

# Forest certification as a tool to support sustainable development in forest management

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**ABSTRACT:** The concept of sustainable development is currently known and used in many contexts across a wide range of industries. Nevertheless, specific approaches to achieving the strategy of sustainability can be found in the individual sectors. The beginnings of sustainable management in forestry go back to the mid-18<sup>th</sup> century. Currently, certification systems contribute to sustainable behaviour in forests. In the Czech Republic, this concerns in particular PEFC and FSC certification systems. Both these certification systems include two different processes, forest management certification and chain of custody certification, i.e. including the wood-processing companies, where only certified wood must strictly be used. This article aims to evaluate the importance of certification for sustainable development in forestry. Given the clear superiority of the PEFC system in the Czech Republic, this paper focuses on the potential benefits for PEFC certificate holders. To determine the benefits of PEFC certification for sustainable development, a questionnaire survey was chosen. Assessment of the benefits for sustainable development depends on the subjective assessment of certification holders. The results suggest that the beneficial effect on sustainable development in forest management is clear in the forest property area of over 500 ha.

**Keywords:** PEFC; FSC; social aspects; sustainability; benefits of the certification

The origin of the term sustainable development dates back to the 18<sup>th</sup> century, when it was used to some extent in forestry. At that time it was possible to cut down only a limited number of trees so as to ensure a continuous supply of timber without a reduction in resources for future generations (LELE 1991). The question of protection of natural resources and environment is brought to the fore by a pessimistically minded report *The Limits to Growth*, which greatly influenced the atmosphere of the time and raised a strong policy response in the form of correction of growth strategies and the adoption of a series of laws strengthening environmental protection (EBNER, BAUMGARTNER 2006).

The year 1987 is considered as an important milestone, when the pressing environmental problems were responded to by the United Nations Commission for the Environment and Development, under

the chairmanship of G. H. Brundtland, namely by a report entitled “Our Common Future” (EBNER, BAUMGARTNER 2006). In this report, known as “Brundtland-Report”, the term “sustainable development” was used which has since become a key concept in environmental policy. The first and so far the best-known definition of sustainable development was also developed at that time: “Sustainable development is development that meets the needs of current generations without compromising the ability to meet the needs of future generations and without it happening at the expense of other nations” (BRUNDTLAND et al. 1991).

The turning point for the concept of sustainable development was the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992. This conference aimed to prepare a global plan of application of sustainable devel-

opment in practice (KLEIN 2001). The conference adopted several legally not binding documents, among which there was also Agenda 21, which contains a total of 40 chapters divided into sections (GLAVIČ, LUKMAN 2007): social and economic aspects, protection and management of resources, strengthening the role of major groups, financial resources and mechanisms.

In an international meeting at the World Summit on Sustainable Development in Johannesburg in 2002 the extended definition of sustainable development was generally adopted: "Sustainable development is development that ensures a balance between the three fundamental pillars: social, economic and environmental" (REDCLIFT 2005). The essence of sustainability is thus achieving the three basic objectives: social development, respectful of the needs of society, effective environmental protection and environmentally-friendly use of natural resources, while maintaining a high stable level of economic growth and employment (REDCLIFT 2005). The government of the Czech Republic adopted in its Resolution No. 1242 of 8 December 2004 the document Strategy for Sustainable Development of the Czech Republic. The strategy was prepared under the coordination of the Government Council for Sustainable Development and it is a long-term framework for policy making in the context of international commitments that the Czech Republic adopted while respecting the specific conditions in the Czech Republic (ZÁZVORKA 2007). It is the basis for the drafting of other materials of conceptual nature (sectoral policies or action programmes) and for strategic decision-making within government bodies and local public administration bodies and their cooperation with interest groups (ZÁZVORKA 2007).

Sustainable development is not a simple and clearly described category, but something that mankind must attain if it is to ensure the vital conditions for the continuation of the human race. The vague definition of sustainable development causes a different understanding of this concept, different approaches in practice and therefore also some inconsistencies (GLAVIČ, LUKMAN 2007).

