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Do forest owners share the public's values? An application of Schwartz's value theory

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Abstract

The purpose of this study is to investigate the differences in value priorities between Finnish forest owners and the general public. A conclusion is drawn whether and to what extent value changes in society are reflected in forest owners' values and objectives, and, finally, in their actual forestry behavior. In addition, the study highlights the differences in value priorities among forest owners in various demographic groups. The data set used in this study was based on a nationwide mail survey on Finnish non-industrial private forest owners conducted in 2009 and consisting of 2116 observations of forest owners. Schwartz's value theory was a good fit for testing the value priorities of forest owners. The three most important values were benevolence, security and conformity, both among the forest owners and the public. Tradition was ranked the fourth most important value by the forest owners, but very low by the public. The forest owners ranked universalism slightly lower than the public in general. This difference was clearly greater when the female forest owners were compared to women in the whole population. The probability of a forest owner belonging to the Softies (high emphasis on universalism and benevolence) increased with age and was higher for the female owners and the owners with recreational or multiple objectives compared to the indifferent owners. The multiobjective owners and recreationists had relatively similar value profiles. The previous literature suggests that multiobjective owners are the most active forest owner group and that recreationists and indifferent owners are the most passive groups in their timber supply behavior. The relationship between values and forestry behavior thus remains ambiguous.

Keywords demographics; family forest owners; objectives of forest ownership; the public; Schwartz's value theory

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1 Introduction

The differences or similarities in demographics and forestry attitudes between family forest owners and the public are an interesting issue, especially in countries where family forestry is common and important for roundwood procurement. This is the case in Finland, where 737 000 forest owners manage some 347 000 forest holdings exceeding 2 hectares of forestland (Finnish Statistical... 2012). The total population of the country comprises only 5.4 mill. inhabitants (November 30, 2012). For instance, in the US the corresponding figures are 10 mill. family forest owners (Butler 2008), compared to the total population of 315 mill. (November 30, 2012).

In countries dominated by private forests, structural changes in society, such as changes in the structures of industries, regional differentiation and migration to urban areas, are reflected in the characteristics of forest owners (Leppänen 2010). Along with these demographic changes, attitudes and values also change. General value changes are also reflected in forest owners' values, at least to some extent, but can a link be established between value changes in society, forest owners' values and their objectives of forest ownership? Karppinen (1998) found only a weak association between forest owners' forest values and their ownership objectives. However, several studies show significant effects of landowners' objectives on forestry behaviors (e.g. Kuuluvainen et al. 1996; Ovaskainen et al. 2006; Favada et al. 2009). If such a link between the public and forest owners existed, the observation of general value changes in society would provide clues about the changes in the timber supply and other forest management behavior.

In Finland, knowledge of the differences or similarities in the attitudes and values of the citizens and forest landowners is not as accurate as knowledge of the demographics (Karppinen and Ahlberg 2008; Leppänen 2010; Hänninen et al. 2011). However, some studies have been conducted concerning differences in attitudes (Karppinen and Hänninen 2000) and the perceived legitimacy of environmental and forest policy (Valkeapää and Karppinen 2013).

According to Karppinen and Hänninen (2000), forest owners' attitudes towards forestry differ from those of other Finns. Forest owners were more in favor of the economic utilization of forests in general and slightly less in favor of forest conservation than non-owners. Studies conducted in the US have not reported significant differences between the attitudes of forest landowners and other citizens (Bliss et al. 1994, 1997; Bourke and Luloff 1994). However, Bliss et al. (1997) detected differences in attitudes between timber-selling forest owners who used professional forestry assistance and non-sellers. According to Karppinen and Hänninen (2000), the majority of Finnish forest owners resemble American timber sellers with timber production objectives.

Valkeapää and Karppinen (2013) found that forest owners considered forest policy in general to be more acceptable than other citizens did. Forest owners felt that forest policy functions more properly concerning overall legitimacy. The same was true as regards to three out of four components of legitimacy, procedural justice, acceptance of power relations and acceptance of forestry operations, with the exception of the acceptance of laws. This discrepancy is understandable, because the laws restrict forest owners' decision-making in their forests more than other citizens' activities.

Elands and O'Leary (2002) compared landowners' and other community inhabitants' opinions on forests in eight European countries. They found that inhabitants emphasized more positive as well as negative aspects of forests than landowners. The more urbanized the area was, the larger the differences in opinions between consumers and producers.

