Икономически изследвания
Година XIV, 2005, 1

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THE ROLE OF INNOVATION SYSTEMS IN NON-TIMBER FOREST PRODUCTS AND SERVICES DEVELOPMENT IN CENTRAL EUROPE

Non-timber forest products and services receive growing attention as they are expected to contribute to income in rural areas and to the solution of conflicts over forest use. This article studies the role of the forestry sector innovation systems of Central European countries in the development and diffusion of non-timber forest products and services on the basis of extensive research done in course of the project centre Innoforce of the European Forest Institute. For this purpose the sector innovation systems are characterised by survey data and case studies. The situation in non-timber forest products and services is presented for the Central European region in general and for the cases of environmental and recreational services in particular. It is concluded that the forestry sector innovation systems in Central Europe are typically made up of "traditional coalitions" of forestry actors. The development of non-timber forest products and services is hardly supported by the innovation systems. For strenthening innovations in non-timber forest products and services, forestry agencies would have to provide more information on new market opportunities and would have to promote cross-sectoral relations to service sectors.
JEL: O32; O33; Q23

Introduction

So-called non-wood or non-timber forest products and services increasingly receive attention in developing countries just like in industrial countries. The somewhat complicated term reflects the very problem: the attention lies on the many goods and services that the forests provide for society, not just timber. The many values that forests have for humankind have also been named "multi-functionality", however, with calling them products and services shall emphasize the possible marketability of these values. In many cases, possible benefits of the forests have not been utilised. In other cases they have been referred to as "public goods" in the past but might be transferred to marketable "private goods". In developing countries there are hopes that the use of non-wood or non-timber products and services either contributes to the income and livelihood of rural people or by their use a sustainable management of the forest shall be attained, or both. In industrial countries it is expected that the offer of these goods and services

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helps in meeting new society's demands on the forest and in resolving use conflicts of the forests. It is therefore worthwhile to study the marketing possibilities of new goods and services of the forest, institutionial systems that support their development and the processes that lead to innovations in these fields.
The EFI PC Innoforce is a project centre of the European Forest Institute, with its head office in Vienna and with 23 partner institutions in 18 European countries. It deals with research in the fields of innovation and entrepreneurship in the forest sector. Since 2001 it has put in its work a particular emphasis on non-timber forest products and services innovations. In its first three years the membership of partners was restricted to Central European (CE) countries for which reason the focus of research was also on this region. These countries comprised such both with economies in transition and with a longer market economy tradition. Results of Innoforce work on innovation systems in non-timber forest products and services in Central Europe is presented in this article.
The research question of this article is the specific role of the forestry sector innovation systems of CE countries in the development and diffusion of non-timber forest products and services.

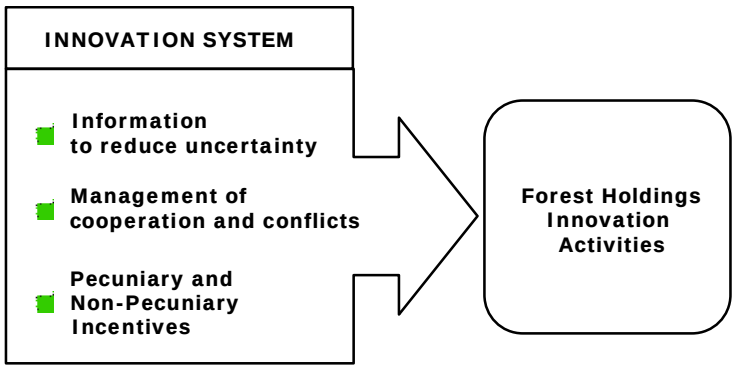
Systems of Innovation

With Schumpeter (1935) **innovation** may be broadly defined as a discontinuously occurring implementation of new combinations of the means of production. Innovation research deals with the question how such innovation occurs and how innovation processes can be fostered. Early conceptions of the innovation process (Rogers 1962/1995) have gradually been replaced by more complex models. There is a growing consensus in the innovation system literature that innovation is an institutional process (Lundvall et al. 2002, Edquist 2001, Moulaert and Sekia 2000) and that it is not only the entrepreneur that is responsible for the innovativeness of the firm. They have to be embedded in a system of institutions that can support them.
The main components of a **system of innovation** are actors and institutions. Actors are considered to be organisations, which are seen as formal structures with an explicit purpose and which are consciously created (Edquist and Johnson 1997). Institutions are understood as a set of habits, routines, rules, laws or regulations that regulate the relations and interactions between individuals, groups and organisations (Edquist and Johnson 1997). Interaction between actors and institutional settings are important for innovation activities.
Systems of innovations can be analysed to find out their role or **functions** in the context of the innovation behaviour of firms and for intentional planning of innovation policy (Johnson 2001). The overall function of a system of innovation is to produce innovations new to the market, diffuse these innovations and use them (Edquist 2001). Edquist and Johnson (1997) summarize the functions of institutions in the process of innovation in three categories: reduction of uncertainties by providing information, management of conflicts and cooperation, and the provision of pecuniary and non-pecuniary incentives (see Figure 1). The institutional system shall provide knowledge for the enterprise to reduce uncertainties in the economic activities of the enterprise. Institutions (e.g. patent laws, norms for repayment periods etc.) may reduce uncertainty either by providing information about the behaviour of other people or by reducing the amount of information needed. The

