

15 years of Forest Certification in the European Union. Are we doing things right?

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Abstract

Forest certification is one of the most important issues that have entered the forest sector in the past 15 years. There are many detractors and supporters of this instrument, but merely looking at the number of hectares certified and products carrying the logo of certification, one cannot deny that certification has gained importance, year after year. The overall objective of this study is to evaluate the effect of 15 years of forest certification in the EU forest-based sector, using the Delphi method. The analysis leads to the conclusion that the impact of certification in the EU forest-based sector is positive-neutral with respect to ecological aspects, positive-negative on the economic and positive-neutral on the social ones. However, its positive effect is limited, due to the fact that the changes needed for the certification are minor. An improvement in the information to both society and local people by the actors involved in forest certification could increase the positive impact on the sector.

Key words: sustainable forest management; Delphi; contingent valuation; FSC; PEFC.

Resumen

15 años de Certificación Forestal en la Unión Europea ¿Estamos haciendo las cosas bien?

La certificación forestal es uno de los acontecimientos más importantes que han irrumpido en el mundo forestal en los últimos 15 años. Si bien existen numerosos detractores y defensores de este instrumento, si nos atenemos al número de hectáreas certificadas y productos portadores del logo de la certificación, nadie puede negar que la certificación ha ido ganando importancia, año tras año. El objetivo general de este trabajo es evaluar el efecto de 15 años de certificación de la gestión sostenible sobre el sector forestal en la Unión Europea, utilizando el método Delphi. El análisis permite concluir que el impacto de la certificación en el sector forestal de la UE es positivo-neutral con respecto a los aspectos ecológicos, positivo-negativo en los aspectos económicos y positivo-neutral en los aspectos sociales. No obstante, su efecto positivo, considerando que las modificaciones para obtener la certificación son leves, es limitado. Una mejora en la información, tanto a la sociedad como a las poblaciones locales, por parte de los actores implicados en la certificación forestal, podría aumentar el impacto positivo en el sector.

Palabras clave: gestión forestal sostenible; Delphi; valoración contingente; FSC; PEFC.

Introduction

The word «sustainable» is not new to the forestry sector. Faustmann's formula (1849), one of the main pillars of the conventional forest economy, is based on the idea of a sustainable supply of wood for an infinite number of rotations. However, the concept of «sustain-

ability» has been expanded in the last quarter of the century with the integration of other products and services in the definition and the strengthening of social and environmental pillars.

Sustainable development can be defined as «*the fact of meeting people's needs without compromising the possibility that future generations do the same*» (United

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Nations, 1987). This definition includes two aspects: an individualistic one referring to the current situation and an altruistic one referring to the future generations.

Concerns over the sustainability of natural resources including forest ecosystems were particularly reinforced after the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. Since then the concept has been discussed and developed at different territorial levels: national, European and global.

In the European context, the Helsinki Process, which is officially called as the «European Process on Criteria and Indicators for Sustainable Forest Management» (MCPFE, 1993) focuses on the development of criteria and indicators for European forests. There are other regional processes beyond Europe, such as the Montreal Process (Montreal Process, 2009), which also develop this concept and adapt it to different geographical frameworks.

Achieving sustainable development requires a balance between economic, ecological and social aspects. However, while the term sustainability is easy to understand intuitively, it is not that easy to conceptualize, measure and formalize rigorously (Voces *et al.*, 2009). The purpose of criteria and indicators defined under the various national and regional processes is to provide a tool for monitoring progress towards sustainable forest management and allow governments and international agencies to monitor and report on the status of sustainable forest management in a country or region (Rametsteiner and Simula, 2003). But the distinction between what is sustainable and what is not depends on the criteria and rating scales, as well as on the personal perceptions of those who evaluate it. However, it is necessary to apply the same principles worldwide, it is needed a valid global approach.

At the Rio Conference, the first global policy on forest management, which was referred to as the «Forest Principles» (United Nations, 1992), was adopted, but no agreement was reached to sign a global convention on forests. This has led non-governmental environmental organizations (NGO) to develop a private, voluntary system to promote sustainable forest management: the certification of sustainable forest management or forest certification.

Forest certification is a voluntary process conducted by an independent third party which issues a written statement or certificate guaranteeing that forest management in a management unit is done according to standards considering ecological, economic and social

aspects (Hansen and Juslin, 1999; Bass, 2004). The two principal objectives of certification are to improve forest management and to ensure market access for products from certified forests, allowing both consumers and companies selling forest products to have an important role in forest conservation. With certification, consumers can express their preferences for sustainable management through their choice of products. However, the process also aims to change consumer preferences trying to reward sustainable goods. It is a way of integrating sustainability into economic theory and extending the traditional boundaries of the forest economy.

