

HOW COMPANIES IN THE WOOD SUPPLY CHAIN PERCEIVE THE FOREST CERTIFICATION

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ABSTRACT

The idea of forest certification, a means of tackling deforestation and forest degradation emerged in the 1990s. Forest certification is a voluntary process whereby the quality of forest management and production is assessed by an independent third party. Besides the general information on the implementation of forest certification systems, the study is focused on the description of the main roles of forest certification. In particular, how roles are perceived by certified entities and the differences in perception of forest certification between the forest owners and managers and the chain of custody certified companies in the wood supply chain are analysed. Respondents are people with high level of understanding the certification concept and considering the certification primarily as a non-economic tool. Subsequently, they understand certification as an economic tool as well. Forest owners and certified companies tend to have same incentives for entering the certification process, however, with different priorities among these incentives. Finally, the main problems related to certification are identified in the paper. In contrast to certified wood processing industries and traders, forest owners do not consider certification costs to be the main problem. On the other hand, main problems of the certified supply chain identified by chain of custody companies is those connected to the sufficient quantity of certified forest products and overpriced certified material inputs. The fact that positive aspects of certification are better valued than its shortcomings are confirmed by the main results.

Key words: wood supply chain, forest certification, chain of custody, certified companies.

INTRODUCTION

Forest certification was initially introduced as a voluntary mechanism by environmental groups to ameliorate the consequences of tropical deforestation and forest degradation (RAMETSTEINER and SIMULA 2003). It represents a mechanism based on third-party auditing of compliance with established standards. This mechanism was quickly accepted as a means to promote sustainable forest management (DURST *et al.* 2005, PERERA *et al.* 2007, SIRY *et al.* 2005) and directly influenced forest management practices (AULD *et al.* 2008, LEWIS and DAVIS 2015, MACDICKEN *et al.* 2015, MOORE *et al.* 2012). Through certification as a soft policy instrument (NUSSBAUM *et al.* 2005, ŠÁLKA *et al.* 2017), it is possible to provide credible assurance to customers about the effective compliance of forest management with sound social, environmental, and economic principles (CABARLE *et al.* 1995, JOHNSON and WALCK 2004, RICKENBACH and OVERDEVEST 2006).

Since their launch, forest certification programs have increasingly become an instrument of governmental procurement policies, obligatory requirements for awarding ecolabels, corporate policies of private companies, requirements for green building initiatives, and acceptance as a tool for proving the legality of timber origin. In addition, perceived pressure from shareholders, firm size, financial health, past environmental performance, and regulatory threats have been linked to firms' decisions to meet environmental standards voluntarily. For some certified companies the implementation of forest certification provides the satisfaction of supporting the sustainability of natural forest resources and society as a whole (WWF 2000). It may also serve to improve their corporate images and access to markets (HANSEN and PUNCHES 1999, HUBBARD and BOWE 2004) or may be part of business system innovations (GILANI *et al.* 2016).

NUSSBAUM and SIMULA (2005) identified several policy issues having relevance to certification such as responsible or sustainable forest management, the balance between economic, social and environmental concerns for forest management, illegal harvesting, conservation of biodiversity, timber markets, etc. At the forest management level, forest certification is a process by which forest owners voluntarily submit their forests for inspection by an independent certification body to determine whether their management practices meet clearly defined standards, particularly those regarding sustainability (PECK 2006). Certified forest consider certification to be a tool representing a commitment to environmental responsibility that improves external company image, promotes sustainable utilisation of forest resources, and improves forest management practices (PALUŠ *et al.* 2018a).

Chain of custody (CoC) is a mechanism that provides assurance that wood and wood-based products originate from sustainably managed forests. It becomes one of the factors in determining leadership position in the forest and wood-based sector, especially under economic crisis conditions (POTKAŃSKI *et al.* 2011). TUPPURA (2016) found out that incentives for adopting forest certification among the world's leading forestry companies are more often external rather than internal, and more market driven than regulation driven. Immature markets, the indirect nature of most benefits, and certification being an unfamiliar concept are commonly cited reasons for a lack of manufacturer support or involvement (JAYASINGHE *et al.* 2007). Forest certification is considered important for indicating a company's sense of responsibility, for keeping market share and for selling products in an existing market (OWARI *et al.* 2006).