One example of a specific approach to sustainable development is forest management (BOWERS 2005). The beginnings of sustainable management in forestry date back to the mid-18<sup>th</sup> century. The destruction and devastation of tropical forests have primarily become the impetus for interest in sustainable forest management. The effort to protect these forests has led to the emergence of forest certification. Although the original goal has failed to be met so

far, the certification was extended to other areas of the world. In Europe, also other reasons were added to the original intent to protect natural forests: defence of the market in each country against imports of wood obtained by exploitation management, fragmentation of forest ecosystems, loss of biodiversity, health of forests, etc. (BOWERS 2005).

In 1993 in Helsinki at the 2<sup>nd</sup> Ministerial Conference on the Protection of European Forests, sustainable forest management was defined as "the management and use of forests and forest lands in a way and to an extent that maintain their biodiversity, production capabilities and regeneration capacity, vitality and the ability to meet at present and in the future relevant ecological, economic and social functions at local, national and international levels, and which cause no damage to other ecosystems" (BOWERS 2005).

Internationally accepted standards of ecological, social and economic requirements have been introduced into a sustainably managed forest. Although many forests are managed in this way, the only way to prove it reliably is through independent verification – certification. The Czech Republic is one of the 11 PEFC system founding countries in 1999. In 2001, the Czech Forest Certification System was recognized (PEFC 2015). Based on an assessment by an independent certification organization, certificate has been issued for the region – the entire territory of the Czech Republic. This was followed by the signing of individual forest owners to participate in the regional certification and issuance of Certificates of Participation in the Regional Certification (PEFC 2015). The entire system of certification and setting criteria for the assessment of sustainable management is based on the conclusions of the United Nations Conference on Environment (UNCED 1992), the conclusions of the Ministerial Conferences on the protection of forests in Europe (Helsinki 1993, Lisbon 1998, Vienna 2004, Warsaw 2007) and legislation in force in the Member State. The concept of sustainable forest management has become the strategy and goal of the forestry policy in the Czech Republic. In that spirit, also Act No. 289/1995 on forests sets out in Section 1 that "its purpose is to establish conditions for forest conservation, forest management and reforestation as national wealth forming an irreplaceable component of the environment, for the fulfilment of all its functions and for support of sustainable forest management" (ZÁZVORKA 2007).

The following basic strategic goals of sustainable forest management are mentioned: (ZÁZVORKA 2007): (i) restore and maintain stable forest ecosys-

tems; *(ii)* in all forests, application of professional management and use of forests in such a way and to the extent that their stability, biodiversity, production capability, regeneration capacity, vitality and ability to perform useful functions of the forest will remain permanently ensured; *(iii)* conservation of forests as permanently renewable natural resources for the benefit of future generations.

Currently, it can be observed that certification systems, among other things, contribute to sustainable development of forestry. In the Czech Republic, this concerns in particular PEFC and FSC certification systems. Both these certification systems include two different processes, forest management certification and chain of custody certification, i.e. including the wood-processing companies, where only certified wood must strictly be used. PEFC organization is convinced that achieving sustainable development in forest management is possible only if it is economically viable, environmentally and socially equitable. These three pillars cannot be separated and addressed individually. On the contrary, they constitute a composite whole and, if failing to simultaneously implement them, it would be very difficult to protect forests, ensure the prosperity of foresters and communities dependent on forest management and reduce emissions of harmful substances produced in unsustainable management. PEFC organization also seeks to strengthen and enhance the positive image of forestry and wood as a renewable raw material (PEFC 2014).

Today more than 240 million ha of forests of all sizes (approximately two thirds of the total global certified forest area) are certified by PEFC. From this perspective, it is the world's largest certification system for sustainable development (PEFC 2014). PEFC certification is based on international standards of sustainable management. It requires compliance with all the basic conventions of the International Labour Organization in forestry. To ensure the independence and impartiality of assessing sustainable development, the processes of setting standards, certification and accreditation are strictly separated. All the standards are also subject to public consultation at the national and international levels and audits by third parties. After obtaining certification national certification systems are reviewed periodically (HASENAUER 2006).