institutional system shall manage the competition and cooperation between individuals and groups necessary for an innovation friendly environment, e.g. by supporting networks and clusters. The institutional system shall also provide a system of non-pecuniary incentives to engage in learning and to participate in innovation processes that can make innovation profitable in the long run. Finally, pecuniary incentives such as tax rules, government subsidies and the allocation of resources to universities shall channel resources to innovation activities and help to re-channel resources from those activities that are unprofitable.

Figure 1

Functions to be Provided by an Innovation System to Support Innovation Activities



There are many different approaches to analysing innovation systems. One debate deals with the nature of National Innovation Systems (NIS), and especially the way institutional dynamics are interpreted (Edquist and Johnson 1997; Lundvall 1992). The innovation system is defined by national boundaries, within which the interplay of actors on the national level are analysed. Besides on innovation systems of national economies, authors have focused on sector innovation systems (deliniated along sector boundaries, e.g. Malerba 2004), regional innovation systems (employing a territorial concept, e.g. Carlson and Jacobson 1997), and innovation systems pursuing a certain goal, for instance, sustainable development (sustainable systems of innovation, Segura-Bonilla 2003).

The **sector innovation system approach** provides an analytical framework to identify the performance of systems in terms of how well they support innovations in a specific sector. Breschi and Malerba (1997) define sector innovation systems (SIS) as “systems of firms active in developing and making a sector’s products and in generating and utilizing a sector’s technologies”. A SIS is therefore a system that is mainly comprised of actors of one specific sector and interactions between them. Furthermore, the majority of functions of the IS are fulfilled by actors of the sector. The SIS approach looks at the firm level, inter-firm level aspects as well as the institutional level aspects both of market and non-market relations and focuses on the differences between different types of sector innovation systems. The key features of this approach are the differences in and the importance of the knowledge base and the learning process, the role of non-firm organisations and institutions and the co-evolutionary process changing the sector (Malerba 2004). Breschi and Malerba (1997) studied five major types of SIS, including IS of

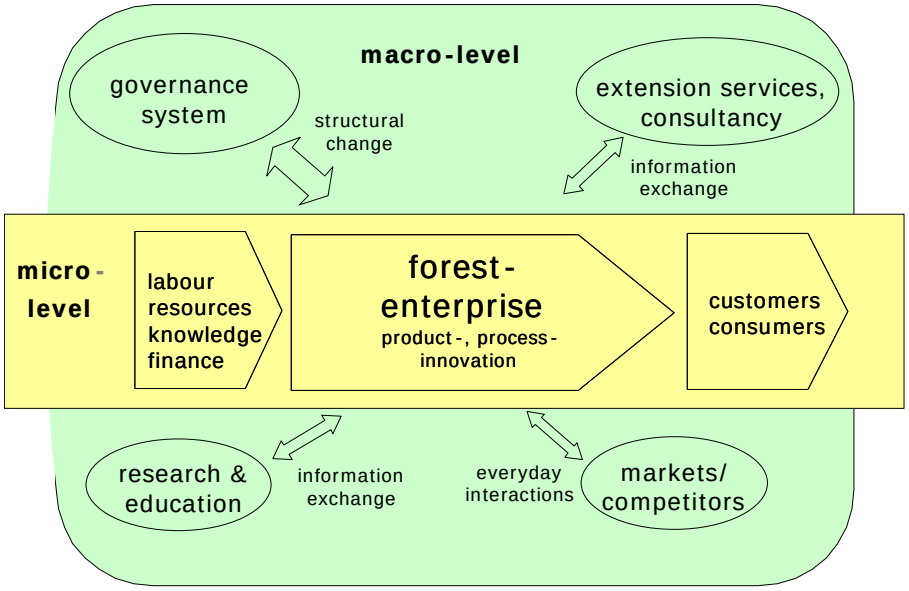
traditional sectors. SIS in traditional, “mature” sectors such as the forest sector often typically support more process innovations than product innovations. Especially, opportunities are pursued to introduce innovations related to reducing production cost. So, according to the theory, non-timber forest products and services are not expected to be supported much by the forestry SIS.