RICKENBACH and OVERDEVEST (2006) view forest certification as a market-based incentive for forestry enterprises as firms adopting certification practices expect direct market benefits. Advantages of market access shall also offer sufficient incentives for suppliers to bear the costs of certification GALATI *et al.* (2017) argue that influence of internal drivers to adopt voluntary certification linked to a pro-environmental behaviour of owners and managers, such as a signalling mechanism and moral and ethical reasons, is more important than economic or market incentives. Empirical results by NAKAMURA *et al.* (2001) and TAKAHASHI (2001) revealed that the market economic and social models explained participation in forest certification.

The adoption of voluntary forest certification by forest owners may result in additional costs related to the standards implementation, initial and surveillance conformity assessment through internal and external audits, and cost resulting from the changes to the traditional forest management practices caused by the certification requirements (PALUŠ 2013). Increased costs of certification are, thus, one of the main barriers for the adoption of forest certification for forest owners as well as for the chain of custody level (MOORE *et al.* 2012, PALUŠ and KAPUTA 2009, CARLSEN *et al.* 2012, CUBBAGE *et al.* 2010). The unit cost is relatively higher for small compared to large forest owners (CUBBAGE *et al.* 2009); however,

certified forest owners believe that certification benefits exceed costs (MIKULKOVÁ *et al.* 2015, CUBBAGE *et al.* 2009).

Many survey-based studies have evaluated the willingness to pay for certified wood products (AGUILAR and CAI 2010, AGUILAR and VLOSKY 2007, KOZAK *et al.* 2004, OZANNE and VLOSKY 2000, OZANNE and VLOSKY 1997, PALUŠ *et al.* 2017, PALUŠ *et al.* 2018b, VEISTEN 2007, VLOSKY *et al.* 2009, YAMAMOTO *et al.* 2014) and indicated a level of price premium that consumers were willing to pay for different wood products in specific market segments. Apart from the promotion of sustainable forest management practices and the satisfaction of supporting the sustainability of natural forest resources and society as a whole (WWF 2000), benefits following from the adoption of forest certification are related to the improvement of the external companies' image associated to their environmental performance (MOORE *et al.* 2012, PALUŠ *et al.* 2017, PALUŠ *et al.* 2018b, VLOSKY *et al.* 2009, PERERA 2008, MIKULKOVÁ *et al.* 2015, PALUŠ and KAPUTA 2009) and environmental communication and consumer relations (OWARI and SAWANOBORI 2008).

Benefits of CoC certification include improved supply chain management performance, communications in supply chains, inventory controls, market knowledge, transparency, and profitability (VIDAL *et al.* 2005), lower overall costs (MILES and COVIN 2000, PEFC 2017), wood legality assurance, company's image and competitiveness of wood products (TRISHKIN *et al.* 2014), good reputation and international recognition (Halalisan *et al.* 2013) and sales increase (TOLUNAY and TÜRKÖĞLU 2014). Regarding timber legality issues, CoC certificates are an acceptable measure for the legality verification of timber products required by the European Timber Regulation (EUTR), in particular concerning risk assessment and risk mitigation procedures as a part of an operator's due diligence system (EUROPEAN COMMISSION 2016). Implementing forest and CoC certification as an assurance for timber legality could contribute to reduced costs and administrative work for operators required to establish due diligence systems according to the EUTR. Only minor additional operator costs are required to make these systems fully compatible with EUTR requirements (EFI 2011). Role of forest certification as a tool to proof timber legality is one of the most important incentives that motives that CoC certified companies to enter certified forest products market (PALUŠ *et al.* 2017, 2018b).

Having introduced the meaning and main roles of forest certification the main objective of this paper is to analyse how these roles are perceived by certified entities and, in particular, what are the differences in perception of forest certification by forest owners and managers and CoC certified companies in the wood supply chain.