Certification is tailored to the specifics of community or family-managed forests, taking into account preserving their livelihoods and strengthening rural development (AULTD et al. 2008). Within the framework of certification of sustainable development, emphasis is laid on (PEFC 2015):

- Maintaining or increasing biodiversity of forest ecosystems
- Maintaining functions of forest ecosystems which:
  - provide food, biomass and wood
  - are a key part of the hydrological cycle, significantly contribute to carbon capture and storage and prevent soil erosion
  - are used as a natural habitat and shelter for people and wildlife
  - include spiritual and recreational functions
- The replacement of chemical substances by natural alternatives, or the minimization of their use
- Protecting the rights and living conditions of labourers
- Support for local employment
- Respecting the rights of indigenous people in the region
- Performing all operations in compliance with the legal framework and best practices.

In addition to forest management certification, PEFC also offers the chain of custody certification. The mechanism of such certification involves tracking of certified material from its acquisition in forest environment to the final product. This ensures that the wood contained in the product is tracked back in terms of belonging to a certified forest (BLOOMFIELD 2012).

In the Czech Republic, in addition to PEFC certification organization also non-governmental non-profit organization FSC (Forest Stewardship Council) carries out its activities. International FSC certification system has been operating since 1993, with a number of stakeholders having taken part in its inception (representatives of international environmental organizations, wholesalers and retailers of wood, foresters, wood-processing industry, associations of indigenous people, trade unions and certification organizations from around the world). FSC aims to promote environmentally friendly, socially beneficial and economically viable management of forests (FSC 2009). The Czech representation of FSC does not perform certification itself, but facilitates the promotion of forest certification by FSC system and certified products, the creation and revision of the Czech FSC standard, as well as monitoring of the certification process in the Czech Republic (FSC 2009).

Certification systems PEFC and FSC can be considered from a global perspective the currently dominant organizations providing certification of forest management (OVERDEVEST 2010). The main principles and goals of these organizations in general terms are not much different. Both certification systems are intended for entities engaged in

forest management or entities in some way connected with it. Certification indicates the successful implementation of sustainable development into business activities. However, there are differences concerning the formation, internal functioning and specific targeting of both organizations.

SCHLYTER et al. (2009) summarized the main differences in the internal operation of both organizations. PEFC and FSC are based on a three-chamber model of decision-making within their managing body. While FSC uses a model where economically, socially and environmentally oriented stakeholders have the same weight in decision-making, in the case of PEFC the managing body puts two thirds of weight to the forest owners and related wood-processing industry. Documentation in both certification systems is available to the public (this also applies to forest owners' plans required to be submitted at certification). Mechanisms to resolve potential problems between the certification body and the forest owner are then less clear in the case of PEFC (MALETZ, TYSIACHNIOUK 2009).

On the example of Sweden SCHLYTER et al. (2009) documented different roles and impacts of the two certification systems. The Scandinavian countries were among the first states to adopt certification of forest management and, therefore, by comparing the two largest certification systems on the example of Sweden it is possible to identify the actual impact of these certifications. PEFC and FSC activities in Sweden are markedly territorially differentiated. The northern part of the country and large private and public forest owners are dominated by FSC certification. PEFC certification is predominant in southern and central Sweden, where it is accepted mainly by smaller non-industrial forest managers. In terms of environmental effectiveness, both systems are considered equally consistent. In mountainous areas with worse conditions in the northern part of the country PEFC system is less effective (and also therefore it is not dominant there) (DIMITROV 2005). On the other hand, the effectiveness of FSC is reduced by inability to attract a larger number of minor forest owners. Different territorial scope of the two systems is also related to different types of forests in these parts of the country and, consequently, to their limited effectiveness beyond "their" area. In "their" areas, both systems are characterized by a high degree of political legitimacy. Based on these facts SCHLYTER et al. (2009) concluded that both systems are complementary rather than to be considered competing. Even, he considered potential certification across both systems ("cross certification"), provided that convergence of the systems would continue in the future.