Some studies have also been carried out on the relationship between forest-related values and demographic characteristics among the public. Steel et al. (1994) found that younger age cohorts and women were more likely to have a biocentric orientation towards forests than their counterparts. This compares well with a study by Tarrant and Cordell (2002), who reported that

females and younger people (less than 43 yrs. old) showed lower utilitarian values. Vaske et al. (2001) concluded as well that the female public were more biocentric. They also detected positive relationships between a higher level of education and a biocentric value orientation and greater income and anthropocentric values.

The purpose of this study is to investigate the differences in value priorities between Finnish forest owners and the general public. Values are measured based on Schwartz's (1992) value theory. To our knowledge, this is the first time in forest owner studies that this theory has been tested with wide empirical data. Previously, Karppinen and Tiainen (2010) adopted the theory with a small sample of future owners. Based on the empirical evidence, a conclusion is drawn whether and to what extent value changes in society are reflected in forest owners' values and objectives and, finally, in their actual forestry behavior. In addition, the study highlights the differences in value priorities among forest owners in various demographic groups.

The specific aims of the study are as follows:

- 1) to compare forest owners' values to those of the public at large using Schwartz's (1992) value theory,
- 2) to link forest owners' value priorities to demographic characteristics and the objectives of forest ownership, and
- 3) to compare forest owner groups with conflicting values by demographic characteristics.

The study is organized as follows. In the next section Schwartz's value theory is presented, which is followed by the description of the empirical data and analysis methods. After comparing the public's and forest owners' values and describing forest owners' values by owner characteristics, the results are discussed and conclusions drawn in the final section.

2 Schwartz's value theory

There is a limited number of basic human problems for which all cultures must find solutions. The so-called universal value theories aim to cover all these basic requirements of human existence (Schwartz 1992; Helkama 1999), among them the relationship between humans and nature (Kluckhohn 1957). This relationship can be exploitative, harmonious or subjugated.

Schwartz's (1992) value theory is a successor of Rokeach's (1973) theory and reaches beyond simply listing values by assuming that values have a universal content and structure (Helkama 1999). Schwartz (1992, p. 4) describes the concept of value as follows: "Values are concepts or beliefs, they pertain to desirable end-states or behaviors, they transcend specific situations, they guide selection or evaluation of behavior and events, and they are ordered by relative importance"; and this relative importance of multiple values guides action (Schwartz 2006, p. 931). Besides the content and structure of values, comprehensiveness and equivalence of meaning are also analyzed. Value structure is described by consistent conflicts and compatibilities among values (Schwartz 1992).

Ten universal motivational or value types can be distinguished (Schwartz 1992; Puohiniemi 1995): self-direction, stimulation, hedonism, achievement, power, security, conformity, tradition, benevolence and universalism: ¹

¹ Spirituality (a spiritual life, meaning in life, inner harmony, detachment) was not included because it is considered to be universal only to a limited extent, and hence was not applied in the study of the Finnish public (Puohiniemi 2006). However, spirituality might have had relevance concerning forest ownership.

SELF-DIRECTION	Independence of thought and action – choosing one’s own goals, creating, exploring
STIMULATION	Excitement, novelty, challenge in life
HEDONISM	Pleasure or sensuous gratification for oneself
ACHIEVEMENT	Personal success through demonstrating competence according to prevailing cultural standards
POWER	Social status and prestige, control or dominance over people and resources
SECURITY	Safety, harmony and stability of society, of relationships and of self
CONFORMITY	Restraint of actions, inclinations and impulses likely to upset or harm others, or to violate social expectations or norms
TRADITION	Respect, commitment and acceptance of the customs and ideas that one’s culture or religion impose on the individual
BENEVOLENCE	Preservation and enhancement of the welfare of people with whom one is in frequent personal contact
UNIVERSALISM	Understanding, appreciation, tolerance and protection of the welfare of all people and nature

The structure of value types is described in Fig. 1. The motivational types form two bipolar dimensions called self-transcendence – self-enhancement and openness to change – conservation. The conflicting value types are located at the opposite side of the axes, and the compatible types next to each other (Schwartz 1992; Helkama 1999).

In this study the most interesting motivational type is the one concerning the relationship between humans and nature, universalism. Unity with nature, the world of beauty and protecting the environment are among the eight indicators in this motivational type. Consequently, Schwartz’s theory considers mystic, aesthetic and pro-environmental aspects of the relationship between humans and nature.