METODOLOGY

This study is based on previous studies (PALUŠ *et al.* 2017, 2018a, 2018b) which was oriented to the state and perception of forest certification in Slovakia and selected countries of the Central and South Europe. One of the studies was focused on the issues of sustainable forest management certification and two studies on chain of custody certification in the wood supply chain. Both studies were carried out using a mail questionnaire survey. This study builds on the results of the three previous surveys. Forest owners and managers have been selected for the survey from the national register of forest owners and managers, national PEFC database and international FSC database. To determine the minimum sample size, a 5% margin error was assumed. Based on this assumption, the total number of forest owners was determined to 369. On the other hand, the companies in the wood supply chain were identified from the international registers of CoC holders of the PEFC and FSC certification schemes. Totally, 487 wood processing companies and traders were contacted in the survey.

Data of above mentioned surveys were analysed using the statistical analysis software SPSS and the non-parametric Mann-Whitney U test to determine the differences between groups of forest owners and CoC certified companies in terms certification scheme used and company size. Additionally, the Chi-square test was applied to identify all the group and between group distributions.

The analyses are oriented to the three main areas. The first section contained issues aimed at the examination of the level of understanding the concept of forest certification and CoC certification based on the objectives of PEFC and FSC certification. The research also determined the level of agreement with the basic certification statements. The main certification statements referred to the main objectives and purposes of certification. One part of questions dealt with the issues such as the use of sustainable resources, commitment to environmental responsibility, improvement of forest owners' image and legality issues. Second part of certification statement was focused on market access, profit margin, improved communication, as well as the improvement of the internal efficiency of management. The second area of the research surveyed internal information about involvement in the certification process, namely the expectations motivating forest owners and companies to implement certification. The last area was oriented towards difficulties regarding certification, including cost related to certification.

For the analyses a five-point Likert scale was used to measure the level of understanding of the certification concepts and level of agreement with principal certification statements, where 1 corresponded to strongly disagree or do not understand and 5 was strongly agree or completely understand. The level of agreement indicated by number 3 represented a neutral response level of all respondents. The data of current study was analysed using a comparison method. This method is developed as a grounded theory to understand the systematic comparison of a relatively small number of cases, focusing specifically on its relationship to experimental and statistical approaches.

RESULTS

Based on the previous studies two groups of respondents were examined. The first group was represented by forest owners; the second group was represented by CoC certified wood processing companies and traders. The group of forest owners consisted by all types of ownership. The area of managed forest was used as an indicator of company size for forest owners. Small owners (up to 500 ha) represent 35% of the respondents, followed by medium-size (501–10,000 ha) owners (55%). Only 10% of respondents represented large owners managing more than 10,000 ha of forests. On the other hand, the size of wood processing companies was determined by the number of employees. Small companies (11–50 employees) represent 41% of respondents, followed by equal representation (27% each) of micro (1–10 employees) and medium-size companies (51–250 employees). Only 5% of respondents represented large companies (over 251 employees).

First of all, the level of understanding of certification concepts and agreement with basic certification statements were examined. Table 1 present the mean value of the level of understanding of certification. Both group of respondents understand the certification concept at adequate level.

The main differences are observed in answers regarding the certification statements. Wood processing companies consider the ensurance of legal origins of wood (4.13) as a most important role of certification. Both groups of respondents strongly believe that the certification represent promotion of sustainable utilization of forest resource. Forest owners further consider the environmental responsibility as a very important role of certification.

Both groups of respondents see the certification as a tool to improve market access. Respondents expressed the lowest level of agreement with the statements regarding the economic issues and those related to the improvement of the internal efficiency that forest certification may bring to companies. On the other hand, wood processing companies consider the ensurance of legal origin of wood as a most important statement of certification. Certification as a tool for the improvement of market access, communication, or the internal company efficiency was considered as the least important. Table 2 shows the result of all certification statements for the both forest owners and wood processing companies.

Tab. 1 Understanding of certification concept.

Understanding of certification	Forest owners	CoC certified companies
	Mean	
Understanding of forest management (SFM) concept	4.11	3.56
Understanding of PEFC objectives	3.76	3.94
Understanding of FSC objectives	3.12	3.92

Tab. 2 Level of agreement with certification statements.