The main objective of this article is to evaluate the benefits of implementing the certification system for forest property owners and sustainable development. This evaluation will be done across all pillars that within sustainable development are integrally monitored by certification, i.e. social, environmental and economic pillars. Another objective is to compare the so far known scientific approaches and define the theoretical foundations in the selected area with a focus on qualifying potential benefits for the company, provided that the chosen certification is implemented.

## MATERIAL AND METHODS

Methodological approach is designed to achieve the objective set by the authors. The first phase of addressing the issue is theoretical research, including the analysis of special literature that will be prepared from the current databases of articles, books, legislation and related government documents. The result of this analysis will be collection, description and explanation of secondary information on the experience in the implementation of the chosen certification. By comparing such information the benefits of the selected certification will be evaluated, and this evaluation will further be verified by research.

To determine the benefits of PEFC certification for sustainable development, a questionnaire survey was chosen which was conducted by interviewing all holders of certification in the Czech Republic. The questionnaire survey enables fast and cost-efficient collection of complex data from a large number of respondents. The survey was conducted via e-mail addressing respondents and arising questions were consulted via telephone. The respondents were managers or professionals responsible for the process of certification. In the questionnaire closed questions (with options from a menu of specific items) or half-closed questions were chosen which in addition to selecting answers from a menu allowed completion in "specify (other)". Closed questions provided a clear and for respondents time-efficient way of answering. These questions were supplemented with open questions, which gave respondents the opportunity to freely express and clarify answers to the previous closed (half-closed) questions. The questionnaire contained 11 questions. The form of questionnaire survey is often used in assessing the impacts of forest certification (CUBBAGE et al. 2010). Holders of certification were identified from the database on the website of PEFC Czech Republic (<http://www.pefc.cz>). According to recent records of PEFC Czech Republic 2015



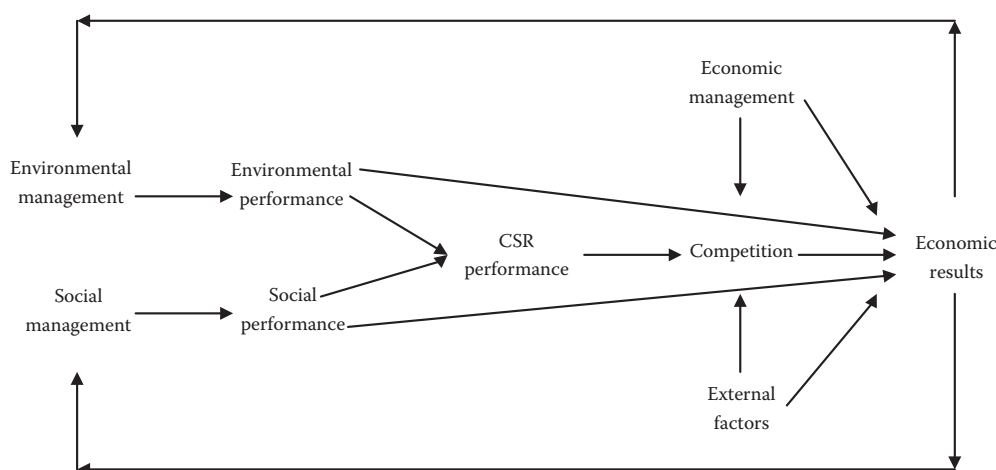


Fig. 1. Business management in accordance with the concept of sustainable development and competitiveness (SCHALTEGGER, WAGNER 2006)

