



FOREST OWNERS' DECISION MAKING – THE IMPACT ON NEW SERVICE CREATION



EUROPEISKA UNIONEN

Interreg
Botnia-Atlantica

Europeiska regionala utvecklingsfonden



Prosperous forest

Diversification through Inclusion and Specialisation

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BACKGROUND

Rikare skog - diversifiering genom inkludering och specialisering is a project funded from Interreg Bothnia-Atlantica -programme aiming at understanding the forest owners' decision making and to developing and piloting new services for forest owners. This summary presents the results of WP1, which focused on exploring forest owners' decision making process, at grass root level, by drawing upon previous research, understanding on existing services and project workshops. This was done by mapping out the existing research and adding ideas and understanding of human decision making process from the psychology and consumer research approach. Also the existing services targeted to the forest owners were mapped out and analyzed. In addition, focus group interviews of private forest owners were organized to test the decision making process ideas as well as to develop potential ideas for the piloting. At the end, also workshops for the forest-based advisor companies were organized to study how they understand forest owners' decision making, their strategies in relation to service provision/development, and test potential pilot ideas. The following report concise and summarizes the results of the WP 1.

Table 1. The information gathering methods in the WP.

Method	Type of information
Literature review of existing research related to the forest owners' decision making and decision making process.	What is known and highlighted in the research?
Multidisciplinary cross-country workshop with experts from the fields of psychology and consumer research.	The forest owner research is traditionally focused on foremost the forest resource and its use. What new input can be learnt from other sectors with longer history on studying human behavior?
Mapping out the existing services targeted to the forest owners.	What is already offered and are there any gaps?
Forest owner workshops.	Bringing the ideas of decision support to the practical grass root level, to get new ideas how potential pilots could help forest owners decision making?
Forest-based advisory company workshops	From a business point of view, what additional need of service provision is there and what is their interest in the further development?

FOREST OWNERS' DECISION MAKING PROCESS – WHAT DO WE KNOW ABOUT THAT?

The practice as well as research has proved that the private forest owners' decision making is not, as much on rational aspects than previously assumed in the sector. For instance, economical rationality is just one dimension influencing on decision making and also different kinds of emotions have a big role in it. This should be understood also in the advisory service sector.

When applying ideas from consumer research, the customer is widely considered to gain several benefits from the service or product they buy. Consumer research highlights today different consumer experiences from the products. Consumption is seen as a holistic experience including different elements, like economic benefits, solving problems for the consumer, providing convenience and/or experiences for the consumer or empowering the consumer (Fig. 1). Similar, the current forest service provision seems to aim for economic benefits, solving problems and also providing services that are convenient to buy for the forest owner. However, maybe the role of providing the experiences, like relating to excellence, esteem or efficiency, to the forest owner or empowering the forest owner is less apparent. The current services aim to involve the forest owner to the decision making process but not focus so much

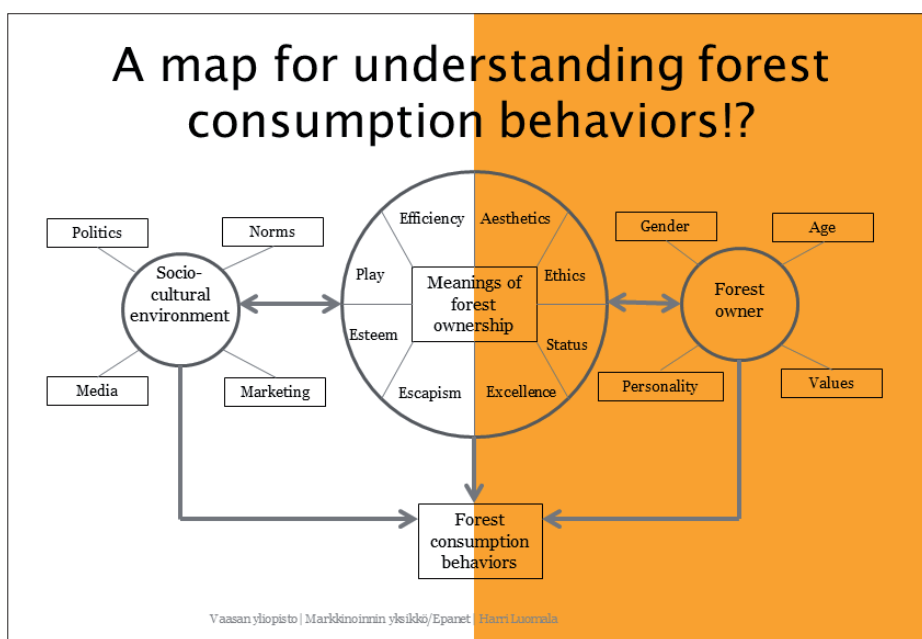


Figure 1. A framework for understanding forest owners' consumption behavior based on consumer research approach (Illustration: Luomala, H. 2019).

about how the process is experienced by a forest owners. For example, at the moment, the forest owners are not really included in the discussion of how the forest resources' can contribute to sustainable development and the solution of some environmental problems. Instead in the emerging bioeconomy discourse, the wood processing industry, forest based products (e.g. wood buildings) and the producers seen contributing to e.g. the mitigation of climate change. Even though, the forest owners are the primary providers of the bio material for these products, they are not recognized and made visible in the discourse.