Certification statements	Forest owners	CoC certified companies
	Mean	
Promotion of sustainable utilisation of forest resource	3.90	4.08
Prevention from illegal logging	3.05	3.60
Improvement in efficiency of corporate management	3.01	3.42
Improvement of communication with customers	3.16	3.72
Improvement of market access	3.27	3.54
Improves management efficiency	3.01	3.79
Commitment to environmental responsibility	4.03	n/a
Improves external company image	4.02	n/a
Improves forest management practices	3.61	n/a
Increases profit margins	2.87	n/a
Ensurance of legal origin of wood	n/a	4.13
Confidentiality in sourcing of timber	n/a	3.56
Improvement in efficiency of internal material flow systems	n/a	2.94
Improvement in efficiency of corporate management	n/a	2.89

The second section of the survey was focused on the expectations motivating forest owners and CoC certified companies in the wood supply chain to implement certification. As the table 3 shows, the improvement of external company image was identified as the most agreed statement by all respondents. Other expectations motivating forest owners to be certified were linked to the demonstration of sustainable forest management practices, commitment to environmental issues, improvement of forest management, and the search to obtain new customers. Expectations such as increase profit margins and increase sales volume were marked as the least motivating factor. In contrast the very important reasons why wood processing companies enter the certified market were the expectations of increase of sales (3.63), penetrating new markets (3.53), commitment to environmental issue (3.52) and seeking to expand market share (3.44). The least significant reasons to enter the certified market were the seeking to expand market share and to diversify product line.

When differences in certification schemes were examined the Mann-Whitney U test proved the significant differences in the factor focused on the demonstration of sustainable forest management practices ($U = 162.0$, $p = 0.001$), where the PEFC certificate holders are

more convinced than FSC ones. Further results show that the PEFC certified companies are more identified with the aforementioned benefits of forest certification than the FSC certified forest owners. This significant difference were observed only in the case of forest owners. On the other hand, in the case of CoC certified companies, there was a significant influence of certification scheme on the statement relating to penetration of new markets identified (FSC companies are more motivated to enter certified forest products market than PEFC).

Tab. 3 The level of agreement with main motivation factors of implementation of certification.

Motivation factors	Forest owners	CoC certified companies
	Mean	
Improvement of external company image	4.30	4.11
Commitment to environmental issues	4.14	3.52
Demonstration of sustainable forest management practices	4.23	n/a
Seeking to increase sales volume	2.68	3.63
Seeking to increase profit margins	2.73	2.98
Seeking to obtain new customers	3.03	n/a
Improvement of forest management	3.57	n/a
Penetrate new markets	n/a	3.53
Seeking to expand market share	n/a	3.44
Seeking to diversify product line	n/a	2.58

The last area of the analysis was oriented towards difficulties regarding certification. Forest owners consider the compliance with the certification criteria (2.60) as the most difficulty issue. Other important difficulties regarded the administrative burden associated with the performance of internal audit (2.51), and the implementation of documentation (2.50). In the same way, the higher cost related to certification (2.45) were identified as a difficulty. Other certification related issues, for example, external audit (2.27), personnel and training (2.22), or communication with the group entity (1.85) seems to be perceived as less problematic. In the case of CoC certified companies the respondents' perception of the problems connected to the purchase of certified products were also examined. These are connected to the insufficient quantity (2.81) of certified products followed by small margins (2.81) and overpriced inputs (2.80).

DISCUSSION

Based on the results, it can be stated that both groups (forest owners and CoC certified companies) of respondents well understand the meaning of certification and the role of forest certification. Both groups of respondents primarily consider the certification as a non-economic tool and subsequently they understood it as an economic tool. Their opinions were also similar in many other cases. Both perceive certification as a tool for the improvement of forest management, ensurance of the sustainability of forest management and last, but not least, determination of the origin of the harvested wood. Moreover, the two monitored groups of respondents understand certification also as a tool for improving the image of the company and improvement of communication with customers and as a way to penetrate new markets. Our results correspond with the conclusions of another authors (OWARI *et al.* 2006; RICKENBACH and OVERDEVEST 2006). Their research shows that forest certification is

consider as tool of indicating a company sense of responsibility, for keeping market share and for selling products.