Schwartz’s theory has been tested in several countries (Schwartz and Bardi 2001; Spini 2003; Schwartz and Rubel 2005; Schwartz 2006; Schwartz and Rubel-Lifschitz 2009) and is being further developed (Schwartz 2011). The relationship between values and behaviors is a focal point. For instance, there are some indications of implications concerning universalism and self-transcendence values and pro-environmental behaviors (Puohiniemi 1995; Schultz and Zelezny 1998).

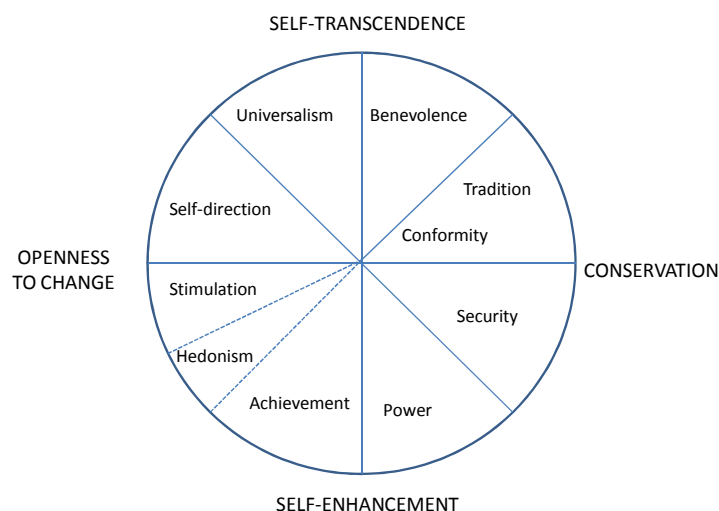


Fig. 1. The structure of the value types. Sources: Schwartz 1992; Helkama 1999; Lindeman and Verkasalo 2005.

3 Data and methods

The data set used in this study was based on a nationwide mail survey on NIPF owners conducted in 2009 (Leppänen 2010; Hänninen et al. 2011). The population consisted of individually or family-owned forest holdings with at least five hectares of forestland in Finland (app. 320 000 holdings). A systematic sampling was conducted using forestland size classes by regions (13 Forestry Center units), the sample size being 1000 forest holdings in each region. The holdings were ordered from smallest to largest by forestland area in each region, and the sample interval was based on the total number of holdings within each region. Every twenty-fourth holding was chosen from the whole country. This procedure produces regionally representative forest holding size distributions in the subsamples. The response rate in mail inquiry was 49% and hence the usable number of responses was 6318 for the whole country.

The analysis of non-response revealed that the sample was somewhat biased: farmers' proportion of the respondents was smaller than their share in the original sample based on the register data (Hänninen et al. 2011). Therefore, case weights were applied in the analysis.

The survey questionnaire included a common part and three varying parts for different forest owner subsamples which were geographically evenly distributed throughout the country. The subsample whose questionnaire included also value measure consisted of 2116 responses from forest owners. However, usable number of observations in the analysis of values varied between 1860–1891 due to missing items.

The questionnaire was designed, tested and administered following Dillman's (2007) procedure. The common part of the questionnaire was mostly based on earlier studies in order to provide monitoring data (see Karppinen and Hänninen 2006). It included demographics and holding characteristics such as the owner's age, gender, occupation, vocational education, place of residence, forest acreage, length of land tenure and way of acquisition of the holding. Also information on the objectives of forest ownership and forestry behavior was collected. The special part included, *inter alia*, value questions measured by the slightly modified Short Schwartz's Value Survey (SSVS, Appendix 1) (Lindeman and Verkasalo 2005). The SSVS directly measures motivational types instead of using several value indicators. The length of the questionnaire was limited, so the SSVS was used for practical reasons. According to Lindeman and Verkasalo (2005), this short value measure has proved to be relatively reliable in spite of its condensed nature.

The data were analyzed by calculating means and percentage distributions. Values were analyzed by ranking the means of the value scores and also comparing them using radar graphs. Binary logit models (Afifi and Clark 1984; Hosmer and Lemeshow 1989) were also applied to identify value types.

