23. EVALUATION OF DECISION-SUPPORT NEEDS AMONG FAMILY FOREST OWNERS IN FINLAND: AN APPLICATION OF MIXED METHODS

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Structural changes of society, such as urbanisation, economic growth and ageing, have evoked a continuing diversification of forest ownership objectives and management strategies in Finland and other Nordic countries. Traditional forestry extension, by means of selling regular forest plans to farm-forest owners, has lost efficiency. As a modern way of activating and satisfying the growing number of new forest owners, the concept of customer-oriented forest planning has been introduced. Recently the present authors have been constructing a theoretical basis and studying empirical implications of customer-orientation in forest planning and consultation activity, which so far has not been unanimously defined in the Nordic countries. Based on some preliminary results of the authors' research, this paper identifies, conceptualises and quantifies the decision-making modes and decision-support needs of Finnish family forest owners. Furthermore, the application of mixed methods in the authors' current research activity is demonstrated and discussed. The research chain comprises the following phases: preliminary case study, pilot enquiry, qualitative in-depth interviews, conceptual modelling of decision-support needs, a postal survey for testing the model empirically, and finally, testing and enhancing the model by means of an adaptive design-based process. The rationale of the research, as well as the steps of the interpretation and verification process with critical observations, is described. The presented research chain will contribute to the development of flexible, customer-oriented decision-support services for Finnish private forestry in particular. However, the approach is generally transferable to other countries and conditions where forest owners' perspective needs to be thoroughly investigated.

INTRODUCTION

In Finland there are over 440,000 non-industrial private forest holdings, which are owned by individuals and families (Finnish Forest Research Institute 2006). Taking into account joint ownerships and the composition of households, about 1 M people (nearly 20% of the total population) are more or less subjects of family forestry. These family forest owners are important for Finland's national economy: over 80% of commercial roundwood removals, representing about 45 M m^3 annually, comes from family forests. The Finnish forest industry produces a share of approximately 25% or 12 billion € of total value of exports (Finnish Forest Research Institute 2006). On the other hand, family forest owners acquire a total of 1.5 billion € from timber trading annually.

The trends of societal modernisation, which have taken place in the industrialised countries during the last few decades, have reached the Finnish family forest owners as well. From the 1970s, the socio-economic structural change, including urbanisation, was the major effect, but during the last decade, ageing has been the most important force for change. In 2003, the average age of Finnish family forest owners was 59 years, and the share of retirees was 43%. About 40% of owners lived in towns or cities, and 29% were wage earners (Ripatti 2006).

The recent inquiry of Ripatti and Anttila (2007) indicates that timber selling represents a notable share of income for only a minority of Finnish family forest owners. A great number of the rest are involved in conduct timber trading and active silviculture, but their behaviour is becoming more and more mediated by other motivations rather than the urgent need of money. Under these circumstances, both Swedish and Finnish studies have reported a notable diversity in forest owners' goals and orientations (e.g. Karppinen 1998, Ingemarson 2004, Ingemarson *et al*. 2006, Tikkanen *et al*. 2006, Hujala *et al*. 2007). The view is taken here that the emerging new decision-support needs of forest owners can only be fulfilled with renewed services. In addition, even a more drastic change is expected when children of the post-war baby-boom generation enter middle age and start owning forests widely; due to a different forest relationship the change will be generational (Inglehart 1977, Inglehart and Welzel 2005, Karppinen and Hänninen 2006, Ripatti 2006). There is pressure on forest planning to transform from a straightforward policy tool to a means of *customer-*

oriented decision support (c.f. Kangas and Hänninen 2003). When the forest owner is regarded as a customer, a concept of *owner-oriented decision support* can alternatively be applied.

Forest planning research has usually focused on developing simulation and optimisation procedures for maximising the decision-maker's expected utility. Appreciating this success story, however, the present authors have noticed that forest owners' behavioural patterns in their social world of decision making have rarely been discussed. The present research project focuses on forest owners' own perspectives as well as the social systems that are supposed to be taking those perspectives into account.

OBJECTIVES OF THE RESEARCH PROJECT

The present research project aims at finding a deeper understanding of the family forest owners' decision making. The chosen research approach is to explore decision making procedures, ways and means of framing the decision problems, and strategies of solving them. Through the results, it will be possible to evaluate the decision-support needs and devise justified recommendations for the developers of decision-support services.