Both groups tend to have same incentives for entering the certification process. These motives are very closely related to the level of certification perception. However, the order of importance of these incentives is opposite in case of the certified forest owners and certified companies. Forest owners enter certification in order to improve forest management, ensure sustainability of forest management and to deal with questions regarding the current environmental issues. On the other hand, it is natural that their incentives are also oriented towards economic and marketing areas. Decision of forest owners to enter the certification process is also conditioned by expectations to obtain new customers, increase profit and sales volume. In contrast, wood processing companies enter to the certification system with clear motives, which are primarily oriented inward the company. Therefore, their basic incentives to enter the certification system are to increase sales, penetration to the new markets or to seek expansion of market share. In contrary, environmental motives are less important for these companies. Based on the study by TUPPURA (2016) many companies enter the certification system to penetrate new markets, gain price premium for certified goods and obtain new customers. Similarly, the results of China's study suggested that the expected price premium from certified timber is the most important motive for forest owners. Other motives such as increased timber growth, public recognition and environmentally friendly harvest were insignificant (TIAN *et al.* 2018). These results are very similar to our current study in Slovakia. Our results are further supported by study of GALATI (2017) who determined the main motivation factor to the enter to certification system in Italy. This research show that the main motivations are those to meet the demand expressed by consumers and the aim to increase the market competitiveness.

CONCLUSION

The objective of the research was to compare the opinions of the forest owners and CoC certified companies, particularly aimed at the analysis of the understanding of the concept and the role of the certification, expectations of companies following from implementation and difficulties connected to certification. In general, positive aspects of certification are better valued by respondents than its shortcomings. The following conclusions can be drawn:

- respondents (forest owners and CoC certified companies) have a high level of understanding of the certification concept and perceive certification as a tool for the improvement of forest management, ensurance of the sustainability of forest management and last, but not least, determination of the origin of the harvested wood;
- forest owners and CoC certified companies tend to have same incentives for entering the certification process. However, the order of importance of these incentives is opposite. Forest owners enter certification in order to improve forest management, ensure sustainability of forest management and to deal with issues regarding the current environmental problems. In contrast, CoC certified companies enter to the certification system with clear motives, which are primarily oriented inward the company;
- forest owners do not consider certification costs as the main problem in contrast to the system implementation and its maintenance as well as external audit performance. On the other hand, CoC certified companies consider the key problems

related to the certified supply chain connected to the sufficient quantity of certified forest products, low margins, and overpriced certified material inputs;

