain.

In the *category socio-demographic characteristics*, for engaged PFOs the age of PFO is the most important hindering factor followed by PFOs' importance the income from forests. The situation is the opposite for detached PFOs. The least important hindering factor according to the stakeholders for both PFOS type is educational level.

In the *category economic factors*, stakeholders perceived that there are no differences in the most important hindering factors between PFOs type. The highest weights are given to timber price, timber markets and dependence on forest income. For engaged PFOs the stakeholders perceived that high acquisition costs, followed by underdeveloped local forest-wood chain are also notable hindering factors. The reversed for detached PFOs. The lowest weight for both PFOs types is given to the inability of obtaining exclusive income from NWFPs, recreation and hunting.

In the ownership and property characteristics *category* stakeholders report that fragmentation of forest property, as well as co-ownership of forest property are the most important hindering factors regardless of the PFO type. Stakeholders' recognized that diverse ownership and property structure, which is typical for Slovenian private forests, has an important influence on forest management. Other important hindering factors identified by stakeholders for both PFOs type are forest property size and the shapes of forest property.

Notable differences in weights of hindering factors between PFOs type are identified for *psychological factors category*. Stakeholders stressed that the most important hindering factors for engaged PFOs are lack of interest in forest management in the future due to low potential income which comes from small properties, followed by

inheritance of forest land, willingness to cooperate with PFOs and urban lifestyle. For detached PFOs, the most important hindering factor is urban life style, followed by employment in non-agrarian sectors, interest in forest management in the future and inheritance of forest land. The least important hindering factor for engaged PFOs was employment in non-agrarian sectors, but for detached PFOs was willingness to cooperate with PFOs.

Discussion

Private forest management is continuously changing due to the internal (i.e. dependence of PFOs on forestry resources, aging of PFOs) and external operational environment factors (i.e. demand for wood and energy, forest taxation, new actors, urbanization). Due to the above mentioned changes in operational environment the PFOs decisions concerning forest management have changed. Therefore, it is relevant to know if forest policy sector and forest-related stakeholders are able to adapt to changes in the operational environment and support different types of PFOs.

Minor Changes in Categories and Factors Between Two PFOs Types

The results of the study done in Slovenia, show that stakeholders identified relatively minor differences in categories and factors between two PFOs types. This may imply that stakeholders' perceptions are result of the traditional management systems in Slovenian, which are based on common management regardless ownership and their opinion that this system is effective enough to solve the private forest management problems and could contribute to efficient resource utilization. On the other hand, the results may imply that stakeholders do not differentiate hindering factors and are not fully capable to changes in operational environment or were for some reasons unable to foreseen the differences between PFOs type or they seem to ignore certain PFO types (although they were explained to them prior to evaluation).

The greater difference between PFOs types in terms of economic factors and ownership and property characteristics reflects that stakeholders are aware that private forest management is influenced by different factors (mostly those rising as a consequence of changed demographic, socio-economic and property profiles of the PFOs) and that stakeholders expect that changes in operational environment will have consequences on the use and management of private forests.

PFOs Socio-Demographic Characteristics as the Main Differences in Hindering Factors

Notable differences in weights of hindering factors between PFOs types were identified only for the psychological factors category. Stakeholders perceived that psychological factors, such as prioritising non-production forest functions, lack of interest to manage in the future, acquiring land through inheritance, urban lifestyle, lost link with agriculture and unwillingness to cooperate, as something that is more related

to detached than for engaged owners. This was confirmed in other countries (Hogl et al. 2005; Berlin et al. 2006; Haugen et al. 2016; Kronholm 2016) which shows that there is a growing number of non-farmers among forest owners (non-agricultural forest owners). This is in line with changing demographic and socio-economics profiles of PFOs and the process of urbanization (Živojinovic 2015). The rural out migration has gradually resulted in the dissolution of the ties between PFO family and their land and the absence of involvement in forest management due to the employment in the non-agrarian sector (Schraml 2003; Ziegenspeck et al. 2004; Hogl et al. 2005). The situation is worsened by the fact that large amount of forest land lies in joint ownership (Pezdevšek Malovrh et al. 2015).

There are also visible differences in the socio-demographic characteristics category (see local weights in Table 2). Stakeholders' perceive age of PFO, educational level and importance of forest income are hindering factors that divide the two PFOs types. This perception of stakeholders may be the result of the current debate in forest policy at the national level where the advancing age of PFOs was set out as a factor influencing the absence of management and related harvesting activity (Winkler and Medved 1994; Medved 2000; Pezdevšek Malovrh 2010; MKGP 2016; Poje et al. 2016; Kumer 2017). It is perceived that elderly PFOs are more likely to own forest for amenity purposes or for future generations, rather than maximizing financial returns. As a result of the continuing aging of PFOs, in the near future many forest properties will be inherited by new PFOs whose attitude and motivation towards forest management is uncertain (Schmithusen and Hirsch 2010). Forests are almost never seen as a source of income and employment. More educated owners will also more frequently search for income outside forestry. Therefore, the state should promote transfer of ownership and introduce efficient schemes to allow younger and motivated heirs to take over the land.