According to the neuroscience research, in pressure of time or in other stressful situation, humans easily select the familiar way of behaving. In relation to passive forest owners, this probably means doing nothing. To be able to persuade the forest owners to act in a way, not typical for them, they need time and unstressful environment to make such a decisions. The public discussion may already create this stress to some forest owners, as there are strong social norms in both countries on what constitutes as a “good forest owner” and what kind of behavior is considered wrong. In changing this as well as introducing any new innovation in the sector, the role of opinion leaders is important. In addition, there are a huge variation of issues that impact to human behavior in decision making situation some even physically connected. This means that, at different day and with different physical/emotional conditions of the forest owner the results of the same advising process can be totally dissimilar. This implies challenges to the service provision and especially in providing suitable frameworks to support decision making.

ALL DECISIONS ARE NOT SIMILAR – THE IMPORTANCE OF DIFFERENT DECISION MAKING LEVELS

In addition to physical and emotional factors, also the nature of the decision and the extent of its consequences influence naturally on decision making. Therefore, the same issue can have different kinds of impacts on decision making depending on what kind of decision is in question – whether it is strategic decision e.g. on buying or selling the forest or a decision from which contractor to use for harvesting (Fig 2). This complexity should be taken into account when aiming to understand the issues that influence on forest owners' decision making.



Figure 2. Levels of decision making in the context of forest ownership and management.

WHAT DOES THE PREVIOUS RESEARCH TELL US?

There is plenty of research discussing on private forest owners' decision making, at least in some level. The research has been focused on different elements related to the decision making (figure 3). The **resource related aspects** link to the characteristics of the forest holdings, and what kinds of possibilities they provide for utilization of the forests. These kinds of characteristics are for example size of the property, what kind of forest /nature areas the property includes etc. All these naturally has an impact on the decision making as well.

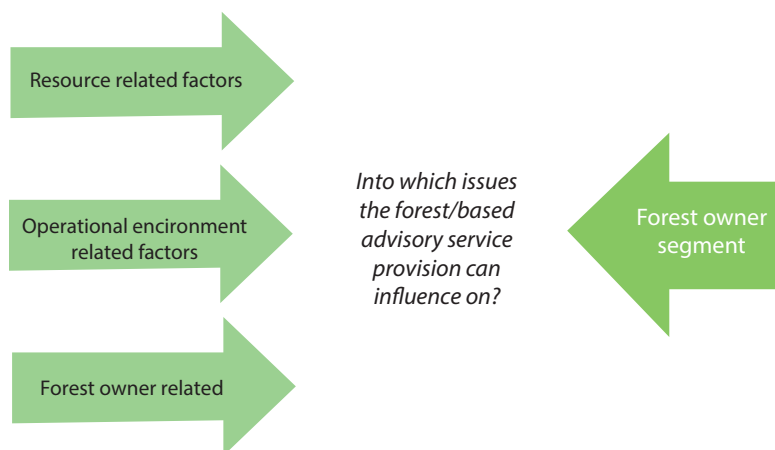


Figure 3. The different aspects influencing on forest owners' decision making based on the previous research.

In addition, to **the operational environment of the forest ownership** has an influence on the forest owners' decision making and to what kinds of decisions are possible to made. These are for example legal or policy related aspects (e.g. tax regulations, land parceling regulation, different subsidy schemes available), market related factors (like dynamic of the property or timber markets) or the social regulation and public discourses which create the accepted social norms to the forest owning.

The third entity influencing on the decision making found from the research is **forest owner related issues** like personal characteristics/traits, decision making mode the forest owner uses, age, family situation, length of the land tenure etc. According to the literature there are indications that the forest owner related factors impact on decision making in all decision making levels, while resource and operational environment related factors focus more concretely only to certain types of decisions, like only at operational or strategical level. The summary of the research findings is presented in the Annex 1.

WHAT ALREADY EXISTS IN THE SERVICE PROVISION?