REFERENCES

- AGUILAR, F. X., VLOSKY, R. P. 2007. Consumer willingness to pay price premiums for environmentally certified wood products in the U.S. In *Forest Policy and Economics*, 2007, Vol. 9, Issue 8, p. 1100-1112.
- AGUILAR, F. X., CAI, Z. 2010. Conjoint effect of environmental labelling, disclosure of forest of origin and price on consumer preferences for wood products in the US and UK. In *Ecological Economics*, 2010, Vol. 70, Issue 2, p. 308-316.
- AULD, G., GULBRANDSEN, L. H., MCDERMOTT, C. L. 2008. Certification Schemes and the Impacts on Forests and Forestry. In *Annual Review of Environment Resources*, 2008, Vol. 33, p. 187-211.
- BUTTERFIELD, R. P., HANSEN, E., FLETCHER, R., NIKINMAA, H. 2005. Forest Certification and Small Forest Enterprises: Key trends and impacts - benefits and barriers. *Forest Trends and the Rainforest Alliance*, 2005, Washington, DC.
- CABARLE, B., HRUBES, R. J., ELLIOT, C., SYNNOTT, T. 1995. Certification Accreditation: The Need for Credible Claims. In *Journal of Forestry*, 1995, Vol. 93, Issue 4, p. 12-16.
- CARLSEN, K., HANSEN, C. P., LUND, J. F. 2012. Factors affecting certification uptake - Perspectives from the timber industry in Ghana. In *Forest Policy and Economics*, 1995, Vol. 25, p. 83-92.
- CUBBAGE, F. W., MORE, S.; HENDERSON, T., ARAUJO, M. M. F. C. 2009. Costs and Benefits of Forest Certification in the Americas. In *Natural Resources: Management, Economic Development and Protection*, 2009; p. 155-185.
- CUBBAGE, F., DIAZ, D., YAPURA, P., DUBE, F. 2010. Impacts of forest management certification in Argentina and Chile. In *Forest Policy and Economics*, 2010, Vol. 12, Issue 7, p. 497-504.
- DURST, P. B., MCKENZIE, P. J., BROWN, C. L., APPANAH, S. 2006. Challenges facing certification and eco-labelling of forest products in developing countries. In *International Forestry Review*, 2006, Vol. 8, Issue 2, p. 193-200.
- EFI. 2011. Support study for development of the non-legislative acts provided for in the Regulation of the European Parliament and of the Council laying down the obligations of operators who place timber and timber products on the market. Final report. [online]. [cit. 2017-10-4]. Available online: <http://ec.europa.eu/environment/forests/pdf/EUTR-Final_Report.pdf>.
- EUROPEAN COMMISSION. 2016. Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market. [online]. [cit. 2017-10-4]. Available online: <<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010R0995&from=EN>>.
- GALATI, A., GIANGUZZI, G., TINERVIA, S., CRESCIMANNO, M., LA MELA VECA, D. S. 2017. Motivations, adoption and impact of voluntary environmental certification in the Italian Forest based industry: The case of the FSC standard. In *Forest Policy and Economics*, 2017, Vol. 83, p. 169-176.
- GILANI, H. R., KOZAK, R. A., INNES, J. L. 2016. The State of Innovation in the British Columbia Value-Added Wood Products Sector: The Example of Chain of Custody Certification. In *Canadian Journal of Forest Research*, 2016, Vol. 46, p. 1067-75.
- HALALISAN, A. F., MARINCHESCU, M., POPA, B., ABRUDAN, I. V. 2013. Chain of Custody certification in Romania: profile and perceptions of FSC certified companies. In *International Forestry Review*, 2013, Vol. 15, Issue 3, p. 305-314.
- HANSEN, E., PUNCHES, J. 1999. Developing Markets for Certified Forest Products: A Case Study of Collins Pine Company. In *Forest products journal*, 1999, Vol. 49, Issue 1, p. 30-35.
- HUBBARD, S., BOWE, S. 2004. Putting Value on Certified Forest Products: Views from Wisconsin. In *Wood Wood Prod*, 2004, p. 57-62.
- JAYASINGHE, P. S., ALLEN, D., BULL, G. Q., KOZAK, R. A. 2007. The status of forest certification in the Canadian value-added wood products manufacturing sector. In *Forestry Chronicles*, 2007, Vol. 83, Issue 1, p. 113-125.