Characteristics of the Forestry Sector Innovation System

In studying the forest sector, it must be noted that path dependence and the institutional system are paramount in the formation of sector systems of innovation. The different natural resources and production conditions of a region may influence the path of development of firms and the whole sectors. Firms therefore operate within this particular structure and establish routines and norms, which generally are stable for long periods of time (Segura-Bonilla 1999).
The institutional design of organisations in the forestry sector that are important for innovations in the sector is quite different in the Central European region. However, the basic structure of organisations is similar (Figure 2). In all CE countries several institutions are key organisations in forest policy. These are different administrative sections of the ministries that are responsible for forestry and the environment, lobby groups of forest owners and forest workers as well as others, such as environmental interest groups. In each of the Central European countries the national knowledge management systems for forestry are also quite similar. In each country at least one university covers forestry, there are federal forest research institutes and further education organisations. Furthermore, private consultancy organisations exist, amongst other actors.

Figure 2

Actors in Sectoral Innovation Systems of Forestry



Source: Rametsteiner et al., forthcoming.

Example: The Sectoral Innovation System of Forestry in Austria

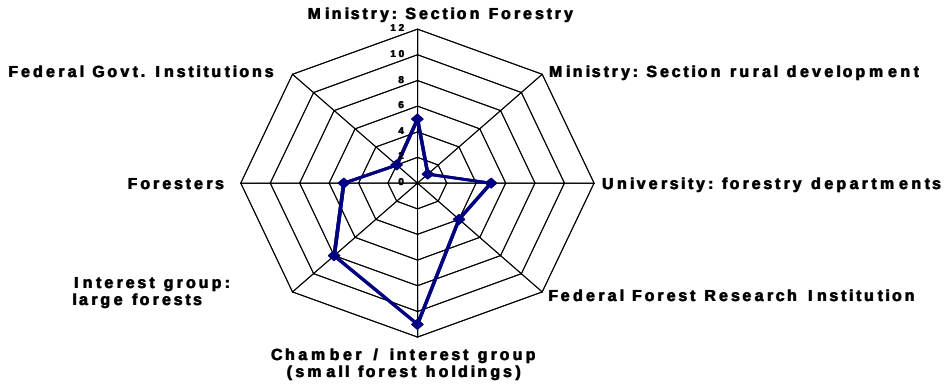
In course of the EFI RPC Innoforce research, the Austrian SIS of forestry has been studied in particular detail, including representative surveys of the forest holdings and the institutional system on national, provincial and regional level as well as case studies. Representatives of the institutional system rated innovation as highly important. However, policy actors could not present a policy or strategy document on the topic. Most actors were nevertheless able, without much hesitation, to name their contributions to supporting innovation. Innovation is thus rated as a highly important policy topic without much of an explicit policy but with considerable activity.

When looking at the integration of forest policies into national innovation policies, it shows that existing national innovation policies are not adapted to sector-specific needs. Little efforts seem to be undertaken to systematically integrate national innovation policies into sector policies or programmes, and none are undertaken in forest policy. Forest related institutions are not in contact with governmental or non-governmental bodies or agencies dealing with innovation policies.

Interaction between institutions constituting the main actors on innovation related aspects is often restricted to or characterized by what could be called “traditional coalitions” (see Figure 3). If main actors on national level forest policies are asked which actors they consider relevant for innovation in forestry, interest groups dominate the picture. What is interesting in the Austrian case is the seemingly low awareness, and possibly low level of integration in innovation initiatives, of institutions constituting the core of the knowledge management infrastructure: research and education institutions. Similarly, governmental actors are not frequently mentioned as amongst the most relevant institutions for forest related innovation. The loosely self-organizing system of innovation evolves around non-state institutions.

Figure 3

Actor Network on Innovation Policies on National Level in Austria: Actors Considered Relevant

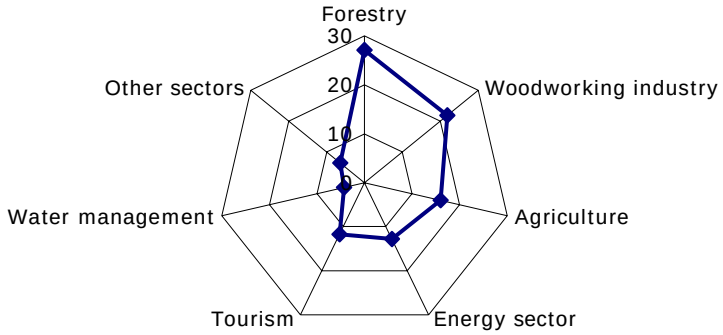


Source: Rametsteiner and Kubeczko, 2003.