Forest certification is one of the most important issues that have entered into the forest sector in the past 15 years. There are many detractors and supporters of this instrument, but merely looking at the number of hectares certified and products carrying the logo of the certification, one cannot deny that certification has gained importance, year after year. Therefore, forest certification is a remarkably persistent theme intended to remain in the economic and political agenda (Rametsteiner, 2002).

Most studies on certification make a comparative analysis between different systems or schemes (Sprang, 2001; Nussbaum *et al.*, 2002; World Bank/WWF Alliance, 2003, 2006; CEPI, 2004; Ozinga, 2004; Federation of Nordic Forest Owners' Organisations, 2005; UPM Forestry and WWF, 2005; Mechel *et al.*, 2006) or study only one of the schemes (Meek, 2001; Hain, 2005; Newsom *et al.*, 2006; López Quero and Daniluk Mosquera, 2006). Others address specific issues, like the role to be played by public service (Rametsteiner, 2002; Koleva, 2005), the impact of certification on forest products market (Pajari *et al.*, 1999; Schwarzbauer and Rametsteiner, 2001; Veisten and Solberg, 2004; Owari *et al.*, 2006; Eriksson *et al.*, 2007) or its relationship with other policies such as climate change (Subak, 2002). Hansen *et al.* (1999 and 2000), Vilhunen *et al.* (2001), Raunetsalo *et al.* (2002) and Poku-Marboah *et al.* (2005) conducted periodic reviews for the United Nations Economic Commission for Europe (UNECE)/FAO on the status of forest certification in the Pan-European region. These analyses include data on certification initiatives, but do not perform an impact assessment. Since 2001, these assessments include the results of a questionnaire sent to UNECE correspondents in various countries. Although the Yale University has dealt very extensively with the issue of certification (Vogt *et al.*, 2000; Nussbaum and Simmala, 2004) and organized several debates

within the framework of The Forest Dialogue, their studies have been focusing on the United States and do not include the latest developments of recent years. In the European framework, there is no recent, scientific and holistic analysis of the impacts of forest certification on the EU forestry sector. The contribution of certification to sustainable forest management with the involvement of all stakeholders has not been assessed neither.

Ramesteiner and Simula (2003) consider it difficult to assess the impact of certification on sustainable forest management. However, it is clear that there is a need to do it (Nussbaum and Simmala, 2004). After conducting a literature review of forest policy, Solberg and Rykowski (2000) concluded that while most studies describe forest policy instruments, only few analyze their effectiveness, costs and benefits and even less assess alternative policy instruments. The same scenario can be observed in the case of forest certification.

The overall objective of this study is to evaluate the effect of 15 years of forest certification in the EU forest-based sector. In substance, the purpose is to analyze whether it has been an effective tool and to assess whether we are doing things right, in order to correct any shortcomings and build on successes.

Material and methods

Data collection and processing was done through an analysis of the state of knowledge, the realisation of semi-structured interviews, the fulfilment of a survey for experts by means of the Delphi method and the use of the contingent valuation method (CVM) in some of the questions.

Application of Delphi method for the assessment of forest certification

Delphi method was considered as a suitable technique to evaluate the effects of forest certification. It is a technique for structuring a group communication processes, allowing a group of experts to address a complex problem (Linstone and Turoff, 1975). The primary information collected allows contrasting the general, economic, environmental and social aspects of forest certification. This method is often used when historical

data do not exist or they are unreliable, when the impact of external factors is more important than the impact of the internal ones and when ethical and moral considerations are more relevant than the economic and technological ones (Landeta, 1999). In the case of forest certification, although there are historical data, due to its short time frame, it is necessary to verify them with the help of expert's opinion. On the other hand, there are many external factors that significantly influence the economic, ecological and social aspects of certification, such as the image of the forestry sector or the integration of this instrument in other policy areas. The Delphi method allows the integration of all these elements.

It was decided to conduct two rounds or iterations in order to receive feedback at least in one occasion, because of the low chance of reaching consensus regardless of the number of survey rounds, due to differences of opinion amongst stakeholders, and to avoid the risk of ignoring subgroup trends.

Preparation of the questionnaire

The questionnaire was set up in a modular form to match the particular characteristics of the different stakeholders interviewed. Thus, certain parts of the questionnaire were applicable only to specific groups (the questionnaire was larger for «owners» and «industry»).