Prior to the analysis of the values, the forest owners were grouped based on their stated objectives of forest ownership following earlier studies (Kuuluvainen et al. 1996; Karppinen 1998; Favada et al. 2009; Hujala et al. 2013) (Appendices 2 and 3). The data used in this analysis consisted after imputations of 1728 observations. The objectives were first condensed into three interpretable dimensions using principal component analysis providing a limited number of broad categories of objectives (Mulaik 1972; Lewis-Beck 1994; Hair et al. 1998). Thereafter forest owners were grouped into five groups based on these dimensions of objectives by K-means cluster analysis (Anderberg 1973; Hartigan 1975; Hair et al. 1998): multiobjective owners, recreationists, self-employed owners, investors and indifferent owners. The group labels are based on the principal component with the highest mean score, except for the multiobjective and indifferent owners. The variable indicating group membership was used as a background characteristic in the analysis of values.

4 Results

4.1 The public's and the forest owners' values

The rankings of the means of the ten value scores reveal some differences in value priorities between the public and the forest owners (Table 1). The results concerning the public's values are based on Puohiniemi's (2006) study. The three most important values were benevolence, security and conformity in both groups. Similarly, power was ranked lowest among the forest owners and the public. The forest owners ranked tradition as the fourth most important, but tradition was ranked last but one among the public at large. It appears that forest owners feel that respect for tradition, humbleness, accepting one's portion in life, devotion and modesty are relatively important aspects in their lives.

Another difference in the rankings was the place of universalism: it was ranked one position lower (the fifth) among the forest owners than among the whole population. This difference was clearly emphasized when the female forest owners were compared to women in the whole population (Table 2). It was the fifth most important value for the female forest owners, but second in rank for female citizens in general. Such aspects as the beauty of nature and the arts, unity with nature and environmental protection, *inter alia*, are less important for those females who own forestland.

4.2 The forest owners' values by demographics and ownership objectives

The forest owners' values in subgroups were described using radar graphs in Fig. 2. The differences in the mean value scores by owner characteristics were in general not large, but the "visible" differences were statistically significant according to ANOVA. The shapes of the diagrams seem to be in accordance with the value theory. If the value in question was ranked highly, the equivalent opposite value was ranked lower. This "non-diamond" shape confirms theoretical expectations of the structure of the values.

The female forest owners were more in favor of values such as universalism, tradition and benevolence (helpfulness, honesty, forgiveness, loyalty, responsibility) than the male owners. Unexpectedly, the forest owners more than 60 years old emphasized more universalism than the owners less than 40 years old. They were also more in favor of traditions, benevolence, security (national security, family security, social order, cleanliness, reciprocation of favors) and conformity (obedience, honoring parents and elders, self-discipline, politeness) than the owners under the age

Table 1. Ranking of values: the public (Puohiniemi 2006) and forest owners.

Public	Forest owners
BENEVOLENCE	SECURITY
SECURITY	BENEVOLENCE
CONFORMITY	CONFORMITY
<u>UNIVERSALISM</u>	<u>TRADITION</u>
HEDONISM	<u>UNIVERSALISM</u>
SELF-DIRECTION	SELF-DIRECTION
ACHIEVEMENT	HEDONISM
STIMULATION	ACHIEVEMENT
<u>TRADITION</u>	STIMULATION
POWER	POWER

Table 2. Ranking of values: the female public (Puohiniemi 2006) and female forest owners.

Female public	Female forest owners
BENEVOLENCE	SECURITY
<u>UNIVERSALISM</u>	BENEVOLENCE
SECURITY	CONFORMITY
CONFORMITY	<u>TRADITION</u>
SELF-DIRECTION	<u>UNIVERSALISM</u>
HEDONISM	SELF-DIRECTION
ACHIEVEMENT	HEDONISM
STIMULATION	ACHIEVEMENT
<u>TRADITION</u>	STIMULATION
POWER	POWER