What the strong concentration of the IS on traditional forestry organisations implies is the lack of interaction with actors not only from the national IS but also from other sectors.
What seems to distinguish the national level interaction patterns from provincial and district level interaction is that the latter have to interact quite a lot with institutions outside the forest sector, with administrations from other sectors and also interest groups. Only about one quarter of all collaborations are stated to be with institutions from forestry, i.e. forest administration or forest interest groups. About as much collaboration, about one fifth, actually is undertaken with institutions from the woodworking sector, followed by institutions from agriculture, the energy sector and tourism (Figure 4). That indicates that cross-sector collaboration is indeed daily business of institutions on district and provincial level.

Figure 4

Cross-Sectoral Collaboration on Province and District Level in Relation to Innovation and Entrepreneurship Support Actions



Source: Rametsteiner and Kubeczko 2003

Cross-sector collaboration and interaction is happening in innovation policy implementation, however, driven by ad-hoc necessity on “the ground” on district or provincial level. It is neither systematically nor strategically planned or managed by institutional level actors on higher level and seems neglected on national level. Cross-sector interaction is assumed to be of particular importance for the development of non-timber forest products and services because these mostly do not belong to traditonal forestry activities but have affinities rather to other sectors or societal groups.

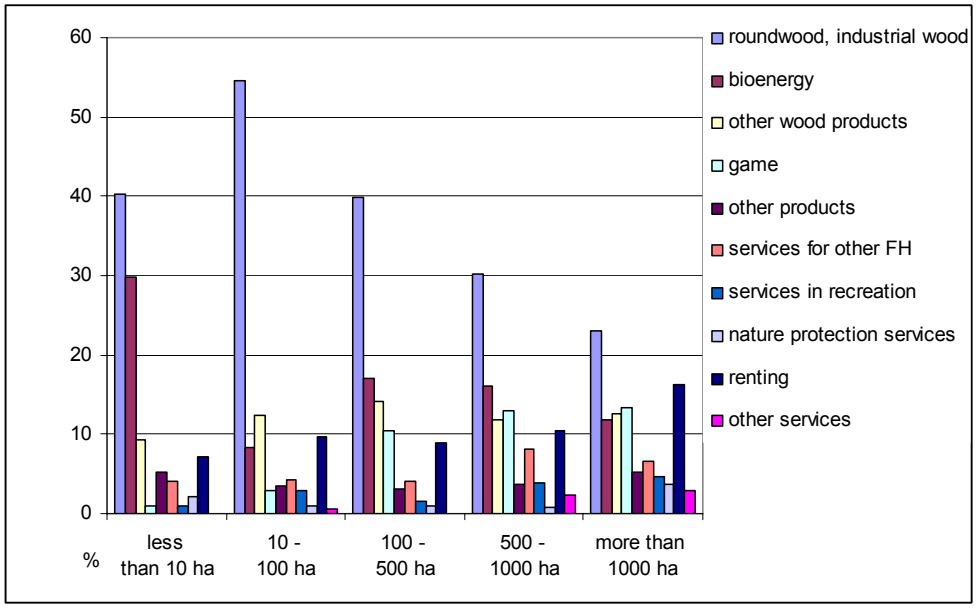
Innovations in Non-Timber Forest Products and Services in Central Europe

In course of the Innoforce work the total range of products and services offered by CE forest holdings was surveyed through questionnaires. The product mix offered by forest companies clearly increases over the size of the holding (see **Error! Reference source not found.**). Small forest holdings rarely offer any other product except industrial wood or wood for bio-energy (if they offer any product at all on the market). Large forest holdings offer a range of wood products, but often also game and services, especially renting (in some countries often hunting rights). Renting

out rights, or offering a service, is the second most often offered “product” by forest holdings.

Figure 5

Product Mix Offered by Forest Owners/Managers in Different Size Classes – Relative Frequency of Responses to Different Products within Each Forest Holding Size Class



Source: Rametsteiner et al., forthcoming.

Within non-timber forest products and services, except for services for other forest holdings, traditional products and services are found (game, gravel, renting, etc.) as well as non-traditional, the most frequent of which are recreation and nature conservation services. In terms of income, however, both recreation and nature conservation services do not play a major role, as shown in the following.