In order to reach a high quality contribution to the forestry society, the intention has been to conduct scientific research in close cooperation with topical development processes in practical forestry. This means striving for sound and coherent concepts, and applying them in a real-world context. The orientation has been influenced by *phronetic planning research* – as defined by Flyvbjerg (2001, 2004) – which incorporates power relations in planning processes and orientates itself to pragmatically understand and develop the current practices. The project applies sequential mixed methods (as defined by Tashakkori and Teddlie 1998, Creswell 2003, Johnson and Onwuegbuzie 2004, Tashakkori and Creswell 2007) and design-based research (illustrated by Barab and Squire 2004, Joseph 2004). The motivation for the first few phases of the research chain is to provide a scientifically sound contribution for the last phase, where an enhanced process of practical planning activity is designed.

PHASES OF THE RESEARCH CHAIN AND REASONING

The research to develop well-grounded recommendations for the enhancement of decision-support services for Finnish family forest owners was carried out in the following phases.

Preliminary Case Study

In 2003, Isokääntä and Tikkanen conducted a case study on forest planning processes in northern Finland. After a thematic qualitative analysis of 10 separate planning cases and the various interaction events between the forest owner and the planner, they divided the forest owners into three classes as planning customers according to the explored motives for interacting during the planning process, namely *multi-objective influential owners*, *profit-seeking trusting owners*, and *multi-objective learners*.

The classification indicates that the planning orientation of forest owners varies even within a relatively small planning area, and that it might be useful to create owner-oriented planning service schemes that take into account this variation. Although the case was rather practically oriented and it dealt with traditional forest management planning, it serves as a fruitful starting point for further studies of forest owners' decision aid desires.

Pilot Enquiry

Based on the study of Isokääntä and Tikkanen (2003) and on the most recent comprehensive research conducted on Finnish family forest owners (as reported by Karppinen *et al*. 2002), a psychological measurement survey was constructed, following the approach presented by Gulliksen (1987), for exploring the various expectations of forest planning processes. Willingness to acquire decision consultation was added to the phenomena under research, and the enquiry comprised several statements per conceptual dimension. The respondents were asked to answer the enquiry in a five-point Likert scale (Likert 1932).

A total of 30 family forest owners who had ordered a forest management plan were asked to answer the pilot enquiry. As a result of this small empirical test, it was observed that the decision-support desires clustered approximately in the way expected. The test also provided information relating to possible combinations of the various desires. After analysing the test results, the authors were able to enhance the enquiry and prepare it for a larger survey.

Qualitative In-depth Interviews

In order to ascertain the overall picture of family forest owners' decision-making-related phenomena, qualitative in-depth interviews were conducted with those forest owners who also answered the pilot enquiry. The interviewees were selected from two separate areas in southern Finland by applying *purposive sampling for heterogeneity* (as described by Patton 2002). The intention was to capture the variety among forest owners. The themes discussed in the interviews were: history, values and objectives of forest ownership; knowledge, know-how and the desire for learning; and decision-making in forest ownership and decision-support.

The interview transcripts were analysed using an *adaptive theory approach* (as described in-depth by Layder 1998) with *NVivo7* software (as described by Richards 2002). In the analysis, following Kvale (1996), ad hoc meaning generation was applied, which included reading through categories, creating narratives and experimenting with visualisations. As a result, a better understanding of both the mental and the social aspects of family forest owners' decision-making patterns was gained.

Conceptual Modelling of Decision-support Needs

The interview findings were conceptualised into two dimensions: sharing the decision power (adapted from Vroom and Yetton 1973) and the level of desire to learn. The findings of Lönnstedt (1997) as well as Isokääntä and Tikkanen (2003) provided justification for the conceptualisation. A deeper analysis of the interviews yielded five decision-making modes, which are described in more detail in Hujala *et al*. (2007). These modes are: substantial trust in professionals; desire to learn for self-reliance; sequential, managerial judgements; balanced, considerate decision making; and strong decisions of one's own. According to Hujala *et al*. (2007), these modes might be combined with conforming decision-support approaches. Thus the decision-support services for forest owners could be delivered in different ways depending on the observed or elicited motives of the decision-makers.

Postal Survey for Quantifying the Phenomena around Decision-support Motives

Based on the first three phases, the measurement survey form was enhanced by adding some new statements, as well as removing and rephrasing some of the initial statements. In addition, the usability of the form was tested with some forest owners and prepared for a postal survey. For study areas, four differently profiled districts (in terms of socio-economic structure and significance of forestry) were selected based on the research findings by Karppinen *et al*. (2002), and regional statistics reported by Finnish Forest Research Institute (2006). The questionnaire was sent to 1600 randomly selected forest owners in the selected four districts (i.e. 400 per district). After three weeks, a follow-up form and supporting letter were sent to all selected owners except those who had voluntarily given their names in the accompanying allotment form (thus, the forms were not individually coded, which resulted in some excess posting). A total of 676 questionnaires were returned, a response rate of 42.2%. The analysis of non-response was conducted both qualitatively by means of phone calls, and quantitatively by comparing distributions of the sample and the respondent group. The sample appeared to resemble the population well. As the main discrepancy, in one of the four districts the mean estate size was somewhat smaller than in the population. The authors judge that in summary the results relating to decision-support needs can be generalised.