the list of certified forest enterprises includes 352 companies. Taking into account that companies in the Czech Republic include a number of assets – enterprises, a questionnaire was sent only to the company headquarters, for the sake of relevance of provided data. The companies concerned are: Lesy České republiky, s.p., Vojenské lesy a statky ČR, Spojené lesy s.r.o., Lesospol Zbiroh, s.r.o., Kaiser s.r.o., Česká zemědělská univerzita v Praze, Školní lesní podnik, Zájmové sdružení vlastníků obecních lesů, Lesy pod Hostýnem, s.r.o., Drahomír Bednář, Firma-Lesodo. Assessment of the benefits for sustainable development is not measured by indicators that would compare the status of forest before and after certification, but it depends on the subjective assessment of certification holders.

An important parameter is the area of certified forests or the size of the owner. The view on the benefits of certification and other related issues is assumed to be different from the perspective of owners by size of assets. Therefore, respondents were divided into three groups. A group with 0–50 ha forest area, a group with 51–500 ha forest area and a group with forest area of 501 ha and more.

Sustainability in certification is assessed especially by questions relating to the success of carrying business, the impact on environmental protection and the social area. The questionnaire is based on the relationships shown in Fig. 1. Successful management of sustainability performance is achieved only if the management of environmental and social issues is in line with increased competitiveness and economic performance (SCHALTEGGER, WAGNER 2006). Sustainability management requires an integration of environmental, social and economic management and thus covers all the links between non-market and economic issues in forestry.

In addition, the issue of support for sustainability through certification can be derived from the reasons for the introduction of certification and particularly its benefits.

Both qualitative and quantitative analyses were used for data processing. In assessing the impact of the area of forest assets comparisons were used between the defined forest land size groups as well as correlations between forest asset size and answers to questions.

To confirm a demonstrable relationship between the size of forest assets and the effect of certification on business success, environmental protection, social area and costs and benefits (questions 1–4), chi-squared test – a non-parametric statistical method is used. The null hypothesis expressing the same effect of certification on the individual criteria according to the size of forest assets and alternative hypothesis expressing a different effect of certification are selected. The achieved significance level of the test is compared with a probability of 0.05, which is the lower limit for acceptance of the null hypothesis. At a value of  $p$  less than 0.05, the null hypothesis is rejected (ŘEHÁKOVÁ 1979; CHRÁSKA 2007).

## RESULTS

In the questionnaire survey a total of 352 forest owners were addressed. The return reached 44.3%. All respondents carry out certification for almost all harvested wood (99.2%).

For sustainability assessment, the influence of PEFC certification on business success is evaluated as the first (Table 1).

The achieved significance level is  $P = 2.90 \times 10^{-9}$ . The null hypothesis is rejected, and the effect of cer-

Table 1. Effect of PEFC certification on variables

Variable	Total ( <i>n</i> = 157)	Area of forest assets		
		0–50 ha	51–500 ha	501 ha and more
<b>Business success</b>				
Yes	26	2	4	20
Probably yes	102	32	55	15
Probably no	13	7	6	0
No	6	4	9	3
<b>Environmental protection</b>				
Yes	14	2	1	11
Probably yes	71	13	37	21
Probably no	21	5	14	2
No	51	25	22	4
<b>Social area</b>				
Yes	25	1	0	24
Probably yes	18	5	12	1
Probably no	42	9	27	6
No	72	30	35	7

tification on business success is not the same for all sizes of enterprise. The results show that the positive effect on business success is demonstrable. “Yes” was answered by 81.5% of respondents. For forest assets of more than 501 ha the positive effect is even clearer (92.1%) with the majority of “yes” answers.

In terms of the impact of PEFC certification on the environment the responses are not unambiguous (Table. 1).

The achieved significance level is  $P = 8.63 \times 10^{-8}$ . The null hypothesis is rejected, and the effect of certification on environment area protection is not the same for all sizes of enterprise. The environmental impacts are positively assessed by 54.1% of respondents. More marked differences are in categories by forest area. In the case of the smallest forest area the positive effect is assessed by 52.4% of respondents, in the category of 51–500 ha the positive effect is assessed by 51.2% of respondents and a clearly positive effect is reported by the category of forest assets of over 501 ha and represents 84.2%.