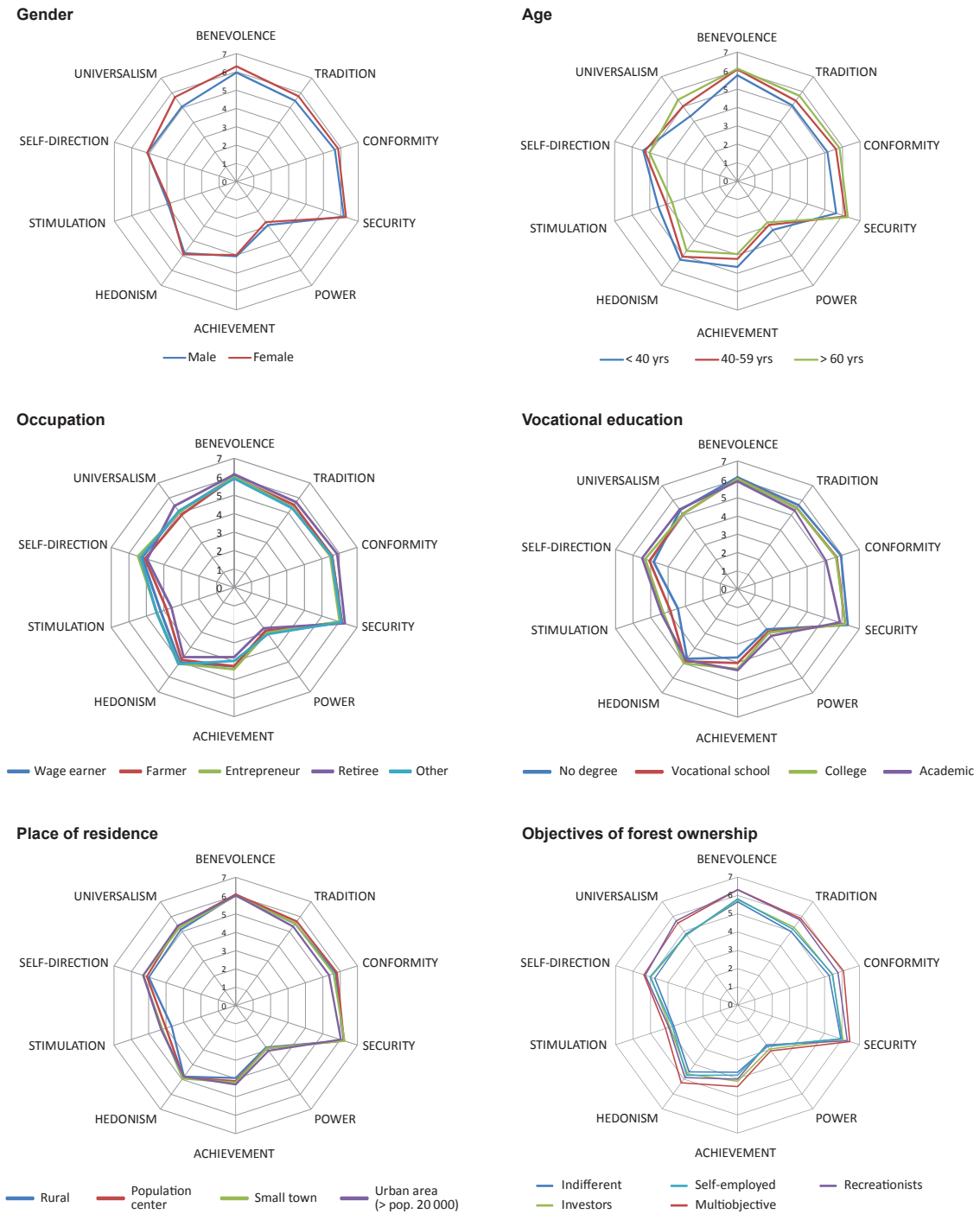


Fig. 2. Means of value scores by the forest owners' demographics.

of 40 years. Instead, the young owners emphasized, according to the theory, conflicting values such as stimulation (daring, a varied and challenging life, an exciting life), hedonism (gratification of desires, enjoyment of life, self-indulgence) and achievement (success, capability, ambition, influence on people and events) more than the old owners. The value profile of the middle-aged forest owners (40–59 yrs.) was closer to that of the old owners than the young owners' profile.

The forest owners' occupation did not indicate the owners' values; the value profiles in various occupation groups were relatively similar. The farmers emphasized universalism slightly less than others. Naturally, the retirees' value priorities were similar to those of the old owners. The more educated the forest owners were, the more emphasis was given to self-direction (creativity, freedom, curiosity, independence, choosing one's own goals), stimulation and achievement. The forest owners without a vocational degree were clearly less in favor of stimulation and more in favor of conformity than those with an academic degree. The location of the permanent residence did not affect the value profiles. However, rural residents emphasized slightly less stimulation than more urban owners. There were only minor differences in values concerning the length of land tenure or the holding size.