Two interviews have been conducted with FSC-Spain and PEFC-Spain in order to identify the different options to be presented in the questionnaire. The objective of these semi-structured interviews based on an open list of questions, also called open semi-directive interviews (Ruiz Olabuénaga, 1996), was to obtain qualitative information and served to complete the options for the different questions. The results of these interviews were also used to determine the range of benefits, achievements, strengths and weaknesses of forest certification. The analysis of the outcome of these interviews was of key importance in the formulation of certain questions, such as those relating to environmental, economic and social aspects of certification.

The questionnaire was divided into the following modules; «general aspects», «ecological aspects», «economic aspects» and «social aspects» (Table 1). Some of the questions of the first questionnaire allowed the experts to explain their choices. The expla-

Table 1. Questionnaire first-round Delphi

Question	Type
<i>General aspects</i>	
1. Major challenges facing EU forests: fragmentation of forest ownership, lack of resources, excessive legislation, abandonment of rural areas, other (to specify)	Lickert
2. Certification benefits or harms owners and industries small and/or big	Closed
3. Main reasons to certify a forest	Open
4. Certified forest: primary forests, semi-natural forests or plantations	Closed
5. Impact of certification on the image of forest products	Closed
6. Modifications necessary to certify a forest: important, minor, not needed	Closed
7. Modifications necessary to certify a forest	Open
8. Main barriers that hinder the development of forest certification	Closed
9. Main drivers for the development of forest certification	Closed
10. Main achievements of certification	Closed
11. Certification standards: subjective or objective	Closed (with justification)
<i>Ecological aspects</i>	
12. Forest certification: implies an improvement in the soils, is positive for biodiversity, is positive for the regeneration, diminishes the environmental impact of forest management, implies an improvement of the surface, structure and operation of the forests, does not imply any modification from the environmental point of view from the business as usual scenario	Lickert
<i>Economic aspects</i>	
13. Price of certified/non-certified wood	Closed
13.b. (Owners) Impact of certification on profitability	Closed
13.c. (Owners) Increment in the price of wood requested to certify a forest	Open, CVM
14. Price of certified forest products.	Closed
14.b. (Industry) Impact of certification on profitability	
14.c. (Industry) Increment in the price of certified forest products requested to buy certified wood	Open, CVM
15. Market access of non-certified wood	Closed
16. Impact of certification on developed/developing countries	Closed
<i>Social aspects</i>	
24. Forest certification: improve conditions of forest workers; improves documentation of the status of forest workers; serves to integrate social criteria into traditional forest management; improves information to local population; improves information to society; does not imply any modification to the previous social management	Lickert
25. Comparison between certification and labour legislation	Closed (with justification)

nations provided were used for the preparation of the second questionnaire.

To assess the impact of certification it is necessary to identify the main challenges of EU forest-based sector. Several challenges were presented in the questionnaire to determine if the experts considered them relevant. In their replies to the first questionnaire, a large percentage of experts mentioned other challenges that were not on the list. The four challenges mentioned by the highest percentage of experts were presented for further analysis in the second round.

The second questionnaire was drawn up taking into account the importance and divergence of first round results. Thus, we delved into the most important aspects on which consensus was not achieved, additional sections were included following the feedback of experts, in order to complete or clarify certain questions, and the open questions from the first round were presented in a closed form. The versatility of Delphi allows for this variant where first round results are used to close the questions in the second round. When the questions from the first round were presented again in the second round, experts were informed about the median, 25th

and 75th percentiles (central value) and expert's previous answer. Hence, individual questionnaires were prepared for each expert. For certain questions that determined the existence of a dependency between responses and experts profile (mainly in the ecological and social aspects), the median by interest group was also provided. The two iterations were performed using e-mail.

Election of the expert panel

One of the first decisions in the implementation of Delphi is to determine the expert's profile. In the present case, the experts belong to the groups «specialists» and «affected» (Landeta, 1999), although a large number of experts in the group «affected» are also leading experts in the field. The selection of experts for the Delphi survey was conducted using thematic and geographical criteria, trying to cover the principal stakeholders in the EU, representing North, Central, Southern and new Member States and including a large number of recognized experts in the subject. The final thematic selection includes the groups «certification schemes», «certifiers», «environmental NGO», «forest owners», «forest industries», «public function» (sub-national, national and European) and «researchers».

Geographical selection covers the following areas:

— European: European Commission, Forest Technology Platform and European industry and owners associations.