At the moment, a great number forest related services exist in both Finland and Sweden. In general, they can be divided into physical and digital services, subject to a charge or for free, and publically or commercially provided. If categorized by the content, they can be described as:

- Planning services. For example: forest management plan, designing the stand marked for harvesting, forest operation planning, forest biodiversity surveys
- Operative forest work. For example: forest regeneration work, planting and tending of young stand, stand marked for harvesting, thinning, first thinning, special thinning, regeneration felling, special harvests, pre-clearing of a harvest area, stump ripping, wood transportation, forest road construction and maintenance, ditching and drainage.
- Managing forest services and audits. For example organizing timber sale agreements, energy wood sale agreements, Kemera applications (abbreviation from Act on the Financing of Sustainable Forestry in Finland), inspection measurements and harvest controls, Forest property assessment, forest certification (PEFC/FSC) services.
- Trainings and advisory services. For example different kinds of trainings for forest owners, new forest owners, forest based entrepreneurs on numerous subjects, like forest taxation, Forest estate's change of generation, jointly owned forest.
- Non-wood forest services. For example providing NWFP production and collection related services, like buying mushrooms, cultivating chaga mushroom, berries, birch sap, rasin etc. or making a contract with a forest owner on behalf of the NWFP company on the collection rights.
- Recreational services. For example providing support for designing and implementing hiking or snow mobile trails, infrastructure etc.

Due to the large amount of available services, both commercial and public, it can be claimed that it is not likely to find a clear lack of service provision. However, there is a plenty of room to modify and tailor the existing services to the different forest owner segments, improve the joint value creation in the service processes as well as increase the differentiation in marketing and communicating for different forest owner segments. It can also be argued that almost all services offered are related to timber production and thereby limits the options for forest owners decision making – thereby constitution a lack of service provision.

FOREST OWNERS' WORKSHOPS

In the forest owner workshops one of the key findings on factors influencing on the forest owners decision making was the meaning of forest to them, not only the objectives for the forest ownership. For some it was foremost an economic resource, for some the link to the family and for some a hobby/recreation. Often the meaning of the forest was a mixture of all of these. This set challenges to the service provision and decision support. How much of it can be tailored based on the forest owners objectives or approach to the forest owning and still keep the service economically viable for the provider?

There was a clear need for support though. Many of the owners mentioned that the responsibilities related to the forest owning are often difficult for them to handle for one reason or another. They are also labour intensive and a lot of knowledge is needed. For example, bureaucracy (Kemera, taxation, change of generation) and choosing the right forest operations and operators was considered difficult among the new forest owners. The forest owners also mentioned that sometimes there is a lot of pressure towards owning a forest and making decisions related to it. As the sources of this pressure were mentioned family, societal needs, companies (when e.g. demand for wood/pulp is high) and even the forest service was seen to put pressure to the forest owners.

The decision making as such was highlighted e.g. by the following issues:

- The single most important guidance and support for the decision making is the forest management plans. Forest management plans was also a guide for the forest owners own observations. Thus they form an important decision support tool and an opportunity to more long term and strategical level decisions related to forest owning
- Many decisions are governed by external and unpredicted circumstances (e.g. damages by storm, snow, bugs) forcing the forest owner” to take certain decisions and carry out management activities although the prices on timber may have dropped.
- Forest company/forest owner association advisors are often used to support in the decision making process. The role of trust and familiarity of the advisor had a huge impact.
- Forest magazines, forest days and web-based courses were highlighted as a source of knowledge especially in Sweden. In Finland many mentioned metsään.fi as a tool and their use of it.
- The timber market can and do affect decision-making (price, bonuses), especially to those forest owners focusing on economic aspects, but also for those who do not have very strong emotions/opinions on the use of their forest. When the price is especially good, the forest owners see no reason not to sell, even though they may not have very strong desire to commercial harvesting in general.
- Domino-effect i.e. when some forest operations are undertaken on forest property it often stimulates the neighboring forest owners to initiate similar activities either because of their own initiative or because they have been approached by same service provider.

According to the forest owners, at the moment, there are a lot of service offers related to timber production, but it is difficult to evaluate which are good, neutral, bad or expensive. Thus, there is a demand for “neutral simple forest services”. Big forest companies are providing nowadays also more and more forest management and support services, but quite many of the forest owners doubted their quality and even more their motives. The big companies were seen to serve only their own benefit, not the individual forest owners’. On the other hand, some Finnish forest owners saw that big forest companies are offering better quality services and offering better price for wood than can be organized through forest management association. Thus, based on forest companies’ good offers, many had decided to take services only from big companies.