The achieved significance level is  $P = 3.04 \times 10^{-17}$ . The null hypothesis is rejected, and the effect of certification on the social area is not the same for all sizes of enterprise. In the social area, the majority of respondents (72.6%) believe that certification has no

effect on it (Table. 1). The big difference, however, is by category. While respondents with forest area of up to 500 ha reported mostly negative answers (84.9%) and those with forest area of up to 50 ha reported unambiguously negative answers (66.7%), forest area of more than 501 ha is dominated by the positive answer, with “yes” answer in 64.9% of cases.

Certification is related to the consideration whether the benefits are higher compared to the costs. In this regard, the major part of the responses is positive.

The achieved significance level is  $P = 2.23 \times 10^{-7}$ . The null hypothesis is rejected, and the effect of certification on incurred amount and achieved benefits from implementation of certification is not the same for all sizes of enterprise. Clearly positive answer is in the case of forest area of more than 501 ha, where 92.1% responded positively with the prevailing “yes” answer. In terms of financing costs associated with certification all respondents identically answered that they used their own financial resources (Table 2).

The key question in certification is the reason for its introduction. If we express the overall results in descending order in percentage (Table 3), the most common reason is to improve the image and credibility (31.5%). The second place (29.7%) is occupied

Table 2. Do PEFC certification benefits outweigh the costs?

	Total ( <i>n</i> = 146)	Area of forest assets		
		0–50 ha	51–500 ha	501 ha and more
Yes	42	4	12	26
Probably yes	67	29	29	9
Probably no	18	7	10	1
No	19	5	12	2

Table 3. Reasons for the introduction of PEFC certification (in %)

Reasons	Total	Area of forest assets		
		0–50 ha	51–500 ha	501 ha and more
To improve the image and credibility	31.5	23.4	33.8	36.4
Pressure of customers and business partners	29.7	34.0	24.1	34.1
Concern for environmental protection	12.2	10.6	14.5	10.2
To improve the competitiveness	11.3	10.6	13.1	9.1
Pressure of laws and standards	8.0	9.6	8.3	5.7
Efforts towards responsible behaviour	5.5	10.6	4.1	2.3
To improve relations with the public and government	0.9	1.1	0.7	1.1
Cost savings	0.9	0.0	1.4	1.1

by the pressure of customers and business partners. For small forest owners, conversely, the pressure of customers and business partners is in the first place (34.0%). Far behind, another reasons are environmental protection (12.2%) and to improve the competitiveness (11.3%). Other reasons for the certification include the pressure of laws and standards (8.0%) and efforts towards responsible behaviour (5.5%).

Following the reasons for the introduction, the main benefits mentioned by respondents are shown in Table 4. In the first place it is improved competitiveness (27.4%), followed by improved image of the organization (24.1%). For the forest area of more than 501 ha, improved competitiveness is a significant benefit (34.3%). This is followed by improvements in supplier-customer relationships (21.9%). This benefit takes the same position in all forest area categories. This is followed by the compliance with legal regulations (11.0%) and improved work in the field of environmental protection (10.5%). In the forest area of more than 501 ha, however, the order is reversed and improved work in the field of environmental protection is the fourth reason in order (14.9%). Other reasons are not statistically significant. None of the respondents found the benefits of certification in the social area.

## DISCUSSION

Jan Mertens, responsible for PEFC Deutschland public relations, mentions in the discussion the strengths of PEFC certification, which he sees mainly in low costs, especially for small forest owners who are thus able to take part in certification even with smaller estates. He further states that PEFC includes the principle of sustainability and attaches equal weight to all three pillars of sustainability – ecological, economic and social. PEFC certification is based on integrating nature conservation instead of leaving areas to their spontaneous development (PEFC 2015). Barbara Korak, responsible for PEFC Austria public relations, states the main reasons for the introduction of PEFC certification: in the first place she mentions the possibility of introducing a regional certification, PEFC as an internationally recognized and known system offers Austrian forest owners credible backing, joining this certification system is demonstration of a responsible approach to forest management. The main reasons that convince companies to join this certification system include: credibility, ecological approach with aspects of sustainability, widespread and globally recognized system, the possibility of regional certification (PEFC 2015).