— National: national ministries, national forest owners associations, private forest owners, NGO, research centres and industry representatives from Spain and other Member States (experts from Italy,

Germany, France, Finland, Lithuania, Estonia and Portugal).

— Regional and local: local and regional authorities (experts of Castilla y León, Galicia, Andalucía, Asturias and the Basque Country)

While most experts are Spanish (68.6%), including experts from other EU countries allows analyzing whether there is any area where Spanish expert opinion differs from the opinion of experts from other Member States.

With regard to determining the number of experts needed for the study, based on the reviewed literature, it was considered desirable that they were over 17 and under 50. Dalkey (1969) notes that up to 17 the average error decreases exponentially for each expert added. Landeta (1999) points out as essential a minimum of 7 but stresses that total number may not exceed 50. The final number was 35 in the first round and 32 in the second (Table 2).

Defining the scale of measurement and analysis criteria

Lickert scale with 5 positions (from 5 —completely agree— to 1 —completely disagree—) was used in a large number of questions. The intermediate position 3 indicates neutrality, doubt or indifference. Three trends of opinion were identified: the agreement, consisting of positive responses (5 and 4) the disagreement, consisting of negative responses (1 and 2) and neutrality, doubt or indifference (3). It is considered an acceptable degree of consensus if at least 66.7% of the experts is «in agreement», «in disagreement» or «in neutrality or doubt». This percentage was considered because,

Table 2. Answers to first and second questionnaires

Stakeholders	First questionnaire			Second questionnaire		
	Questionnaire sent	Questionnaire received	Answers (%)	Questionnaire sent	Questionnaire received	Answers (%)
Forest owners	10	8	80.00	8	6	75
Industry	7	6	85.71	6	6	100
Research	8	4	50.00	4	4	100
Certification systems	4	2	50.00	2	2	100
Certifiers	7	4	57.14	4	4	100
Public Function	12	8	66.67	8	7	87.5
E-NGO	7	3	42.86	3	3	100
Total	55	35	63.64	35	32	91.4

limiting to three trends, the majority originates when at least 2/3 of the experts are at a certain position. The arithmetic mean of the grouped responses must be above 3.6 in case of agreement or below 2.4 in case of disagreement. With respect to neutral responses, they indicate uncertainty or neutrality. This group, however, includes two different situations: one where it meets the three criteria mentioned above with respect to neutral (3) or a convergence of responses to that position, due to differences of opinion among experts. In the latter case, the second questionnaire was used to increase the degree of consensus.

For other «closed questions» where no Lickert scale was applied, the same criteria mentioned above were followed. Accordingly, the responses were grouped into three or four groups, depending on the options presented. In the questions where experts were asked to choose up to two answers, it was considered the cumulative percentage of each option. Thus if one option was chosen by more than 66.7% it was considered acceptable with a high level of consensus.

Contingency tables and χ^2 test

Tables of contingency and χ^2 test were used to check the possible dependence between responses and expert profiles, as well as between different variables related to forestry in the EU and the situation of certification. The importance of certification in the various Member States was analysed and compared with the percentage of forest area and the predominance of the different certification schemes with respect to the main forest property types.

Contingent valuation: application to the assessment of forest certification

The contingent valuation method (CVM) was used within the range of questions, to determine the price increase that wood or forest products should have for the owner or the operator to decide to certify their forest management or to purchase certified wood. The CVM is a technique to estimate the value of goods (or services) for which no market exists (Bateman, 1999). Considering that in this study the number of observations is reduced and lower than the necessary for using a dichotomous question, an open question was used, in view of its greater efficiency.

Results

General aspects

Evolution and current status of forest certification in the European Union (EU)

At present, forest certification is a consolidated instrument, with over 341 million hectares certified in the world, of which 73.7 are in the EU and 1.2 in Spain (own elaboration based on data from FSC, 2009 and PEFC, 2009). There is coexistence of different certification schemes of which the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification Schemes (PEFC) need to be highlighted in the European framework. The EU currently has 25.3 million hectares (Mha) certified by FSC and 48.4 Mha by PEFC (Table 3), corresponding to 47.36% of EU forest surface. Although there are certified forest areas covered simultaneously by both systems, in general each Member State has opted for one or other certification system. For this reason and also taking into account that those areas would need to be identified at forest management level, hectares certified simultaneously by both systems have not been deducted in the calculation. Forest area is considered to cover both forests and other wooden lands (FAO, 2000), having been some of the latter also certified.

Growth in the number of hectares certified in the EU has been reduced in recent years (Fig. 1).