The forest owners also envisioned some potential concrete services, in a wider sense, that they might be interested in. Following some of these are listed:

- Need for peer-to-peer learning, e.g. forest mentoring could be an effective learning method. There are experienced forest owners who could share their knowledge and experience for younger/beginner forest owners.
- Un-official Facebook group for forest owners, for sharing experiences and asking advice, or if there already is one
- A tool for comparing service offers
- Ready-made, well designed, forest owning packages needed for distant forest owners.
- More information spreading on jointly managed forest needed for urban forest owners and FO owning small forest estates.
- Decision support for selling a forest property and highlighting it’s value should be acknowledged as forest owners also often tend to think that my forest property is worth for nothing.
- Alternative forest management methods as continuous forestry interests many owners. However, there is not enough information or services supporting this interest.
- The cost-efficiency of forest roads and how to build and maintain those
- How climate change may affect the forest and how my forest can help mitigate, e.g. by carbon sequestration. A “carbon budget” should be included in the forest management plan.

In general, the workshops reviled that the forest owners’ feel that at the end their different objectives are not fully taken into consideration in forest service provision, especially Forest Associations were mentioned in this regard. For example, there is a nice possibility to choose objectives (harvest income, recreation, biodiversity, timber quality, game management, mushroom/ berry picking etc.) for forest owning in metsään.fi -service, but it does not really lead to anything or is much visible in management suggestions. In addition, it was mentioned that forest advisor’s attitudes and values have an influence and also reflect to their advisory work.

FOREST-BASED COMPANY WORKSHOPS

The forest based advisory companies approach to the service development is naturally the economical one. If there is enough markets and paying customers, the companies are ready to launch new services. However, they are not that interested in developing marginal forest owners segments, especially those, who are less likely to sell timber. However, there seem to be interest towards the niche markets especially by the smaller operators and companies where the needed expertise already exists. Also if existing services could be easily fine-tuned, there is an interest towards developing new types of services.

In addition to the forest advisory companies, who mainly focus on wood production activities, a few companies focusing on nature-based entrepreneurship (non-wood forest products) took part in the workshops organized in Finland. They highlighted the need for functioning raw material supply and the income potential it provides to the forest owners. For example, they pointed out the great need for wild herb or wood based products (e.g. resin, sap) collection stations, in order to get more raw material on high season and include local people. In many cases this requires a permission of forest owners and an active supplier network. These companies also saw that the dominant value in forest services is in timber production due to the intense lobbying of forest industry sector. Forest owners are not aware of the different values and advantages of their forests, e.g. peat, wild herbs, berries, plants, game and wild animals, green care, chaga mushroom and other edible mushrooms. The nature-based companies stated also that forest owners need somebody (a forest advisor) to walk with them in the forest and introduce them in to these different possibilities of their forest. This could be one new potential service.

SOME CONCLUSIONS

In order to develop advisory services to overcome the obstacles and/or support forest owners' decision-making, it is worthwhile firstly to consider, into which factors of the decision-making the forest-based advisory services can influence on and secondly, to which factors the current service provision does not provide sufficient support for, meaning that there might be room for new services or need to improve the existing ones.

WHERE CAN THE FOREST-BASED SERVICES HELP?

The possibility to influence on the resource-based aspects with totally new forest-based services is rather small. The current service provision already aims to reduce management operational costs by coordination of logistic (economy of scale) and gather larger areas for joint management or harvesting activities as well as aims to form larger conservation areas by combining the land from several forest owners. Similarly, the possibility of the advisory-based services to solve for example tax system or land parcelling regulations (operational environment), which have an influence on forest owners' decision making is fairly slim. The service providers can naturally help the forest owners to cope with the current regulations but cannot really change them and thus their impact in decision making process. Neither the service provision can very easily influence on personal characteristics of the forest owners. However, the services can be modified better to match these characteristics. At this point, one must, nevertheless, consider for which forest owner segment the services are targeted for as the factors influencing on decision making have different impact among the different types of forest owners, as also the previous research proves. It is also worthwhile to consider in the service provision, who's objectives the advisors actually aim to fulfill. Are these truly forest owners' own personal objectives or the ones that are created for the use of the forest resources by the society?

HOW DO THE EXISTING ADVISORY SERVICES WORK?

In general, the findings indicate that *usually forest services are not designed properly for clients' perspective*. It is difficult for new forest owners to have an understanding, what is available as there are so many actors and so much information. Even though there are plenty of services, they are not well designed and marketed or targeted.

The service provision is basically driven by the prospect of wood/timber production At least in Finland, there are only a few national actors, who underline themselves providing services for continuous forest cover; biodiversity, wetland management, wildlife and game, restoration of mires etc. or a bit surprisingly focus on the quality of wood (even sawmills do not really underline it). In addition, mitigation the climate change is not yet mentioned, at all.