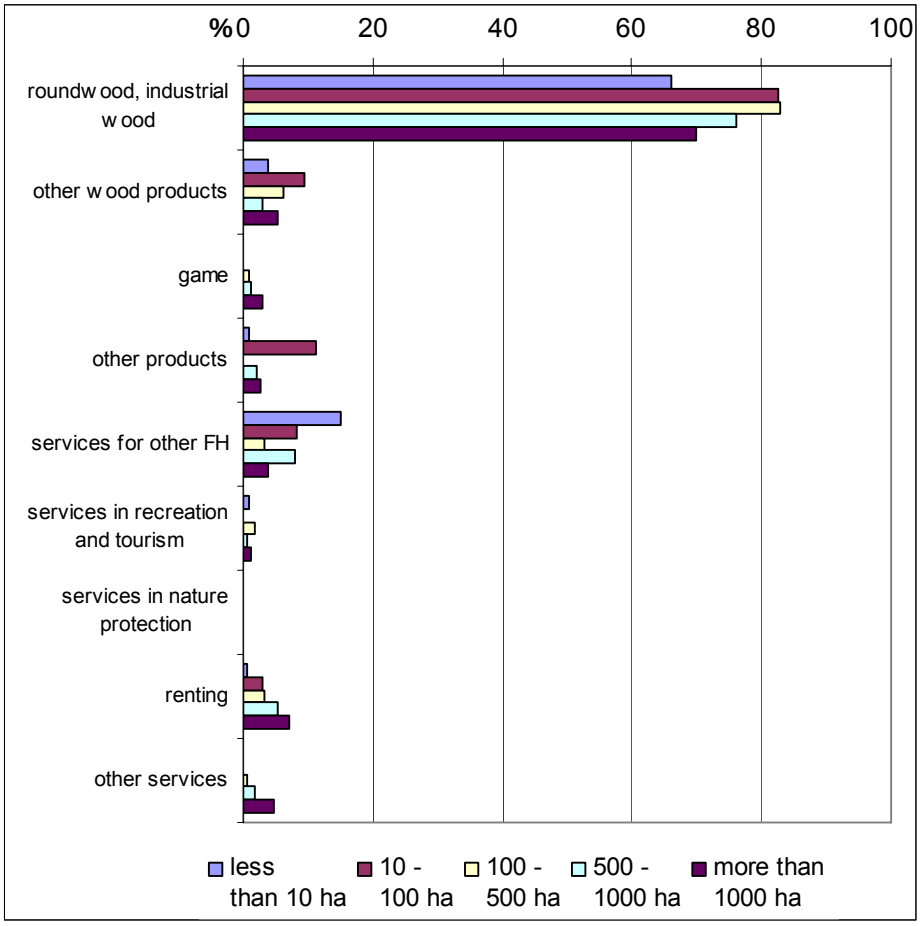
The following graph shows the contribution of different products to the income of forest owners (see **Error! Reference source not found.**). The figure clearly demonstrates the strong role of wood and, overall, the negligible shares of other income sources in practically all forest holding size classes. In Austria wood for bio-energy plays an important role especially for smaller forest ownership sizes, with about 30% of income recorded to have come from this source for forest holdings <10 ha.

Services contribute, according to the data from this survey, very little to the turnover of forest holdings. The most important further income source from services for small forest holdings is gained by way of services for other forest holdings. According to these results game contributes a very small share of income even for larger forest holdings, on average across Central Europe. Renting includes the lease of hunting rights in the countries surveyed, where these can be leased on a private contracting basis, such as in the Czech Republic, Hungary or Austria. Here, the small average property sizes usually result in low additional

income, on average. In Slovenia the state held all of the hunting rights at the time of the survey. No rents were therefore accrued by private forest holdings. It is notable that services for nature conservation practically have no source of income for the time being.

Figure 6

Share of Different Products to Turnover in Central European Countries



Note: Round wood and industrial wood includes fuelwood; German data is included from 100-500 ha category onwards – German data includes forest holdings >200 ha
Source: Rametsteiner et al., forthcoming.