A relationship of dependence between the dominant certification system (FSC or PEFC) and the predominant type of forest ownership (private or public) was found, being the result of chi-square test $p = 0.045$. Excluding Malta and Cyprus from the analysis because of their limited forest area and without certified forest, FSC is more present in 14 Member States of which 9 have a predominance of public forest ownership, whereas PEFC is more important in the remaining 11 Member States, of which 8 have predominance of private property.

Challenges of the forest-based sector in the EU

The experts considered that the fragmentation of forest ownership, the abandonment of rural areas and the lack of resources are amongst the major challenges of the forest-based sector. However, they disagreed with the statement considering the lack of sustainable forest management as one of the main challenges and showed

Table 3. Certified surface in EU27 in 2009 (ha)

	FSC certified area	PEFC certified area	FSC and PEFC certified area	% Forest and other wooden land certified by FSC o PEFC
European Union	25,317,648	48,369,026	73,686,674	47.36
Belgium	16,806	281,052	297,858	44.66
Bulgaria	104,361		104,361	2.88
Check Rep.	53,282	1,883,149	1,936,431	73.13
Denmark	110,558	215,262	325,820	65.16
Germany	451,711	7,337,973	7,789,684	70.33
Estonia	1,082,915		1,082,915	47.41
Ireland	448,597		448,597	67.05
Greece	36,626		36,626	0.98
Spain	95,272	1,123,814	1,219,086	6.80
France	16,610	4,999,433	5,016,043	32.25
Italy	48,766	630,156	678,922	6.80
Chyprus	0	0	0	0.00
Latvia	1,620,915	0	1,620,915	55.11
Lithuania	976,936	0	976,936	46.54
Luxemburg	18,835	26,202	45,037	51.77
Hungary	251,906	0	251,906	12.75
Malta	0	0	0	0.00
Netherlands	151,611	0	151,611	41.54
Austria	5,086	1,955,799	1,960,885	50.77
Poland	6,990,045	0	6,990,045	76.04
Portugal	225,418	0	225,418	5.96
Romania	917,473	0	917,473	14.40
Slovenia	270,840		270,840	21.43
Slovak Rep.	174,083	1,220,576	1,394,659	72.30
Finland	9,577	20,806,165	20,815,742	92.51
Sweden	9,736,010	7,889,445	17,625,455	64.03
United Kingdom	1,503,409	0	1,503,409	52.84

Source: Own elaboration based on data from FSC (2009) and PEFC (2009). Hectares certified by both FSC and PEFC are not considered.

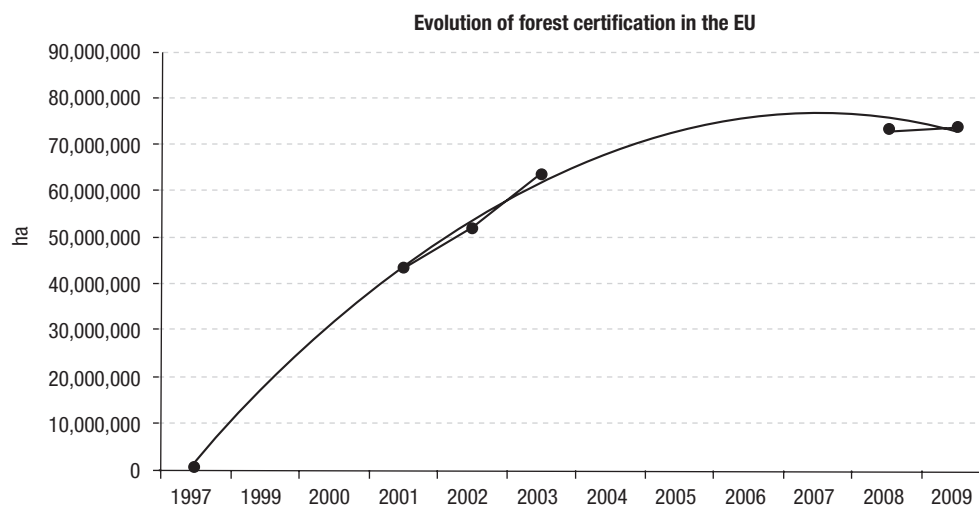


Figure 1. Evolution of certified forest area in the European Union. Source: Own elaboration based on data from Gafo (1997), Vilhunen *et al.* (2001), Raunetsalo *et al.* (2002), Poku-Marboah *et al.* (2005), FSC (2009) and PEFC (2009).