Some of the existing services do not work as planned. Forest owners do not use operational services, especially tending of seedling stand or pre-commercial thinning because they do not see the value of it. The value of increased wood amount and quality is not taken into account in the decision-making, only the price of the service at the present. It is difficult for the forest owners to focus on the benefits that may not realise until decades and sometimes only for the next generation of forest owners. Stewardship discourse has been used to market these services, but perhaps it's persuasion power is decreasing for some reason?

Because of former incentive policy, the forest management plan used to be almost for free in Finland, (and also in Sweden in the 1980s), and therefore forest owners are nowadays reluctant to pay the real/full price of the management plan. In Sweden, a new generation of forest owners do understand the value of a management plan, not least in their communication with operational service providers and authorities. Yet in the current Finnish case there is a need to renew the forest management plan somehow. Maybe by using rebranding or using service design to create added value? In Sweden the situation has been different. There might be something to learn on the differences between the countries related to the forest management plan introduction.

The easiness to buy and use forest services is the key, but without taking the feeling of control away from the forest owner. Nowadays nearly every consumer behavior study shows that people want everything to be easy: eating, cooking, shopping, living etc. Generally, everything should be very easy, ready-made and tailored for us. This trend is visible also in the forest-based services. However, the vital thing is that even though the forest owners want easy advice and solutions, they still want to be in control of their forests. Thus, even easy services should still give a perception of control to the forest owners. For example stewardship agreements would be a very easy solution for the forest owners concerning forest management, but have not been as successful as originally thought. The feeling of lack of control is probably one reason for that. The lack of trust towards the forest service provider further decreases the feeling of control. However, this concern both relate to forest owners and the advisory and service companies since trust is fragile and full control comes with responsibilities and accountabilities – which both parts might not willingly take on.

According to the results of mapping out the existing service provision, there is also a need for many companies to renew the *marketing or visibility of their existing services*. At the moment, there are many small and medium size companies, whose webpages are quite weak. Also the *masculinity is still very much visible* e.g. in webpages. Many of the new services are digital aiming to reach also female and urban forest owners.

As a conclusion, it can be said that there is a *plenty of room to modify and tailor the existing services to the different forest owner segments, improve the joint value creation in the service processes as well as increase the differentiation in marketing and communicating for different forest owner segments*.

HOW TO DEVELOP THE SERVICES FURTHER – SOME IDEAS

FOREST OWNER AS A CONSUMER?

Consumer research highlights today different consumer “experiences” from the products. Consuming is seen as a holistic experience including aspects, like economic benefits, solving problems for the consumer, providing convenience and/or experiences for the consumer or empowering the consumer (Fig. 1). The current forest service provision often aims for economic benefits, solving problems and also providing services that are convenient to buy by the forest owner. However, providing the experiences to the forest owner or empowering the forest owner has not a significant role at the moment. For example Coca cola aims to provide the customers wide range of benefits than just satisfy one's thirst. Similarly, it could be considered that what kind of experiences and benefits forest based services could provide to the forest owners than just a managed forest? One way to make the forest owners empowered as well as “own” the forest management process is to integrate them more closely into the planning processes. They need to develop their own “voice” and commitment. At the moment, for example the forest management plans are made for them, hopefully based on their management objectives, but otherwise quite separately from the owners. Similarly, the forest owners could be engaged to make a more strategic level plan, some kind of forest ownership plan or forest strategy. This kind of conscious planning process could help the forest owners, not only to see themselves, but also clearly to communicate their ownership objectives to the potential advisors or service providers. In a way, a forest ownership plan or planning process should be *focused more on the owner than the actual forest resource*.

CREATING MEANING FOR THE FORESTS – A WAY TO ACTIVATE THE PASSIVE FOREST OWNERS?

Especially for the more passive forest owners, there is a need to create at least some meaning to the forests and forest ownership. It can be a meaning of owning forest, but also a meaning for selling or buying management services can be created, either from global or local perspective. For example, at the moment, the forest owners are separated somehow from the discussion of forest resources' potential to solve environmental problems. The industry and forest based products (e.g. wood buildings) are highlighted in this discussion and the producers seen contributing to the mitigation of climate change etc. However, the forest owners as producers of raw material for these products are neglected from this discourse. The forest owners are not at the moment, recognized as part of the wood based value networks.

In pressure of time or in other stressful situations, humans easily select the familiar way of behaving. In relation to passive forest owners, this means doing nothing. In relation to active forest management, this can mean doing more of the same. To be able to persuade the forest owners to act in a way, not typical for them, they need time and unstressful environment to create the conditions for new decisions. On its part the public discussion already creates this stressful environment to some forest owners, as there are strong social norms in the socio-cultural environment (forestry community) both Finland and Sweden on what constitutes as a “good forest owner” and what kind of behavior is considered wrong. In changing this as well as introducing any new innovations in the sector the role of opinion leaders is important.

