Journal of Tropical Forest Science 36(3): 319–326 (2024)
https://doi.org/10.26525/jtfs2024.36.3.319
ISSN: 0128-1283, eISSN: 2521-9847

DRIVERS FOR ADOPTING MALAYSIAN TIMBER CERTIFICATION SCHEME/PROGRAMME FOR THE ENDORSEMENT OF FOREST CERTIFICATION CHAIN OF CUSTODY CERTIFICATION IN MALAYSIA

Murughan M[1,*], Mohamad Roslan MK[1], Zubaidah H[2], Johar M[1], Seca G[3] & Pakhriazad HZ[1]

[1] *Department of Forestry Science and Biodiversity, Faculty of Forestry and Environment, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia*
[2] *Department of Wood and Fiber Industries, Faculty of Forestry and Environment, Universiti Putra Malaysia, 43400 UPM, Serdang, Selangor, Malaysia*
[3] *School of Biology, Faculty of Applied Sciences, Universiti Teknologi Mara, 40450 Shah Alam, Selangor, Malaysia*

**mmurughan@outlook.com*

Submitted October 2023; accepted January 2024

The Malaysian Timber Certification Scheme/Programme for the Endorsement of Forest Certification (MTCS/PEFC) chain of custody (CoC) certification was introduced in 2001. Currently, Malaysia holds the highest number of CoC certification certificate holders in the Southeast Asia region under the PEFC global. While the number of MTCS/PEFC CoC certification certificate holders has been increasing significantly over the last two decades, it is important to explore what drives these timber and timber products companies to adopt this certification. Thus, a close-ended questionnaire, which includes three sections namely company information, external driver mechanisms (e.g. market, signalling, legal, and incentive), and internal driver mechanism (e.g. moral and learning) were sent to the 341 MTCS/PEFC CoC certification certificate holders via an official email. A total of 86 completed questionnaires were received. Results showed that signalling has emerged as the most important driver mechanism for the adoption of this certification, followed by market, legal, moral, learning, and incentive driver mechanisms. The external drivers were more valued than the internal drivers among timber and timber products companies in adopting the MTCS/PEFC CoC certification.

Keywords: Certification, chain of custody certification, external driver mechanisms, internal driver mechanisms, Malaysian Timber Certification Scheme

INTRODUCTION

Chain of Custody (CoC) certification is an important part of forest certification. Forest certification both Forest Management (FM) certification and CoC certification aims to address the environmental, social, and economic issues in the forest sectors (Cashore et al. 2004). Forest certification is also a tool to promote sustainable forest management and trade in legal timber and timber products (Cashore et al. 2004). The FM certification demonstrates that forest management practices are in compliance with the forest management standards, and the CoC certification demonstrates that supply chain tracking of timber and timber products between forests and consumers complies with CoC standards (Upton & Bass 1996, Nussbaum & Simula 2005). Generally, CoC certification is a standard procedure that controls the sourcing and transfer of timber and timber products from forests to sawmills, factories, and processors (Upton & Bass 1996, Nussbaum & Simula 2005). Thus, a CoC certificate proves to customers that timber and timber products produced are sourced from well-managed certified forests and well-tracked supply chains from forests, processing, and consumers (Nussbaum & Simula 2005, Suryani et al. 2011).

Globally, there are many certification providers namely, the Programme for the Endorsement of Forest Certification (PEFC), Forest Stewardship Council (FSC), Sustainable Forest Initiative (SFI), and others that provide

the CoC certification (Murughan et al. 2023, Zubizarreta et al. 2023). The PEFC is the largest forest certification provider globally (Murughan et al. 2023, PEFC 2022, Zubizarreta et al. 2023). The PEFC had a total of 12,526 CoC certification certificate holders in 2022, where the Europe region has the highest number of CoC certification certificate holders 10,083 or 80% followed by Asia region (1,608 or 13%), North America region (425 or 3%), Oceania region (212 or 2%), Central and South America region (165 or 1%), and Africa region (33 or 0.3%) (PEFC 2022). For Malaysia, the MTCS/PEFC, is ranked in the top ten of CoC certification certificate holders globally after France, Germany, Spain, United Kingdom, Italy, Austria, Japan, China, and the Netherlands, and ranked third in the Asia region after Japan and China under the PEFC (PEFC 2022).