The Need for Changes in Ownership and Property Structure

Inefficiency of ownership structure (large share of co-owned properties) is recognized by stakeholders as an important private forest management hindering factor. They understand co-ownership of forest property as something that is negatively related to forest management, because the size of a common property is affected by both the economics of forest property size and differences in PFOs and co-owner preferences. Joint ownership can also cause conflicts between PFOs as they have different management objectives and preferences regarding their forests, especially if they do not live in the same household (Pezdevšek Malovrh et al. 2010). Moreover, fragmentation of forest property (mainly due to inheritance) is recognized as an important hindering factor as PFOs with consolidated properties have better preconditions for active forest management. The problem of parcellation has been partly solved by the government which amended regulation that stops further parcellation. Now the Forest Act (2007) prohibits division of forest parcels, which are smaller than 5 ha. It is necessary to make major innovations in legislation regarding the transition of ownership to more appropriate legal forms. To successfully prevent

parcellation, the Act should be changed so that the smallest part of the division would not be less than a threshold of 10 ha that enables market orientated forest management.[5]

Low Profitability of Forest Management

Low forest income is perceived by the stakeholders as an important private forest management hindering factor as well. This is because the average property size of both PFOs types is lower than 5 ha and therefore management of small parcels is too expensive per unit, and that prevents additional income. To be precise, the ongoing parcellation resulted in a loss of economies of scale, which made forestry practices economically infeasible (Hatcher 2014). Another possible reason for this is that income from sources other than forest property implies less economic importance of forest resources and that the total income is smaller or infrequent compared to other sources. Despite the relatively small taxes on private forest properties, stakeholders think that detached owners are hindered by taxes which is probably attributed to the fact that PFOs generate small (or no) income from their properties, therefore the taxes are perceived as a burden. The reason lies also in the large inefficiency of timber market on one hand and ownership and property structure that are typical for Slovenian private forest sector on the other hand—all of which decreases the profitability of forest management.

Policy Framework as Considerable Weakness

The stakeholders indicated that good general political framework (e.g. National forest program and Forest Act) for forest management exists but does not adequately support private forest management; therefore, legislation is perceived by the stakeholders as important private forest management hindering factor. The political framework is focused mostly on administration and management of forests as one entity and neglects the needs and management objectives of PFOs. These considerable weaknesses in policy framework are also reflected in stakeholders' views in the economic factors category where they recognized economic related factors as crucial private forest management hindering factors—wood production is the favourable management goal from the national policy perspective. This is mainly due to the increased frequency and intensity of natural disasters at a large scale in the last years, increasing growing stock and European Commission Renewable energy policy (2009/28/EC 2009). As a consequence, the realization of allowable cut is increasing constantly, but on the other side conditions for development and establishment of forest-to-wood-processed chain are not being created and mobilization of wood from private forests is still well below planned level. From that it can be concluded that there are a number of perceived policy framework and economic

[5] PFOs with less than 10 ha of forests maintain and manage their forests simply for "having a forest" and other non-market relevant purposes (Weiss et al. 2006).

factors barriers that influence PFOs' decision-making towards more effective forest management. The national policy makers are aware of these problems and put more and more emphasis on cooperation between PFOs, which is reflected also in the legislation.[6] The PFOs' associations are recognized by the government as an appropriate instrument to achieve better results in private forest management, but the problem is that financial support of 850 €, which was planned by the Act was implemented only in 2009 and had afterwards dissipated. Therefore, it is necessary to remove the obstacles and prepare a policy instrument which would systematically encourage for PFOs cooperation in order to achieve higher private forest management activity. Studies from other countries show that there are many barriers in internal and external operational environment related to private forests management (Haugen et al. 2016; Snyder and Kilgore 2017) and show that the support to PFOA remains an unsolved problem (Hrib et al. 2017). It is also highlighted if policies fail to tackle these barriers then policy goals might not be met in the future and management level in private forest might not be enhanced (Kurttila et al. 2001).