TRUST IS A KEY!

Both the research and practical experiences highlight the role of trustful relationship between the advisor/service provider and the customer (forest owner). The trust also has to be earned, it does not generate automatically. The personal traits of the advisor as well as the forest owner influence whether this kind of trustful atmosphere can be created. Thus, the personal relations are important. However, sometimes the advising process can focus too much on the rationalism. The role of experience and emotions are maybe neglected. Also advisors are different regarding their personal characteristics -naturally. Different advising styles could be implemented based also on the advisors' skills not only focusing on the forest owners' personal traits. Already now and in the future, the role of online services is increasing and here a one of the key questions is, how to create the trustful relationship within these services.

WHAT IS "THE CORE" OF FOREST OWNING?

Is it also important to understand, how the forest owners perceive themselves as forest owners. Forest owning often has some kind of influence on the owner's identity, whether it is a forest/property owner identity or the forests produce the owner's identity as including them as part of the chain of generations, family or a resident of the local village. Forest owning can also produce some other identity elements. Social norms provide the understanding on what is a good forest owner and through the socialization process, the owners learn from the previous owners or generations what constitutes it. However, the new forest owners may want to build a different kind of forest owner identity, for example as a nature conservationist. It is not easy to influence values and attitudes contributing one's identity. Also threats to one's identity often generate negative feelings and distrust towards the party causing this threat. The advisors/services should be formulated so that the amount of threats to forest owners' personal values and elements influencing their identity are minimized, regardless of the personal opinion of the advisor. This also has an impact on the market argumentation that is used to enhance the use of the forest-based advisory services as it also should fit to forest owners' values.

FLEXIBILITY OR TAILOR MADE – OR A COMBINATION OF THESE?

There are a huge variation of issues that impact human behavior and thus also the decision making. In different physical/emotional/social conditions of the forest owner, the results of the same advising process can be totally opposite. Thus, it is unrealistic to assume that forest-based advisory services could cover all these aspects nor be tailored carefully for each forest owner in each decision making situation. Therefore, to be economically viable but also effective, the potential new services should be flexible, i.e. easily modified according to the decision making style or situation of the forest owner, but at the same time they would need suit the large enough amount of forest owners.

ANNEX 1. SUMMARY OF THE MAPPING OUT OF THE PREVIOUS RESEARCH

In this annex the results of the survey of previous research is collected together. The research was mapped out from Web of Science by using the following criteria:

- Articles published within the last 10 years (2008-2018)
- The search words:
 - “Forest owner*”+decision*+service + Finland/Finnish or Sweden/Swedish
 - “Forest owner*”+decision*+advis* + Finland/Finnish or Sweden/Swedish
 - “Forest owner*”+decision*+extension+ Finland/Finnish or Sweden/Swedish
 - “Forest owner*”+strateg*+service + Finland/Finnish or Sweden/Swedish
 - “Forest owner*”+strateg*+advis* + Finland/Finnish or Sweden/Swedish
 - “Forest owner*”+strateg*+extension+ Finland/Finnish or Sweden/Swedish

The Internet search resulted in total to 43 research articles (19 in Fin and 23 in SWE). The summary of the found research results is presented in the Table 2.

Table 1. Summary of the resource related findings from the literature review.

Factor	Influence	Decision making level	Country
Resources	<p>Small-scale forest owners many have limited possibilities to communicate “biodiversity qualities” of their forest to the market.</p> <p>Decision support program provides help to rank personal preferences and combine them to weigh the importance of net income, nutrient loss, biodiversity, scenic value or the risk of insect pests and thus provide recommendations for management. Assist in making of a comprehensive decision.</p>	Strategic, Tactic	SWE
Physical distance between the forest owner and the forest holdings	<p>Distance has a potential effect on the relations to and of the forest holding, which in turn may have an effect on e.g. knowledge and frequency of activities. For that reason, increasing distances may increase the need for place-based support/advice.</p> <p>Physical distance decrease the impact of traditional and local norm-setting.</p>	Strategic, Tactic	SWE
Other types of land use/users	Potential conflict or need for consideration in long-term and short-term decisions/management, e.g. expressed as restrictions in forest management plan	Tactic, Operational	SWE
Browsing pressure	Browsing pressure seen as one of the main potential risks for the forest resources by the owners.	Operational	SWE

Table 2. Summary of the operational environment related findings from the literature review.