Only 15% of the Finnish forest holdings change ownerships in the free market, others are either inherited or bought from parents and relatives or mixing both ways, or donated (Hänninen et al. 2011). However, it is interesting to note that those who actually bought their forests emphasized more achievement and power (self-enhancement) as well as self-direction and stimulation (openness to change) than those who acquired their forests from the family via inheritance, donation or purchase.

As regards to forest owner groups based on ownership objectives, the multiobjective owners and recreationists had relatively similar value profiles emphasizing universalism, self-direction, tradition, benevolence, conformity and security (Fig 2., for the objective groups, see Appendix 3). The multiobjective owners gave the highest rankings to all the motivational types except universalism. The value profiles of the three remaining groups, the self-employed owners, investors and indifferent owners, were relatively similar.

4.3 Softies and Toughies

The forest owners were also classified into groups based on their values. Two dichotomous groupings describing the conflicting basic values, self-transcendence and self-enhancement (Schwartz and Rubel-Lifschitz 2009), were formed. *Softies* (positive case n=850) highly emphasized benevolence and universalism (at least 6 on the score from 1 to 7). Similarly, *Toughies* (n=78) were strongly in favor of power and achievement. The comparison of the two groupings was handicapped by the small number of Toughies, which could be expected based on the rankings on the value scores.

Table 3 summarizes Softies and Toughies by owner characteristics. The share of males was larger among the Toughies than the Softies. This was actually the only statistically significant difference. The Softies were on average older and more urban than the Toughies, who were more often farmers and rural residents. The Softies more often had an academic degree and were more frequently recreationists than the Toughies. In turn, half of the Toughies had multiple objectives for their forest ownership.

Logit models were applied to deepen the analysis of the background differences. Due to the low number of observations, Toughies could not be identified by estimating models. The analysis was started by stepwise regression using both forward selection and backward elimination. The reduced model explaining the probability of the forest owners to be numbered among the Softies is shown in Table 4. The *ceteris paribus* estimation results compare well with the cross-tabulations above. According to the results, the probability of a forest owner belonging to the Softies increased

Table 3. Softies and Toughies by owner characteristics.

Characteristic	Softies % of forest owners	Toughies % of forest owners
Gender		
Male **	68	80
Female	32	20
Owner's age, yrs		
< 40	3	11
40–59	33	36
≥ 60	64	53
Occupation		
Wage earner	29	29
Farmer	14	22
Entrepreneur	6	8
Retiree	49	40
Other	2	1
Vocational education		
No degree	30	35
Vocational school	36	36
College	19	19
Academic	15	10
Place of residence		
Rural	51	61
Population center	20	19
Small town	18	13
Urban area (> pop. 20 000)	11	7
Objective group		
Multiobjective owners	34	45
Recreationists	32	20
Self-employed owners	14	15
Investors	13	12
Indifferent owners	7	8
n	850	78
** Significant at 5%		

by age. The probability was higher for the female owners and the owners with recreational or multiple objectives (reference group, indifferent owners). The female owners belonged almost twice as likely to the Softies as the male owners, and the recreationists and multiobjective owners approximately three times as likely as the indifferent owners.

In addition, following Roncek (1991), the direct probabilities of group assignment were calculated by different value combinations of the independent variables. The most “favorable” value combination – the owner being female, old (upper quartile 70 years) and a recreationist – yielded the probability of belonging to the Softies as 77%.

Table 4. Forest owners' probability of assignment to Softies. Logit model.

Characteristic	Reduced model		
	Coeff.	Odds ratio	Sig.
Constant	-2.930	0.053	0.000
Gender			
Male=0	0.654	1.922	0.000
Female=1			
Owner's age, yrs	0.033	1.033	0.000
Objective group			
Multiobjective owners	1.023	2.782	0.000
Recreationists	1.173	3.231	0.000
Self-employed owners	0.400	1.491	0.099
Investors	0.005	1.005	0.984
Indifferent owners (reference group)			
Log-likelihood	1624.6		
Pseudo-R ²	0.146		
n	1295		

5 Discussion

Schwartz's value theory is a good fit for testing the value priorities of forest owners. The "non-diamond" shapes of the radar diagrams appear to be in accordance with the theoretical expectations of the structure of the values. If the value in question is ranked highly, the equivalent conflicting value is ranked lower. This confirmation is to be expected: Schwartz's theory has been tested in tens of countries (Schwartz and Bardi 2001; Spini 2003; Schwartz and Rubel 2005; Schwartz 2006; Schwartz and Rubel-Lifschitz 2009).