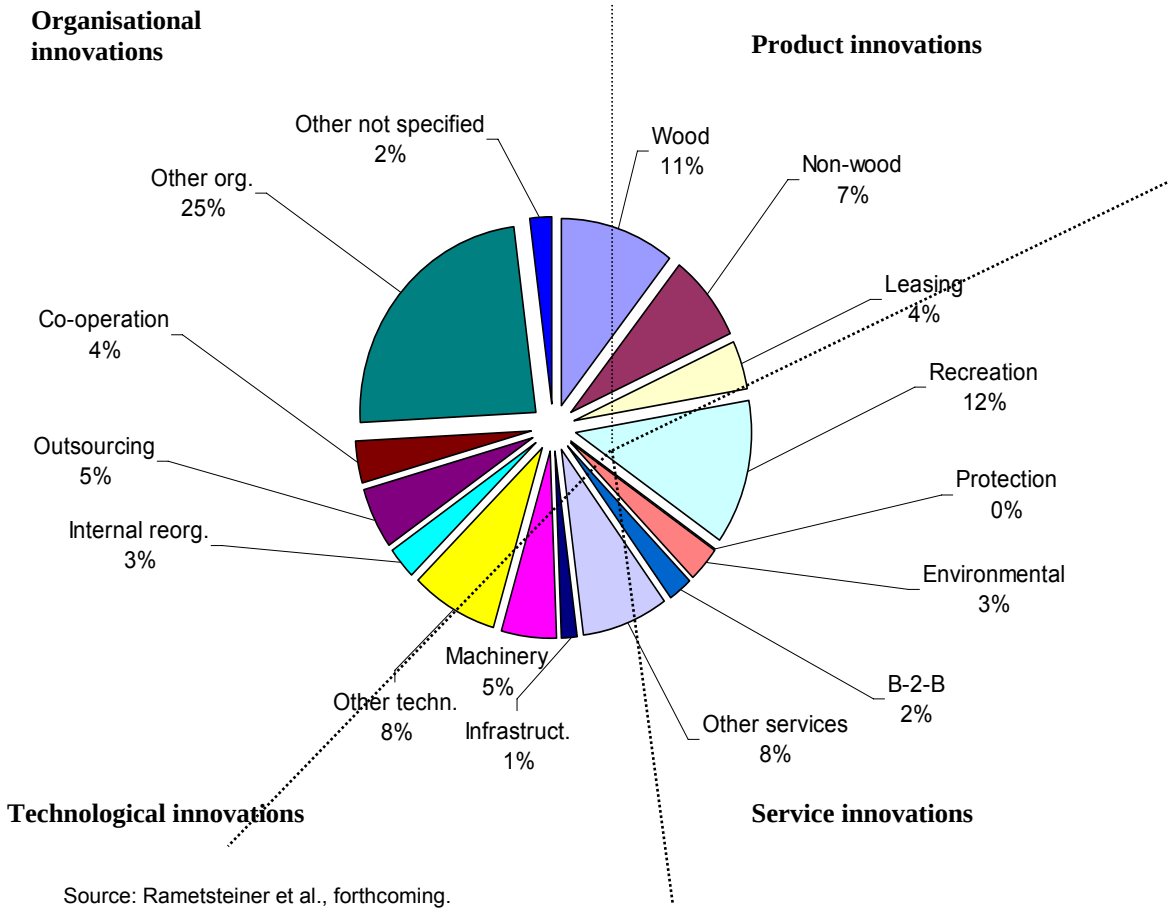
Looking at where innovations actually take place, might give a feeling of future developments: recreation services might therefore grow considerably in importance in future.

An overall picture of the most successful innovations in CE countries recorded by the forest owners/managers shows the dominant focus on organizational and service innovation in forest management (see **Error! Reference source not found.**). The figure shows that the range of newly introduced aspects is quite large.

Recreation leads the field in non-process oriented innovations, followed by the introduction of new wood products (new to the firm).

Figure 7

Overview on Recent Successful Innovations in Central Europe
(Austria, Czech Republic, Germany, Hungary, Italy, Slovakia)



Source: Rametsteiner et al., forthcoming.

Case Studies on Non-Timber Forest Products and Services Innovations

In course of the work of the EFI PC Innoforce 32 case studies on innovation projects have been investigated in the CE countries Austria, Czech Republic, Germany, Slovakia, Slovenia, and Switzerland.[3] The cases covered the fields of wood products (8 cases), non-wood products (2 cases), recreation (5 cases) and environmental services (3 cases) as well as technological (3 cases) and organisational innovations (11 cases). Bio-energy innovations were allocated to the

[3] Source: Rametsteiner et al., forthcoming.

category of wood products, although one important innovation in this field is the production and marketing of heating. Particularly in Austria, forest owners run biomass based district heating plants, mostly in rural areas. This special case could also be considered a service (energy supply).
In the field of non-wood products no other examples besides traditional products such as gravel or venison were found. Although a range of new products could be visualised, (e.g. water, chemicals from wood or needles, etc.) no such cases could be discovered.
In the field of **services** the main driving force is the strong demand from the public that calls for recreation and environmental services from the forest. After a first phase of strong reservedness from the landowners, they have started certain offers now, particularly mountain bike routes, nature conservation contracts, etc. Both environmental and recreational services strongly depend on public money. Only very few cases are found where the services are offered to private customers. Forest experts also see a high latent potential in forest services. The very rare cases where forest services are marketed private-to-private show that the potential exists but currently is almost not utilised at all.
On the basis of the analysed cases in environmental and recreation services innovations, these two fields are describe in more detail in the following.