Factor	Influence	Decision making level	Country
Tax system	Age of the forest owner tend to intensify the increasing effect on the forest bequest tax on harvesting. Income and inheritance tax decreases harvesting and ties more capital in the standing stock. Positive effect on other aspects of the forest (governmental policy).	Strategic	SWE
Land parceling regulation	Constrains the options for changes in ownership constellation and property size (e.g. not possible to split properties below a certain production capacity).	Strategic	SWE
Inheritance law & traditions	Traditionally, men has to higher degree inherit forest properties which gives an expectation of inheritance/engagement. However, properties are today often inherited jointly between siblings – which also sets the setting of decisions-making. Due to high land prices, the “buying-out” or compensation of siblings can be costly – and may for that reason come with debt. The perceived expectations of the giver may influence the perceived options.	Strategic	SWE
Regulations & subsidies	Regulations constitute the legislative boundaries of decision-making while subsidies often constitute a pull-factor towards specific behavior/decisions (e.g. related to environmental policy goals).	Tactic, Operational	SWE
Policy/political processes	May have an influence on the willingness to take on various forest-related decisions (either actively or proactively) – e.g. public attitudes towards specific management measures.	Tactic, Operational	SWE
Dynamics of property markets	The various demand for, and types of, properties in different areas of Sweden may have an impact on the supply. Most properties are not exchanged on the market, which contribute to a low supply/dynamic.	Strategic	SWE
Certification	The standard of certification direct influence the forest management of individual owners, while the market has a higher demand for certified timber (with higher premiums)	Strategic, Tactic, Operational	SWE
Land/Property market (value)	Increasing values/price of land both makes it more expensive to acquire land and lower barriers to sell land.	Strategic, Tactic	SWE
Timber market	Price had little impact on selling while concern about soil fertility had a negative impact. Timber harvest as the main source of fuel wood sale. Selling forest owners: 1) active manager seeking different gain from fuel wood harvesting and, 2) who primarily relies on the advice from timber buyers.	Tactic, Operational	SWE
Planning and implementation process of FMP	The specific structure of the FMP mainly support/promotes timber production.	Tactic	SWE
Neighboring activities	Clear-felling a larger area increased the risk for storm felling in connected stands. Provides options for similar activities (e.g. harvesting and forest road construction).	Operational	SWE

The services available	<p>Many service providers try to create a need among the NIPF based on their services --> not based on NIPF objectives --> their role also influence on NIPF objectives?</p> <p>Late adaptors/passive(?): info should be available easily, everyone from the organization should be able to provide it (no calling from one person to another)</p> <p>Visualization has found to be a useful tool in decision making process, esp. for women</p> <p>Actual efforts connecting forest-owners to value creation are still missing.</p> <p>The current service provision supports mainly those interested in industrial round wood production.</p> <p>One main barrier to the new innovative services: dominant role of existing organizations aiming to secure their current positions mainly driven by the forest industry timber procurement needs.</p> <p>The available services to public forest owners do not support multifunctional objectives enough?</p> <p>The role of expert-led encounters is strong in Finland & owners' opportunities for good mutual communication are rare</p>	Strategic, Tactic, Operational	FIN, SWE
The role of change agents	The role of change agents is vital. The message does not reach laggards only through forest professionals --> peer to peer (within this owner group is important), sharing concrete examples.	Strategic, Tactic	FIN
Discourses/social regulation of forest stewardship	Discursive environment focuses on naturalization of economic meanings and practice. This is reflected to the agencies services. Forest owners not responding to this call are seen more marginalized (order of forest discourses), which can create social tensions. There is a need for improved semantic openness and democracy.	Strategic, Tactic	SWE
Subjective norms	<p>Subjective norms have the biggest explanation power for the stand improvement intention (FMAs, local wood buyers & family the biggest sources of norm pressure) Esp. women sensitive to social norms.</p> <p>Social pressure and proximity have a significant, but unpredictable, role in business relations. The social pressure is an interesting "stakeholder management tool" and one probably more common than anticipated, especially in small rural communities.</p> <p>Women are more influenced by social norms in their decision making.</p>	Tactic, Operational	FIN, SWE

Table 3. Summary of the forest owner related findings from the literature review.