The three most important values, both among the forest owners and the public, are benevolence, security and conformity. Power is ranked lowest in both groups. The forest owners rank tradition as the fourth most important value, but it is ranked very low by the public at large. Forest owners perceive respect for tradition, humbleness, accepting one's portion in life, devotion and modesty as relatively important. The result is not unexpected, taking into account that most of the current Finnish forest owners, no matter how urban their current living conditions might be, have a rural background.

The forest owners rank universalism slightly lower than the public in general. This difference is clearly greater when the female forest owners are compared to women in the whole population. It is the fifth in the female forest owners' ranking, but the second among the female citizens, directly after benevolence. It seems that, for instance, the beauty of nature and the arts, unity with nature and environmental protection are less important for female forestland owners than Finnish women in general. This difference may be partly explained by technical reasons. Female forest owners are underrepresented in the data, because only one questionnaire was mailed to each forest holding. The desired respondent is the one taking care of the forest management, who is most often a male person. Perhaps the female forest owners in the sample are the real decision-makers in forest management and represent, therefore, "harder" values.

The female forest owners, however, emphasize universalism, tradition as well as benevolence more than the male owners. In general, the differences in the mean value scores by forest owner categories are not large. The literature on gender differences in values gives ambiguous

results. For instance, Prince-Gibson and Schwartz (1998) found no differences in values between men and women in Israel. However, Schwartz and Rubel (2005) and Schwartz and Rubel-Lifschitz (2009) found that women valued benevolence and universalism more than men, which compares well with the results of this study. They also found, following theoretical expectations, that men inherently valued the contrasting values, power and achievement, *inter alia*. According to Schwartz and Rubel-Lifschitz (2009), gender differences in values may increase as gender equality in the culture increases. Therefore, greater value differences could be expected among Finnish forest owners.

The presented differences in general values by the forest owners' demographic characteristics in Finland are not directly comparable with the results concerning the US public and forest-related values. However, it seems that female citizens' value orientations are "softer" in both cases (Steel et al. 1994; Vaske et al. 2001; Tarrant and Cordell 2002).

The elderly forest owners (more than 60 years of age) emphasize universalism, tradition, benevolence, security and conformity more than the owners under the age of 40. Instead, these younger owners emphasize contrasting values, such as stimulation, hedonism and achievement, more than the older owners. The results of this study are partly in line with the previous literature. According to Prince-Gibson and Schwartz (1998), age was positively related to tradition and benevolence and negatively to achievement, hedonism and stimulation.

The results concerning the effect of the level of education on value priorities also partly compare with the previous literature on the topic. Prince-Gibson and Schwartz (1998) concluded that education increases the importance of stimulation, self-direction and universalism, and diminishes the emphasis on tradition, conformity and power. According to this study, the more educated the forest owners are, the more emphasis is given to self-direction, stimulation and achievement. Forest owners without a vocational degree value stimulation less and conformity more than those owners with an academic degree. The forest owners' occupational status does not explain their value priorities. This is in line with the findings of Prince-Gibson and Schwartz (1998). The rural or urban residence area does not affect values either.

The multiobjective owners and recreationists have relatively similar value profiles, emphasizing universalism, self-direction, tradition, benevolence, conformity and security. In addition, the multiobjective owners give the highest rankings to nine out of the ten value types, the only exception being universalism. The value profiles of the three other objective groups are relatively similar to each other.

The *ceteris paribus* estimation results confirm the descriptive results presented above. The probability of belonging to the Softies (high emphasis on universalism and benevolence) increases by age and is higher for the female owners compared to the male owners, and for the owners with recreational or multiple objectives compared to the indifferent owners. The female owners can be assigned to the Softies almost twice as likely as the male owners, and the recreationists and multiobjective owners three times as likely as the indifferent owners.

In a country with a wide population of family forest owners, demographic trends in the whole population can be assumed to be also seen among forest owners. General value changes in society are also reflected in forest owners' values, although there are differences in the value priorities between the forest owners and the public. However, the relation between forest owners' values, ownership objectives and forestry behavior is complicated. The owners with recreational or multiple objectives have relatively similar value profiles. The previous literature (Kuuluvainen et al. 1996; Favada et al. 2009; Kuuluvainen et al. 2013) suggests that the multiobjective owners are the most active forest owner group, and the recreationists and indifferent owners, on the contrary, the most passive groups in their timber supply behavior. Thus, the relationship between values and forestry behavior remains ambiguous. It is evident that simple monitoring of changes in public

values is not sufficient for drawing conclusions on forest owners' behavior. Further studies on the relationships between forest owners' values, objectives and behavior are required in the future.