- JOHNSON, D., WALCK, C. 2004. Certified Success: Integrating Sustainability into Corporate Management Systems. In *Journal of Forestry*, 2004, Vol. 102, Issue 5, p. 32–39.
- KOZAK, R. A., COHEN, D. H., LERNER, J., BULL, G. Q. 2004. Western Canadian consumer attitudes toward certified value-added wood products: an exploratory assessment. In *Forest Products Journal*, 2004, Vol. 54, p. 21–24.
- LEWIS, R. A., DAVIS, S. R. 2015. Forest certification, institutional capacity, and learning: An analysis of the impacts of the Malaysian Timber Certification Scheme. In *Forest Policy and Economics*, 2015, Vol. 52, p. 18–26.
- MACDICKEN, K. G., SOLA, P., HALL, J. E., SABOGAL, C., TADOUM, M., DE WASSEIGE, C. 2015. Global progress toward sustainable forest management. In *Forest Ecology and Management*, 2015, Vol. 352, p. 47–56.
- MIKULKOVÁ, A., HÁJEK, M., ŠTĚPÁNKOVÁ, M., ŠEVČÍK, M. 2015. Forest certification as a tool to support sustainable development in forest management. In *Journal of Forest Science*, 2015, Vol. 61, Issue 8, p. 359–368.
- MILES, M. P., COVIN, J. G. 2000. Environmental marketing: a source of reputational, competitive, and financial advantage. In *Journal of Business Ethics*, 2000, Vol. 23, Issue 3, p. 299–311.
- MOORE, S. E., CUBBAGE, F., EICHELDINGER, C. 2012. Impacts of Forest Stewardship Council (FSC) and Sustainable Forestry Initiative (SFI) Forest Certification in North America. In *Journal of Forestry*, 2012, Vol. 110, Issue 2, p. 79–88.
- NAKAMURA, M., TAKAHASHI, T., VERTINSKY, I. 2001. Why Japanese firms choose to certify: A study of managerial responses to environmental issues. In *Journal of Environmental Economics and Management*, 2001, Vol. 42, Issue 1, p. 23–52.
- NUSSBAUM, R., SIMULA, M. 2005. *The Forest Certification Handbook*; Earthscan: London, 2005. ISBN 1844071235.
- OWARI, T., JUSLIN, H., RUMMUKAINEN, A., YOSHIMURA, T. 2006. Strategies, functions and benefits of forest certification in wood products marketing: Perspectives of Finnish suppliers. In *Forest Policy Economics*, 2006, Vol. 9, Issue 4, p. 380–391.
- OWARI, T., SAWANOBORI, Y. 2006. Market Benefits of Chain of Custody Certification Perspectives of Japanese Suppliers. In *Forest Resource Management and Mathematical Modelling*, 2006, Vol. 7, p. 121–132.
- OZANNE, L. K., VLOSKY, R. P. 2003. Certification from the U.S. consumer perspective: a comparison from 1995 and 2000. In *Forest Products Journal*, 2003, Vol. 53, p. 13–21.
- OZANNE, L. K., VLOSKY, R. P. 1997. Willingness to pay for environmentally certified wood products: a consumer perspective. In *Forest Products Journal*, 1997, Vol. 47, p. 39–48.
- PALUŠ, H. 2013. *Trh a obchod s drevom a výrobkami z dreva (Wood and Wood Products Market and Trade)*, Zvolen: Technical University in Zvolen, 2013. ISBN 978-80-228-2587-0.
- PALUŠ, H., KAPUTA, V. 2009. Survey of attitudes towards forest and chain of custody certification in the Slovak Republic. In *Drewno*, 2009, Vol. 52, Issue 182, p. 65–81.
- PALUŠ, H., PAROBEK, J., DUDÍK, R., ŠUPÍN, M. 2017. Assessment of chain-of-custody certification in the Czech and Slovak Republic. In *Sustainability*, 2017, Vol. 9, p. 1–13.
- PALUŠ, H., PAROBEK, J., ŠULEK, R., LICHÝ, J., ŠÁLKA, J. 2018a. Understanding Sustainable Forest Management Certification in Slovakia: Forest Owners' Perception of Expectations, Benefits and Problems. In *Sustainability*, 2018, Vol. 10, Issue 7, 17 p.
- PALUŠ, H., PAROBEK, J., VLOSKY, R. P., MOTIK, D., OBLAK, L., JOŠT, M., GLAVONJIĆ, B., DUDÍK, R., WANAT, L. 2018b. The status of chain-of-custody certification in the countries of Central and South Europe. In *European Journal of Wood and Wood Products*, 2018, Vol. 76, Issue 2, p. 699–710.
- PECK, T. 2001. *The International Timber Trade*. Cambridge: Woodhead Publishing Ltd, 2001. ISBN 9781855731905.
- PEFC. 2017. PEFC Chain of Custody Certification. The Key to Sell Certified Products. [online]. [cit. 2017-10-4-]. Available online: <https://www.pefc.org/images/documents/brochures/PEFC_Chain_of_Custody_Certification.pdf>.
- PERERA, P., VLOSKY, P. R., HUGHES, G., DUNN, M. A. 2007. What do Louisiana and Mississippi Nonindustrial Private Forest Landowners Think about Forest Certification?. In *Southern Journal of Applied Forestry*, 2007, Vol. 31, Issue 4, p. 170–175.