Table 4. Major challenges of EU forests

Degree of agreement/disagreement	Agreement (%)	Disagreement (%)	Neutral (%)	Median	P25	P75	Trend of opinion
The biggest challenges that affect European forests are related to:							
Forest ownership fragmentation	80	2.9	17.1	4	4	5	Agreement (consensus in 1 st round)
Lack of sustainable forest management	19.4	68.6	11.4	2	2	3	Disagreement (consensus in 1 st round)
Lack of resources in the forest sector	81.2	3.1	15.6	4	4	4	Agreement (consensus in 2 nd round)
Excessive legislation	11.4	40	48.6	3	2	3	Neutral (without consensus)
Abandoning of rurals area	62.9	5.7	31.4	4	3	5	Agreement (without consensus)

1= completely disagrees. 5= completely agrees.

neutrality/indifference towards excessive legislation (Table 4).

Amongst the four challenges mentioned by the majority of experts in the first round, the lack of political support (34.4%) and the low value of primary production compared with the indirect benefits (31.3%) have been considered as the most relevant out of 32 valid responses.

There is a relationship of dependency between being Spanish and considering that the lack of resources and the fragmentation of ownership are some of the greatest challenges of European forests (Table 5). This may indicate that these challenges are especially relevant in Spain. Experts from other Member States consider that the lack of resources is a major challenge, but to a lesser extent.

Impact of certification on the image of forest products

Most experts, with an acceptable degree of convergence (77.2%), estimated that certification improves the image of certified forest products, offering consumers a guarantee of sustainable origin (Table 6).

Modifications required for obtaining certification

Out of 35 valid responses, a large majority of respondents with a high degree of convergence (80%) believe that certification of forest management usually involves a slight modification of management as a precursor to certification. An 11.4% considers that modifications needed are important and 8.6% thinks that it is unnecessary to make any change.

Table 5. Dependence relationship between the answers to the general questions and experts profile: χ^2 value

	Membership to the different stakeholder groups	Membership to the stakeholder groups in clusters	Country of origin (Spanish or from another Member State)
<i>General aspects</i>			
Lack of resources as a major challenge for the forest sector (2 ^o quest.)	p=0.58	p=0.769	p=0.010***
Abandoning of rural area as a major challenge (1 ^o quest.)	p=0.872	p=0.826	p=0.002***
Other additional challenges presented by experts in first round (2 ^o quest.)	p=0.016***	p=0.134	p=0.044**
Main reasons to certify a forest (2 ^o quest.)	p=0.938	p=0.285	p=0.538
Main barriers that hinder the development of forest certification (2 ^o quest.)	p=0.241	p=0.978	p=0.698
Main achievements of certification (2 ^o quest.)	p=0.271	p=0.580	p=0.376

Stakeholder groups in clusters: «NGO, certifiers and certification schemes» and «owners, industry, research and public administration». ***, **, *: significant at 1, 5 and 10% levels.

Table 6. First questionnaire results on the impact of certification on forest product image: frequencies and percentages

		Frequency	Percentage
Valid	It is improved, since it offers to the consumer a guarantee of sustainable origin	11	31.4
	It is not affected	5	14.3
	It is improved, since it offers to the consumer a guarantee of sustainable origin and it is not affected compared to other materials like metals or plastics	3	8.6
	It is improved, since it offers to the consumer a guarantee of sustainable origin and it is also improved compared to other materials	12	34.3
	It gets worst, since non-certified products are under suspect and it is also hampered compared to other materials like metals or plastics	2	5.7
	It gets worst compared to other materials like metals or plastics	1	2.9
	It is improved, since it offers to the consumer a guarantee of sustainable origin but it is hampered compared to other materials like metals or plastics	1	2.9
	Total	35	100.0

Major achievements of certification

The achievements mentioned by a majority of experts in the first round were presented in the second questionnaire. No consensus was reached for any of the achievements. Out of 32 valid responses, the two predominant achievements were «to educate consumers about the origin of wood and have opened the debate on sustainable forest management» (43.8%) and «to educate consumers about the origin of wood and have succeeded in integrating multiple objectives in forest management» (28.1%).

Ecological aspects

The questions concerning the ecological aspects of certification included references to the improvement of surface, structure and functioning of forests

and their soils, to biodiversity and to forest regeneration. In this section it was not possible to achieve in the first round an acceptable degree of convergence for any of the questions. For the second questionnaire, the most relevant questions were asked again, with the aim of increasing the degree of agreement from the first round. Consensus was achieved on the positive impact of certification on biodiversity and on the surface, structure and functioning of forests (Table 7).