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Appendix 1. Short Schwartz's Value Survey (SSVS) (Lindeman and Verkasalo 2005; Hänninen et al. 2011).

We ask you to rate the importance of the following values as a life-guiding principle for you. Choose alternatives on the scale 1 Not important...7 Very important

1. POWER (social power, authority, wealth)
2. ACHIEVEMENT (success, capability, ambition, influence on people and events)
3. HEDONISM (gratification of desires, enjoyment of life, self-indulgence)
4. STIMULATION (daring, a varied and challenging life, an exciting life)
5. SELF-DIRECTION (creativity, freedom, curiosity, independence, choosing one's own goals)
6. UNIVERSALISM (broad-mindedness, the beauty of nature and the arts, social justice, a world at peace, equality, wisdom, unity with nature, environmental protection)
7. BENEVOLENCE (helpfulness, honesty, forgiveness, loyalty, responsibility)
8. TRADITION (respect for tradition, humbleness, accepting one's portion in life, devotion, modesty)
9. CONFORMITY (obedience, honoring parents and elders, self-discipline, politeness)
10. SECURITY (national security, family security, social order, cleanliness, reciprocation of favors)

Appendix 2. Objectives of forest ownership. Principal component analysis. Varimax rotation (loadings below 0.250 denoted by an asterisk, n = 1728 after data imputations) (Mulaik 1972; Lewis-Beck 1994; Hair et al. 1998).

Objective	Economic security and regular sales income	Non-timber benefits	Self-employment opportunities and outdoor recreation
Security for old age	0.811	*	*
Hedging motives	0.796	*	*
Funding of investments	0.734	*	0.290
Security against inflation	0.708	0.288	*
Asset motive	0.692	*	*
Credibility	0.684	*	*
Regular income for consumption	0.665	*	0.375
Income from labor	0.570	*	0.482
Inheritance	0.556	0.364	*
Aesthetic values	*	0.782	*
Solitude and meditation	*	0.729	0.271
Nature conservation	*	0.722	*
Biodiversity	*	0.715	*
Outdoor recreation	*	0.603	0.512
Roots in native locality	*	0.600	*
Inherent value	0.294	0.587	*
Residential environment	*	0.560	0.545
Berry picking	*	0.558	0.502
Household timber	*	*	0.632
Forest work	*	0.309	0.608
Hunting	*	*	0.544
Speculative motives	0.441	*	*
Eigenvalue	4.794	4.345	2.581
Variance explained (%)	22	20	12

Carmines' theta (0.904) is computed for the unrotated solution as follows:

$\Theta = [N/(N-1)][1 - (1/\lambda_1)]$, where N is the number of items in the total principal component analysis and λ_1 is the largest (the first) eigenvalue. Θ may be considered a maximized Cronbach's alpha coefficient. (Carmines and Zeller 1979; Vehkalahti 2000)

Appendix 3. Forest owner groups based on ownership objectives. K-means cluster analysis (Anderberg 1973; Hartigan 1975; Hair et al. 1998).

Owner group	n	Economic security and regular sales income	Non-timber benefits	Self-employment opportunities and outdoor recreation
Mean of principal component score (st. dev.)				
Multiobjective owners	501	0.782(0.622)	0.467(0.587)	0.605(0.578)
Recreationists	400	-0.637(0.745)	0.976(0.567)	-0.476(0.743)
Self-employed owners	337	-0.760(0.772)	-0.619(0.717)	0.878(0.549)
Investors	318	0.805(0.535)	-0.719(0.742)	-0.753(0.924)
Indifferent owners	172	-0.793(0.508)	-1.087(0.733)	-0.983(0.714)
	Σ 1728			
F-value		561.348	573.91	447.669
P-value		0.000	0.000	0.000
Coefficient of variation st.dev/mean				
Multiobjective owners		0.80	1.26	0.96
Recreationists		1.17	0.58	1.56
Self-employed owners		1.02	1.16	0.63
Investors		0.66	1.03	1.23
Indifferent owners		0.64	0.67	0.73