- PERERA, P., VLOSKY, R. P., DUNN, M. A., HUGHES, G. 2008. U.S. home-center retailer attitudes, perceptions and behaviors regarding forest certification. In *Forest Products Journal*, 2008, Vol. 58, p. 21–25.
- POTKAŃSKI, T., WANAT, L., CHUDOBIECKI, J. 2011. Leadership in time of crisis or crisis of leadership? Implications for regional development. In *Intercathedra*, 2011, Vol. 27, p. 45–52.
- RAMETSTEINER, E., SIMULA, M. 2003. Forest certification - An instrument to promote sustainable forest management? In *Journal of Environmental Management*, 2003, Vol. 67, Issue 1, p. 87–98.
- RICKENBACH, M.; OVERDEVEST, C. 2006. More than Markets: Assessing Forest Stewardship Council (FSC) Certification as a Policy Tool. In *Journal of Forestry*, 2006, Vol. 104, Issue 3, p. 143–147.
- SIRY, J. P.; CUBBAGE, F. W.; AHMED, M. R. 2005. Sustainable forest management: Global trends and opportunities. *Forest Policy and Economics*, 2005, Vol. 7, Issue 4, p. 551–561.
- ŠÁLKA, J., DOBŠINSKÁ, Z., SARVASOVA, Z., ŠTĚRBOVÁ, M., PALUŠ, H. 2017. *Lesnícka politika (Forest Policy)*; Zvolen: Technical University in Zvolen, 2017. ISBN 978-80-228-3008-9.
- TAKAHASHI, T. 2001. *Why firms participate in environmental voluntary initiatives: Case studies in Japan and Canada*, Vancouver: University of British Columbia, 2001.
- TIAN, N., LU, F., JOSHI, O., POUDYAL, N. C. 2018. Segmenting Landowners of Shandong, China Based on Their Attitudes towards Forest Certification. In *Forests*, 2018, Vol. 9, p. 1–14.
- TOLUNAY, A., TÜRKOĞLU, T. 2014. Perspectives and Attitudes of Forest Products Industry Companies on the Chain of Custody Certification: A Case Study from Turkey. In *Sustainability*, 2014, Vol. 6, p. 857–871.
- TRISHKIN, M., LOPATIN, E., KARJALAINEN, T. 2014. Assessment of motivation and attitudes of forest industry companies toward forest certification in northwestern Russia. In *Scandinavian Journal of Forest Research*, 2014, Vol. 29, p. 283–293.
- TUPPURA, A., TOPPINEN, A., PUUMALAINEN, K. 2016. Forest Certification and ISO 14001: Current State and Motivation in Forest Companies. In *Business Strategy and the Environment*, 2016, Vol. 25, p. 355–368.
- VEISTEN, K. 2007. Willingness to pay for eco-labelled wood furniture: choice-based conjoint analysis versus open-ended contingent valuation. In *Journal of Forest Economics*, 2007, Vol. 13, Issue 1, p. 29–48.
- VIDAL, N., KOZAK, R., COHEN, D. 2005. Chain of custody certification: an assessment of the North American solid wood sector. In *Forest Policy and Economics*, 2005, Vol. 7, Issue 3, p. 345–355.
- VLOSKY, R. P., OZANNE, L. K. 1998. Environmental certification of wood products: The U.S. manufacturers' perspective. In *Forest Products Journal*, 1998, Vol. 48, p. 21–26.
- VLOSKY, R., GAZO, R., CASSENS, D., PERERA, P. 2009. Changes in value-added wood product manufacturer perceptions about certification in the United States from 2002 to 2008. In *Drvna Industrija*, 2009, Vol. 60, p. 89–94.
- WWF. 2000. *The Forest Industry in the 21st Century*. Report prepared by the WWF's Forests for Life Campaign. Branksome House, Godalming, Surrey.
- YAMAMOTO, Y., TAKEUCHI, K., SHINKUMA, T. 2014. Is there a price premium for certified wood? Empirical evidence from log auction data in Japan. In *Forest Policy and Economics*, 2014, Vol. 38, p. 168–172.

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