Table 4. The real benefits of the introduction of PEFC certification (in %)

Benefits	Total	Area of forest assets		
		0–50 ha	51–500 ha	501 ha and more
Improved competitiveness	27.4	23.2	25.7	34.3
Improved image of the organization	24.1	18.8	27.7	23.9
Improved supplier-customer relationships	21.9	24.6	19.8	22.4
Compliance with the legal regulations	11.0	18.8	9.9	4.5
Improved work in the field of environmental protection	10.5	7.2	9.9	14.9
Improved environmental performance	2.5	4.3	3.0	0.0
Increased sales	1.3	1.4	2.0	0.0
Creating environmental awareness among all employees	0.8	0.0	2.0	0
Improved communication with the public and government	0.4	1.4	0	0
Improvements in the social area	0	0	0	0
Improvements in the working environment	0	0	0	0

CUBBAGE et al. (2010) examined ten companies in Argentina and Chile that adopted FSC certificates or certificates under Sistema Chileno de Certificación Forestal (Chilean certification system within PEFC). Although the authors in this research addressed mainly changes that the companies were forced to undergo in order to adopt certification, they also partly surveyed managerial, economic, social and environmental impacts of certification. The method of collecting the information included personal interviews with the owners of companies, questionnaire survey and survey of the audit reports and other reports relating to certification. The vast majority of those surveyed were satisfied with the impacts of certification. Compared to research conducted in the Czech Republic, this result can be considered identical, with a positive effect on business having been confirmed by 81.5% of respondents. A markedly positive effect was reported by 92.1% of owners of the forest area of over 501 ha.

CUBBAGE et al. (2010) also mentioned that in many cases the certification was not only introduced as a tool to meet public expectations in relation to forest management, environmentally friendly practices and social standards, but its contribution was expected to also improve the quality and sustainability of forest management within individual companies. The following main strengths of certification were identified: general strengthening of forestry work, training and equipment for workers, consumers and public acceptance of management practices, control over delivery procedures, development of sustainability system in the future, improved working conditions and environment, improved public relations and credibility of the company. In contrast, the weaknesses were considered: a greater administrative burden, low national certification coverage in the countries concerned, weak subsidies for certification, poor ability of the market to advantage certified companies, lack of government incentives to obtain certification, the high costs of smaller businesses (which are not offset by the benefits) and the need to create certified clusters for the purpose of contacting clients.

Czech entrepreneurs in forestry see real benefits and strengths of certification especially in improving the company's competitiveness, improving the image and supplier-customer relationships. In contrast, Czech companies see as a weakness especially a greater administrative burden. Hardly any consistency between certification and social area of the company can be considered as a common indicator of researches. In the social area, the majority of respondents (72.6%) believe that certification has no effect.

In their study JOHANSSON and LIDESTAV (2011) aimed to assess the impact of forest management certification on environmental protection in Sweden. The study is based on the assumption that the effect should be positive and environmental protection should be strengthened. Three methods were used: data analysis based on the survey of the database Swedish National Forest Inventory, data analysis from the Swedish Database for Forest Owner Analysis and subsequent questionnaire survey (e-mailing) of smaller private forest owners owning forest management certificates. The analysis of secondary data resulted in the finding that there are certain improvements in the environmental area, with mentioning biodiversity of forest ecosystems. While the changes were almost imperceptible in the case of larger forest owners with FSC certification, in the case of smaller forest owners with PEFC certification the changes were more visible.