Methodological Viewpoints and Limitation of the Study

The scope of this study is Slovenia, but the findings of the study may be applicable to other countries facing similar private forest management challenges. Moreover, as the approach of the study is based on the PFOs typologies that are often used by researchers to understand similarities and differences among PFOs, the same methodological framework can be replicated in countries where private forest management challenges exist and stakeholders' opinion is needed for efficient policy formulation and implementation. The use of the common methodological framework will enable comparison between stakeholders' perception in different countries. The approach allows that researchers or stakeholders include the most important country-specific factors in the analysis which could be an opportunity or a limitation of the framework. The opportunity is shown in the possibility to analyze national specific factor and categories, but the limitation is that the comparisons among countries are thus constrained.

Our study is subject to some limitations. First, the number of stakeholders was limited but compared to other studies (Dwivedi and Alavalapati 2009; Grošelj and Zadnik Stirn 2015; Pezdevšek Malovrh et al. 2016) the sample was large enough to provide adequate results. The statistically representativeness the sample of stakeholders reflect the larger diversity of opinions. Therefore, other groups of stakeholders (i.e. wood industry, forest owners, forest companies, wider public) with broader backgrounds and expertise should be included in the evaluation to gain an even greater diversity of opinions. Moreover, the present results do not reveal the behaviors of PFOs about hindering factors related to their forest management. Therefore, participatory research methods that bring together PFOs as well as stakeholders (e.g. series of focus groups) should be conducted in the future. Also, our choice of

[6] Promotion of the association of PFOs was regulated in the amendment of Forest Act from 2007, in order to adjust with the European Union legislation and its rural development policy.

categories and factors was based on PEST(LE) analysis and six was the maximum number for factors within each category. Having additional factors and categories that characterize private forest management problems may yield more detail results which could be a good base for forest-policy decision makers. PEST(LE) serves to analyze operational environments and it formed the framework for factors selection which were then verified among private forest management experts. The paper aims to understand perceptions of stakeholders regarding forest management factors and it is therefore based on their subjective judgement. However, the criteria for inclusion of stakeholders in the study was their expertise in private forestry sector.

Conclusions

Small-scale PFOs are diverse individuals who own a significant proportion of the forest land in Slovenia. This study, based on the latest PFOs typology in Slovenia, provides a better understanding of forest-related stakeholders' perceptions related to the factors that hinder private forest management for different types of PFOs and could help mitigate barriers that the private forestry sector is likely to experience in the future.

The clustering done by Kumer and Štrumbelj (2017) that was used as the basis for this study, resulted in two types of PFOs, referred to as "engaged" and "detached". The results of typology coincide with the conclusions of many PFOs typologies, which show that PFOs have multiple management objectives and that sustainable forest management is fully embraced (Feliciano et al. 2017).

The background and expertise profiles of the stakeholders included in this study varied and were coming from different institutions: ministry and inspection, public forest administration, educational-research institutions and associations (PFOs associations and Chamber of Agriculture and Forestry). Based on their perceptions it can be concluded that stakeholders do not differentiate hindering factors between PFOs types, which means that stakeholders seem to ignore certain PFO types and do not fully understand the new reality that private forest ownerships are facing today. This suggests that stakeholder efforts are not primarily focused on the creation of targeted policies, more innovative policy instruments and extension services to encourage PFOs to engage, but on the main problems that forestry sector faces in managing private forests.

In the eyes of the stakeholders, the economic category and related factors were the most important hindering factors as wood production is the desire management goal from the national policy perspective. Moreover, other recognized hindering factors were identified by the government in the Resolution on national forest program (2007) (e.g. high age of PFOs, small and highly fragmented forest properties shared by a large number of PFOs and low levels of forest incomes, PFOs are not farmers, private forests are not well connected with roads, etc.) and are according to the Resolution, the main reason for low levels of private forests utilization.

The results also suggest that the current forest policy lacks a fundamental strategy in stimulating management of small-scale private properties. It seems to be tailored to large properties which in Slovenia could be generally applied to state-owned

forests. The problems of private forest management can be solved only with implementation of innovative and active policy instruments, which take into account multifunctional forest management orientation of PFOs, their characteristics and ownership trends.

As part of the further work, we plan to employ additional methods to verify the stakeholders' perception. The use of qualitative methods would ideally complement the present study on.

PFOs by conducting focus groups where stakeholders as well as owners are invited.

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Affiliations

Peter Kumer[1] · **Špela Pezdevšek Malovrh**[2]

Špela Pezdevšek Malovrh
spela.pezdevsek.malovrh@bf.uni-lj.si

[1] Anton Melik Geographical Institute, Research Centre of the Slovenian Academy of Sciences and Arts, Gosposka ulica 13, 1000 Ljubljana, Slovenia

[2] Department of Forestry and Renewable Forest Resources, Biotechnical Faculty, University of Ljubljana, Večna pot 83, 1000 Ljubljana, Slovenia