Economic aspects

Price of certified wood

Experts were questioned about the increase in the price of wood after certification, to evaluate whether, from the economic point of view, the situation for

Table 7. Ecological aspects of forest certification: second questionnaire results

Degree of agreement/disagreement	Agreement (%)	Disagreement (%)	Neutral (%)	Median	P25	P75	Trend of opinion
<i>Forest certification</i>							
Is positive for biodiversity	81.3	3.1	15.6	4	4	4	Agreement (consensus)
Diminish the impact of management	28.1	12.5	59.4	3	3	4	Neutral (without consensus)
Implies an improvement of the surface, structure and operation of the forests	71.9	9.4	18.8	4	3	4	Agreement (consensus)

1= completely disagrees. 5= completely agrees.

forest owners is more favourable than before certification. The majority, with consensus in the first round, believes that certified wood is sold at the same price than non-certified wood (of 33 valid responses, 88% considers that price does not change while 12% believe that price increases).

Using the CVM, owners were asked to indicate what percentage increase in the price of wood would make them willing to certify their forests. 6 valid responses were obtained giving an average of 7.4% price increase, with mode and median 7% and standard deviation 3.9. Owners would, then, require an increase of around 7% in the price of wood as a «premium» to certify their forests.

Price of certified products

In the first round some experts indicated that, although *usually* certified and non-certified wood products are sold at the same price, in some very specific cases (*e.g.* products of high added value) there could be a slight increase in the price of the certified product. In the second questionnaire this question was asked considering the *normal situation*. Experts with a high degree of consensus (87.5% of a total of 32 valid responses) believe that *normally* certified and uncertified products are sold at the same price.

Applying the CVM, industry experts were asked about what would be the percentage increase in the price of the products they would require to buy certified wood. 6 valid responses were obtained, with an average of 5.25%, a median of 3% and standard deviation

of 6.85%. Therefore, industry experts would require an increase of around 3-5% in the price of wood products in order to buy certified wood. However, it should be noted that the percentage of invalid responses was high (33%). Some experts noted that certified timber is purchased if available, regardless of price.

Market access for non-certified wood

In the opinion of experts with a high degree of consensus in the first round (85.7% of 35 valid responses), the non-certified wood has open access to both international and national markets. However, some experts mentioned that this situation would probably change in the future.

Social aspects

Questions regarding the social aspects referred to improvements in the situation of workers after certification, the integration of social aspects into traditional forest management and the information and communication to society and local populations. No consensus was reached for any of the questions in the first round, but in the second questionnaire the degree of agreement was significantly increased, having reached consensus on the contribution of certification to the integration of social considerations into forest management and the improvement of the information to the society about what is done in the forests and why (Table 8).

Table 8. Social aspect of forest certification: second questionnaire results

Degree of agreement/disagreement	Agreement (%)	Disagreement (%)	Neutral (%)	Median	P25	P75	Trend of opinion
<i>Forest certification</i>							
Improves conditions of forest workers	28.1	9.4	62.5	3	3	4	Neutral (without consensus)
Integrates social criteria into traditional forest management	81.2	6.3	12.5	4	4	4	Agreement (consensus)
Improves information to local population	59.4	15.7	25	4	3	4	Agreement (without consensus)
Improves information to society	81.3	0	18.7	4	4	4	Agreement (consensus)

1= completely disagrees. 5= completely agrees.

Table 9. Dependence relationship between the answers to the social questions and experts profile: χ^2 value

	Membership to the different stakeholder groups	Membership to the stakeholder groups in clusters	Country of origin (Spanish or from another Member State)
<i>Social questions</i>			
Contribution of forest certification to:			
Improvement forest workers conditions	p = 0.105*	p = 0.001***	p = 0.314
Integration of social criteria into traditional forest management	p = 0.167	p = 0.182	p = 0.265
Improvement of information to local population	p = 0.027**	p = 0.02 **	p = 0.853
Improvement of information to society	p = 0.283	p = 0.948	p = 0.948

Stakeholder groups in clusters: «NGO, certifiers and certification schemes» and «owners, industry, research and public administration». *****: significant at 1, 5 and 10% levels. In the questions where there is a dependency relation for both the membership to individual stakeholder groups and to stakeholder groups in cluster, the highest dependency relation would be analyzed (minor p value).