Some interesting results could be found by calculating simple response distributions. For example, 62% of forest owners agreed with the statement 'I want to understand the basics of silviculture better', while 31% judge that 'I know enough about forestry already'. About 66% usually makes decisions according to expert's advice, while 27% rely on their own experience regardless of any given advice. About 41% of respondents are interested in the forest itself more than the financial profit it can offer. These and other related results have been complemented with a comprehensive multivariate analysis (following the methodology reviewed by Anderson 2003), and the detailed results are currently being written up.

Testing and Enhancing the Model by Means of an Adaptive Design-based Process

In the phronetic research paradigm being followed in the present project, testing and enhancing the preliminary research findings is essential. It is recognised that the work done so far is not yet enough and the results have to be verified and further developed by means of consistent co-operation with forest planning practice. Therefore, it is planned to organise a design-based action research campaign with practical planning developers, where the abovementioned findings will serve as a core element of the intervention by researchers.

The pre-design of new customer-oriented decision-support services, which is currently being constructed by the present authors based on the research reported above, includes the decision-making environment and forest ownership strategy, in other words the outside world of the forest owner (see also Swedish considerations of forest owner's decision-making environment in Lönnstedt and Törnqvist 1990). The decision-making modes (described by Hujala *et al*. 2007) can be seen as combinations of the decision-maker's cognitive properties and reflections of the current outside world.

A conclusion of the study is that in order to be owner-oriented, the decision-support process (e.g. forest planning) should be initiated by the owner. Therefore, several service products have been formulated, out of which the forest owners may make a selection without being prompted and make contact with the service provider. The research will continue as design-based research (Barab and Squire 2004, Joseph 2004) where the researchers' pre-design will be evaluated through practical testing. The idea is that the adaptive spiral will result as a progressive refinement of the design.

In the outlined design scheme, around five planning processes will be conducted, and after developmental assessment procedure, the design will be enhanced, and this cycle will be repeated three times. As the result, the intention is to acquire an improved design of owner-oriented decision-support services for Finnish family forest owners, challenging the practical development processes in planning organisations. In addition, a large volume of systematic information will be available to be analysed, conceptualised, and reported in scientific research articles as well as in popular texts.

MIXED METHODS APPLICATION IN THE PROJECT

The application of a mixed methods approach in the present project can be seen as a sequential one (see details and related examples in Creswell 2003). The sequence of different approaches in the phases 1–6 is as follows:

Phase	1	2	3	4	5	6
Approach	Qualitative	Quantitative	Qualitative	Qualitative	Quantitative	Qualitative

The qualitative approach in the first phase served as a starting point for the whole research chain. In the second phase, the initial ideas have been conceptualised and quantified with a small data set to offer directions for the following phases. The third phase was qualitative, the motivation being to explore and describe the decision-making phenomena. The fourth phase was also qualitative, but focused on conceptual modelling and binding together the recent and earlier findings. The fifth phase utilised the results of the second phase and quantified the phenomena. In the sixth phase, the qualitative and quantitative results of the fourth and fifth phase provide a basis with the help of which the researchers' pre-design can be built logically.

CONCLUSIONS

So far the logical flow of differently oriented research phases towards a progressive knowledge-building has progressed well. When investigating a complex real social world with a strong motive for contributing to the development of practices, a comprehensive mixed-methods based process is useful. It seems to be critical how the epistemologically different knowledge provided by the various phases and approaches can be combined with a solid way. The experience from this study is that methodological pluralism is a challenging but at the same time rewarding choice in studying the grounds for new practices and developing them. In future, blending the mixed methods scheme with a systemic approach (see examples in Walters 1986, Mäntysalo 2000) with more focus on the stability of inputs and outputs of the related systems might help the researchers to move between the conceptual and pragmatic world more efficiently.

Although forestry in Finland is unique, the research as a whole would benefit from mixing the findings with the ones in other countries: the different cultural histories and different societal conditions may cause different decision-making-related phenomena to emerge in different countries. A comparison would help the researchers to draw more general conclusions on the development of services provided for family forest owners at a European and global level.

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