Environmental Services

Forest owners offer nature conservation services for local, provincial or national governments. Money is usually given by nature conservation authorities for conservation contracts. Only in a few cases private actors do pay for these services. There is a trend that nature conservation by decree more and more is replaced by nature conservation by contract. However, this obviously strongly depends on national and provincial policies.
The investigations in Austria and Germany reveal that state and provincial policies within the two countries can be quite different in how much money is dedicated to nature conservation in forests and in how far legal restrictions are preferred. For Austria some provinces rather limit their nature conservation contracts to agricultural land, others include forestry. The German partner of this study reports that the forestry ministry has started nature conservation contracts with forest holdings in seven federal countries but has stopped these activities because of a shortage of money.
In Slovenia no money is dedicated for nature conservation of forestland; the forest administration rather relies on regulatory instruments. In the Czech Republic forest owners obtain financial support from the State Fund for the environment if nature protection measures are prescribed. The amount of financial means available for these purposes, however, is rather small. In Slovakia subsidies for nature conservation were provided only in a few cases to the forest owners. In comparison, in Austria even the federal forest enterprise was compensated well for the loss of income in nature reserves and national parks.
For Switzerland a few examples are reported for so-called eco-sponsoring, where public or private organisations support certain nature conservation projects in forests (case 13). For companies from other sectors, sponsoring of ecological projects shall improve their public image and shall have advertising effects. The disadvantage of eco-sponsoring for forest enterprises is the orientation at rather

short projects and the dependence on the actual public image of forests and nature and on the general economic situation.
Forest agencies support innovations in nature conservation only in exemptions. They are used to negotiate conflicts over the utilization or conservation of forest land in political form but not on the market. Innovations are driven by companies' initiatives. For the example of Austria, two examples are documented in case studies: the forest owners' initiative BIOSA and the nature conservation activities of the Austrian Federal Forests Inc. BIOSA (Biosphere Austria) is an association of large private forest holdings that pools forest areas and offers these to potential financiers, e.g. provincial governments. The organisation is supported by the Austrian land owners' association (Hauptverband der Land- und Forstwirtschaftlichen Betriebe Österreichs).
The Austrian Federal Forests Inc. manages a range of contractual nature conservation projects that are usually paid by (national or provincial) governments. The goal of the company – just like BIOSA – is not so much to make profit from nature conservation but to keep the land under their management, possibly with compensation, and to improve their public image. In history demands for nature conservation were defended, but today the company presents itself with a "green image". It wants to be a "competent partner" in the field of nature conservation and proves that in a number of joint programmes with various nature conservation groups and the government. The strategy of the company today is to offer nature conservation areas for compensation. This strategy was successfully employed in the case of two national park projects, where the company is compensated for the areas and receives a yearly budget for the (nature conservation oriented) management of their areas. In two "national park" management units a staff of 35 is employed.
It can be said that public forestry agencies are hardly involved in the development of nature conservation services, they rather defend the sector against demands of conservationists. Projects are rather born by cooperation of forest holdings with nature conservation groups.

Recreational Services

Recreation services in rural areas are often connected with 'farm tourism', which is quite important in some Austrian, German, Italian, Slovenian and Swiss regions. The contribution of forest owners or forest resources, however, is usually rather low. Accommodation in the forest or in forest buildings is successfully offered by a few forest holdings. The collected cases prove that cooperation with professional travel agencies is a prerequisite for the success of the business. A further development potential is particularly seen in combined offers of accommodation with outdoor activities (hiking routes, sport activities, adventure tours, forest pedagogics offers, hunting, etc.).
The so-called "forest pedagogics" (German: Waldpädagogik) is one of the very rare examples for successful innovation in the service sector in forestry. Forest pedagogics means environmental education activities where foresters share their knowledge with children or other interested persons of the public (Voitleithner 2001). Many Central European countries experienced a boom in such services during the recent 5 or 10 years. Very quickly persons and institutions active in forest pedagogics organised themselves into associations, schools and training

centres set up training courses, and policy makers dedicated financial incentives. Many forest holdings are active in this field today. To some extent, the activities are supported by public funds (e.g. school excursions or similar activities are subsidised by the Austrian forestry ministry through the EU programme for rural development); to another part they offer actual profit (family programmes or manager seminars and other offers for adults). For the recreation market a high potential is assessed in both Western and Eastern CE countries of our study. A limiting factor is seen in the income situation of the countries; this is – in the medium term – also expected for the countries in transition. Successful examples are documented in this study for Western and Eastern countries.
A competitive situation is often found between public bodies and private initiatives. As many public forest holdings or forest services offer recreational and educational services for free or for a very low price it is difficult for private owners to engage without subsidies, except for very specific offers such as manager seminars or mere accommodation. In Slovenia the supply of recreation service or forest pedagogics is a task of public institutions (e.g. educational forest path, forest pedagogics) and is very important for their public image. There is no incentive for the public forest service to promote private initiatives in this field. Similarly, in Slovakia forest pedagogics services are traditionally provided by public institutions such as the Institute for Complementary Education in Forestry and Water Management and the Forest Research Institute, Forestry Faculty or the Faculty of Environmental Sciences. A few initiatives, however, are known for new market oriented developments, e.g. by a regional forest enterprise or by the Center for Scientific Tourism which is operated by the workers of the Institute of Forest Ecology and the Forestry Faculty in Zvolen.
Forestry institutions are hardly active in developing recreational services except for the described forest pedagogical activities. Both public administration and forest owners' interest groups promote and support forest owners' initiatives in forest pedagogics. Their main motivation, however, is not so much the development of these activities as a business field but they see it as a means of the sector's public relations work. Public policy instruments do not primarily focus on the development but rather on the diffusion of the services (offer of courses or financial incentives). For the support of other forest-related recreation services practically no public policy exists.