The results obtained from the questionnaire survey in the Czech Republic are different in the area of environmental protection. The environmental impacts are positively assessed by 54.1% of respondents. Considerable differences are shown by forest area categories. In the smallest forest area category of 0–50 ha, an environmental effect is positively assessed by 52.4% of respondents, in the category of 51–500 ha it is positively assessed by 51.2% of respondents and a clearly positive effect is reported by owners of the forest area of over 501 ha, representing 84.2%. Compared to the study by Johansson and Lidestav, visible results are shown also by larger forest owners in the Czech Republic.

In the study by JOHANSSON and LIDESTAV (2011), the main reasons for adopting certification were identified economic reasons (36%), environmental reasons (34%) and a smaller part of respondents reported to have been influenced by the forest owners' association (22%). In the Czech Republic, the most common reason for adopting certification was improving the image and credibility of the company (31.5%). In the second place (29.7%) is the pressure of customers and business partners. In the case of small forest owners, however, the order is reversed and the pressure of customers and business partners (34.0%) is in the first place. Scandinavian countries are paid much attention also in other research studies – see e.g. GULBRANDSEN (2005) and SVERDRUP-THYGESON et al. (2008).

VAN KOOTEN et al. (2005) addressed the economic, institutional and social reasons that led 117 monitored countries to the adoption of forest management certification, or how important role was played by the factors in the adoption of FSC certification. Using a



purely quantitative methodology (regression model), the relationship between economic (e.g. the proportion of forest products in exports), institutional (e.g. the role of the government in economic development) and social variables (gender balance of literacy) and the adoption of the certification system is examined (CASHORE et al. 2004, 2005). Although economic factors influence the likelihood that forest management practices of the country are certified, research results support the idea that it also depends on economic institutions and social context. The ability of citizens to influence the political process is also an important factor. In this case, the authors believe that the probability of failing to adopt certification increases if the role of women in civil society is declining.

Specific research is represented by studies that address problems associated with the potential implementation of certification systems. On the example of Greece GEORGIADIS and COOPER (2007) examined the benefits of PEFC and FSC certification systems. Greece itself had no national certification standard of forest management at the time of the research. The authors describe the essential elements that would be necessary to meet for the adoption of PEFC and FSC system requirements. Quite a hypothetical study concludes that for Greece it would be advantageous to set up a system that would be accepted by both organizations (PEFC and FSC). In a country without any certification system it is thus a prerequisite to integrate sustainability into forest management and variations between individual certifications are not a priori a subject to closer research.

CHEN and INNES (2013) conducted several interviews with small forest owners in southern Chinese provinces. The aim was to identify the main obstacles to successful incorporation of certifications into management. The study identified several aspects constraining potential adoption of sustainable forest management and subsequent certification. They include limited financial resources, poorly developed infrastructure and transport systems, a complicated system of the ownership of forest areas, incoherence of policy in forestry, low level of awareness, illegal methods of forest management, lack of local co-operative organizations and insufficient knowledge of stakeholders.

## CONCLUSION

Certification of wood has been applied in many countries in recent years. With increasing pressure from society and non-profit organizations engaged

in sustainability the forest owners and timber companies realize the necessity of implementing certification mechanisms. Research shows that the success of certification depends on the specific local conditions. Based on the survey conducted among forest owners using PEFC certification, great interest in obtaining certification is obvious, especially because of improving the image and credibility and also because of the pressure of customers and business partners. The results also show that the benefits of the certification outweigh its costs.

It is not possible to come to a definite conclusion in terms of monitoring the impact of certification on sustainable development in forests. In the questionnaire survey there were achieved very different results in terms of the beneficial effect of certification on the environment and social area. The results suggest that the beneficial effect on sustainable development in forest management is clear in the case of forest property area of over 500 ha. In this category of respondents the awareness of the impact of certification on sustainable development is greatest. A similar tendency is described, for example, by CHEN and INNES (2013). It is a matter of setting the criteria for the certification system as well as forest owners' awareness of sustainable management.

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