Factor	Influence	Decision making level	Country
Livelihood dependence on property	Influence of climatic change to the forest sector may be less important than that of socio-economic change or behavioral differences among the forest owners.	Strategic	SWE
Socio-demographic characteristics	Landscape values are more important to women forest owners. Realistic pictures could help forest owners in decision making. Women are more influenced by social norms in their decision making as well as are youngest (<44 years) and the oldest >65 years) age cohorts	Tactical	FIN
Practical and theoretical knowledge	Forest owners have relatively few knowledge sources. Besides being self-taught, the most common ways of learning are from their fathers and from attending forest days. There seems to be a strong connection between self-activity and self-estimated knowledge of forestry. The recommendation for communication planning is therefore to use the self-activity among different groups of forest owners as a starting point for planning communication strategies. The main info sources related voluntary protection were FC and the mass media. The role of forest planners is big.	Strategic	SWE
Shared values of property buyer & seller	If the values of the property buyer and seller are shared, the values of the property is more likely to be recognize in the sale interaction – and have an impact on the e.g. price or the willingness to sell.	Strategic	SWE
Mental distance from forest	The connection and relation to the forest and forest activates may influence the level of engagement in forest management and activities – e.g. due to prioritizing other activities and interests.	Strategic, Tactic, Operational	SWE
Forest owners' values/objectives for the use of forests	Forest owners holding materialists or Non-Materialists objectives for the use of forests consider different information in relation to forest management. Owners who permanently cooperated with the public forest service hold typically materialist values. Forest owners' general appreciations are often interpreted as actual objectives, resulting in an overly multi-objective impression of forest owners. Thus, careful consideration is always needed before emphasizing the complementarity of economic and non-monetary objectives.	Strategic, Tactic, Operational	SWE
Access to informal communication/networks	Owners' opportunities for good mutual communication are rare, informal communication groups needed (cannot be designed, should bring some value to owners and thus reinforce participation)	Strategic, Tactic, Operational	FIN
Family "traditions" limit the decision making	Forest owners feel that they should manage the forest in a similar way than the previous generations did no new innovations etc.	Strategic, Tactic, Operational	FIN

Networks, access to forest related networks	<p>The decisions are seldom done alone (the role of family is important)</p> <p>Networks and knowledge transfer=interaction (way/whom/trust) = dealing with complexity and uncertainty in decision making.</p> <p>Networks serve only a minimal function of sharing knowledge of climate change and adaptation. Importance of the most frequent communicators (e.g. forest advisors)</p> <p>The existing informal communities are mainly in countryside (neighbors & families)</p>	Strategic, Operational	FIN SWE
Personal decision making style of the forest owner	<p>Different decision making styles (learning, trusting, decisive) need different approaches</p> <p>Laggards needs to be convinced on the rationality and ease of voluntary protection.</p>	Strategic, Tactical, Operational	FIN
Common language with the advisor	Professionals sometimes hard to understand --> peer support preferred and concrete mediating artefacts needed	Strategic, Tactical, Operational	FIN
Trust between the forest owner and the advisor	<p>Trust to the professionals important, but note: it varies e.g. according to the decision making style of the NIPF!</p> <p>Minimizing costs not a priority, if the most important thing is to get thing done with the trusted advisor.</p> <p>Trust may transfer from NIPF generation to another.</p> <p>If offered services seem limited compared to actual needs --> also doubts towards sincerity of the advisor</p>	Strategic, Tactical, Operational	FIN, SWE
The "innovation level" of the forest owner	<p>in reaching the late adaptors, the role of mass media decreases and the role of personal channels increases</p> <p>The forest planners play a big role in decision making, esp. for late adaptors.</p> <p>Marketing message for early adaptor: values, visionary, possibility to change and try out new things.</p> <p>To late adaptor: rational easy solutions, efficiency, productivity.</p>	Strategic, Tactical, Operational	FIN
The ways the forest owner collects information and ideas	<p>in reaching the late adaptors, the role of mass media decreases and the role of personal channels increases</p> <p>After the first idea, the owners collect information from social networks & media (all kind) and potentially from familiar experts.</p> <p>The first idea for protection (in this study) came from: owners values and/or mass media and/or suggestion from the advisor</p> <p>The decision to protect was not told publically beforehand (means outside the support group)</p>	Strategic, Tactical	FIN
The length of the forest tenure	<p>The new forest owners can be more experienced service buyers & understand that no free services exist.</p> <p>Current consumption first decreases and then increases moving from young to old forest owners.</p>	Strategic, Tactical, Operational	FIN, SWE

Risk perception/ understanding	<p>No relation between attitude towards risk and property size, but risk taking and final felling. No significant difference in felling intensity. Difficulties in making rational decisions facing uncertainties.</p> <p>Drivers of non-adaptation towards a natural risk situation: short-term economic reasoning in a pressing situation (economic evaluations); an understanding of windstorms as natural catastrophes (framing); and uncertainties associated with alternative forest management practices.</p>	Tactic	SWE
Willingness to share power	Some NIPF willing to share power in decision making, some not, no relation to passiveness?	Tactic, Operational	FIN
Learning orientation in decision making	learning orientated decision making style the most common one in FIN (trusting, self-reliant etc.) --> tailoring services	Tactic, Operational	FIN
Supervision	The possibilities to control and influence the service carried out.	Operational	SWE