The Role of Innovation Systems in Non-Timber Forest Products and Services Innovation

The data collection in course of the EFI PC Innoforce proves the assumption of the IS approach that innovation is an institutional process, depending on various actors and institutions and their interaction. The case studies show that innovations often are developed and implemented in a network of different actors who depending on the nature of the innovation belong to different sectors and administrational units. Innovations are often not the result of established IS – neither national, sectoral nor regional. It might be talked of ad-hoc IS or one-project IS. Particularly innovations that are new to the sector are born "between" sectors, and thus between sectoral innovation systems. Such examples are particularly non-timber forest products and services, for instance, the offer of nature conservation services, tourist accomodation or bio-energy services.

The **forestry SIS** is made of “traditional coalitions” of forestry actors and is mainly active in the traditional product areas of forestry. Non-timber forest products and services do not belong to this and the SIS only in exceptions supports the development of such products and services. An exception is the case of forest pedagogics, as for instance, in Germany, Switzerland and Austria, a market field that has developed from PR activities of forestry. It can be observed that while new products and services are often developed in a regional, cross-sectoral setting, the SIS becomes active in the diffusion of the new idea. An example of this is the offer of biomass-based district heating plants in Austria, that have been developed in a network of agricultural, forest industry, energy technology and regional development actors as well as representatives from different governmental levels. The diffusion, however, is strongly driven by the SIS.[4]

Summary and Conclusions

The forestry sector innovation system is active in the fields of technological and organisational process innovations, and in supporting the adoption/diffusion of certain pre-selected innovations. Typical areas of activity are mechanisation of forest work and recently the forming of forest owners’ cooperations. Except for some selected topics – such as bio-energy or forest pedagogics – product and service innovations are rather disregarded. Specific support aiming at the development of new product and service innovations are practically missing.

A range of **weaknesses** is found with regard to the forestry innovation system and related policies that have strong hampering effects on the development of non-timber forest products and services.

First, no comprehensive innovation policies are formulated for the forestry sector. Innovation aspects are handled in diverse operational policies for specific issues, but are not dealt with in a coherent form. The development of explicit innovation policies could include new impulses, also in other product and services fields than the traditional ones.

Second, there are virtually no interactions between forestry actors and actors dealing with existing national innovation policies. Forestry actors hardly know about the programmes and opportunities that these might provide, including financial means for the development of innovations.

Third, there is a lack of interaction with actors in sectors where a considerable part of innovations are currently occurring (and are expected to occur in the future), namely forest services, including tourism. Forestry institutional systems have strong sectoral boundaries, even to the wood and agricultural sectors, and even more to other sectors such as energy, tourism, nature conservation, etc. Forest policy institutions and forest knowledge institutions have difficulties in establishing systematic and stable relationships with other sectors that in fact are closely related to existing or potential markets for forest products and services. Such interactions, however, are the precondition for the evolvement of new ideas and their concrete implementation by forest companies.

For **strenthening** innovations in non-timber forest products and services, forestry agencies would have to provide much more information on new market opportunities, market research and marketing knowledge and means as well as

[4] Weiss, forthcoming; Kubeczko et al., forthcoming.

information on specific sources for further information. A further important area is information on available financial support opportunities. Another area concerns information on juridical issues, including trade and social security related aspects that are particularly relevant in many new market fields like tourism, sports etc.
Cross-sector relations to services sectors have received increasing attention by forest policy makers in the recent past. It seems recommendable to make steps to enhance policy interaction with policy actors in areas that are most important for forestry, e. g. tourism, nature conservation, etc. Workshops, common excursions, and other forms of opportunities for interaction can start the establishment of closer cooperation.

Acknowledgements

We would like to thank the researchers active in the consortium of EFI PC Innoforce for research contributions. The authors also want to thank the Austrian Ministry of Agriculture, Forestry, Environment and Water Management for the financial support of the EFI PC Innoforce.

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