There is a relationship of dependency between considering that certification implies an improvement of the conditions of workers and increases information to local populations and belonging to the cluster «NGO, certifiers and certification bodies» (Table 9). These groups consider that certification implies an improvement of the status of workers, while the majority of the cluster «owners, industry, research and public service» gave a neutral answer, with also several responses indicating disagreement. With regard to the information to local population, the cluster «NGO, certifiers and certification bodies» unanimously agree that certification improves the information to local populations, while the cluster «owners, industry, research and public administration», although giving predominantly a positive response, offered plenty of neutral and disagree responses.

Discussion

As it has been demonstrated, forest certification is a consolidated instrument. However, analyzing its evolution, the number of hectares certified appears close to its highest level in the EU. That might be just the result of the economic crisis affecting the EU since the fourth quarter of 2008 or it may be a response to other factors. Until the economic recovery is in full speed, it will be premature to conclude if the stabilization in the number of hectares certified is consequence of the actual economic downturn or responds to more deep structural causes and is close to its potential upper limit in the EU.

In view of the data, it appears that the FSC system is best suited to public ownership and the PEFC to pri-

vate property, which seems reasonable considering that PEFC scheme was initially proposed by the private owners and the industry in response to FSC and sought, among other objectives, to minimize costs. While FSC also has a program for smallholders, it has not achieved the same success, probably due to its higher levels of requirement and cost.

With regard to environmental aspects, although some authors have doubts about the contribution of certification to biodiversity conservation (Ghazoul, 2001), the results of this study indicates that the experts consider a positive impact on biodiversity, in line with the work of Ramesteiner and Simula (2003). However, the positive impact is limited by the fact that in EU forests the necessary modifications required to be certified are usually minor and that, according to the experts, the lack of sustainable forest management is not included amongst the greatest challenges of EU forests, probably because the starting levels are already relatively good. On the contribution of certification to reduce the impact of management, this paper concludes that the outcome remains unclear, which coincides with the finding of Nussbaum and Simula (2004).

With regard to economic aspects, although other studies have found that consumers would be willing to pay more for certified products (Ozanne and Blosky, 1997), usually certified wood and forest products have not obtained the expected price «premium» and therefore forest owners have to bear themselves the certification costs (negative impact). This result is consistent with the work of Ramesteiner and Simula (2003) and Rametsteiner *et al.* (2007).

López Quero and Daniluk (2006) consider that certification costs are among the main factors that work

against its implementation and have justified many times the difficulty of access to certification by small producers. If this is analysed together with the lack of resources, which is considered amongst the major challenges of the forestry sector by the present study, the negative economic impact for forest owners is further aggravated. The forest owners would require a 7% increase in the price of wood for deciding to certify their forest.

The absence of price premium, however, must be analyzed together with the impacts of certification on the image of certified wood and wood products, and on the market access for non-certified wood. The impact on the image is considered positive. With regard to its impact on market access, non-certified wood has open access to both national and international markets. Besides, access to market for certified wood products has not been included by experts among the main achievements of certification. Therefore, the impact of certification on market access is considered neutral at present, although experts believe that this may change in the future.

In the case of industries, given that, normally, there is no increase in the price of certified wood, the impact is considered positive, since they can certify their products and improve their image without having to pay more for certified raw material. Industry would ask for a 3-5% increase in the price of its products in order to be willing to buy certified wood, although some experts indicated that certified wood is purchased if available, even if the price of products cannot be increased.

Moreover, it is necessary to consider the demand of the society for information on the sustainability of wood and forest products to which certification has tried to respond to. Some authors believe that forest certification has succeeded in increasing awareness and knowledge worldwide about the concept of sustainable forest management, including the economic, ecological and social pillars (Rametsteiner and Simula, 2003), although there are studies concluding that the information to both society and local people on sustainable forest management should be improved (Rametsteiner *et al.*, 2009). The impact on social aspects of this study shows neutrality-uncertainty for some (improving conditions for workers) and it is considered positive on the impact on the integration of social aspects on traditional forest management and on information provided to society. No consensus has been reached with respect to the information to local populations mainly due to the discrepancy of the groups «owners» and «research».

Thus, the analysis leads to the conclusion that the impact of certification in EU forest-based sector in the EU is positive-neutral with respect to ecological aspects, positive-negative on the economic and positive-neutral on the social ones. However, its positive effect is limited, due to the fact that the changes needed for the certification are minor. An improvement in the information to both society and local people by the actors involved in forest certification could increase the positive impact on the sector. Therefore, the findings of this study confirm that forest certification in the EU is an instrument that should continue, but further efforts are necessary to improve the weaknesses hereby identified.

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