The Malaysian Timber Certification Council (MTCC), which was established in October 1998, is an independent organisation, that develops and operates the MTCS (MTCC 2023). The MTCS standards, which were developed in 2001, have been endorsed by the PEFC since 2009 (MTCC 2001, Murughan et al. 2024). Murughan et al. (2023) reported that the MTCS/PEFC is the largest forest certification program in Malaysia. There are a total of 5.21 million hectares certified natural forests, 0.14 million plantation forests, and 384 CoC certification holders in 2021 (MTCC 2021). The MTCS/PEFC CoC certification standard, which was introduced in 2001, is to ensure the timber products manufactured and exported are produced from forest and forest plantations that have been certified and granted the Certificate for Forest Management and Certificate for Forest Plantation Management under the MTCS/PEFC (MTCC 2001, MTCC 2023). Currently, the standards used are the PEFC ST 2002:2020 (Chain of Custody of Forest and Tree-Based Products – Requirements), and PEFC ST 2003:2020 (Requirements for Certification Bodies operating Certification against the PEFC International Chain of Custody Standard) (MTCC 2023, PEFC 2023). Generally, there are about 22 types of MTCS/PEFC-certified timber products, where sawn timber, moulding, and plywood are the top three certified timber products. The sawn timber consists of about 60 percent of the total certified timber products followed by moulding at about 10 percent and plywood at about 5 percent (MTCC 2021). These certified timber products contribute up to 75 percent of the total certified timber products under the MTCS/PEFC. Other MTCS/PEFC-certified timber products are builders' carpentry and joinery, fibreboard, woodchips, laminated finger-jointed, and wooden furniture (MTCC 2021). The export markets of MTCS/PEFC-certified timber products are Europe with 73%, followed by Asia (17%), Oceania (5%), Africa (3%), and North America (2%) (MTCC 2021). In 2021, the top five export markets are Japan, the Netherlands, the United Kingdom, Australia, and Germany (MTCC 2021). The scenario showed that the Europe region dominated the export markets of MTCS/PEFC-certified timber products. The MTCS/PEFC CoC certification certificate holders were 16 in 2001, and rose to 177 in 2011 and to 384 in 2021 (MTCC 2001, MTCC 2011, MTCC 2021). This showed that the MTCS/PEFC CoC certification certificate holders had risen significantly over these two decades between 2001 and 2021 (Chew et al. 2009, Chew 2019, Yong & Siti 2022).

While the number of MTCS/PEFC CoC certification certificate holders has been increasing over the last two decades (Chew et al. 2009, Chew 2019, Yong & Siti 2022), it is important to explore what drives timber products companies to adopt this certification. Also, a systematic review study on forest certification research in Malaysia has stated that the study on drivers of FM certification and CoC certification is yet to be explored (Murughan et. al. 2023). Murughan et al. (2023) stated that these studies are important for policy-making on forest certification. Similar studies on drivers of forest certification have been conducted in Europe and America region (Takahashi 2001, Faggi et al. 2014, Galati et al. 2017, Halalisan et al. 2018, Tricallotis et al. 2019, Zubizarreta et al. 2021, Lombardo et al. 2021, Murughan et. al. 2023). In order to address the research gap, the current study aims to explore the drivers for adopting the MTCS/PEFC CoC certification in Malaysia.

METHODOLOGY

A survey was conducted to explore the drivers for adopting the MTCS/PEFC CoC certification

in Malaysia. A close-ended questionnaire which includes three sections was developed. The first section was developed to obtain basic information on the company, which includes company business, company size, certification program, other management certification program, business mode, years of certification, percentage of export, and major export market information. The second and third sections were developed to obtain the external and internal drivers that led to the adoption of the MTCS/PEFC CoC certification, namely market, signalling, legal, and incentive (e.g. external drivers), and moral and learning (e.g. internal drivers), respectively. These drivers consist of 18 items, where market consists of 6 items, signalling consists of 3 items, legal consists of 2 items, incentive has 3 items, while both moral and learning have 2 items each (Table 1). These drivers were mainly developed based on the reviewed literature on the drivers of forest certification research (Faggi et al. 2014, Galati et al. 2017, Zubizarreta et al. 2021). These 18 items were valued using a five-point Likert-type scale, where 1 (strongly disagree), 2 (disagree), 3 (neither agree nor disagree), 4 (agree), and 5 (strongly agree) were agreed upon. Similarly, Faggi et al. (2014), Galati et al. (2017), Halalisan et al. (2018), Halalisan et al. (2019), and Zubizarreta et al. (2021) used the five-point Likert-type scale in their studies to identify the drivers of forest certification in Spain, Romania, Italy, Argentina and the United States, respectively. The information and

Table 1 Drivers mechanism items for MTCS/PEFC CoC certification

Mechanisms	Mean*	S.D.
Market		
Access to Markets	4.27	0.773
Increase Company Competitiveness in the Market	3.92	0.755
Increase the Market Share	3.94	0.859
Differentiate Company Products from the Competitors	3.88	0.758
Diversify Sales Channels	4.07	0.851
Increase the Selling Price of the Products	3.33	0.887
Signalling		
Attracts Customers	4.08	0.755
Improve Company Image	4.07	0.590
Certify the Product Traceability	4.26	0.723
Legal		
Ensuring Compliance with International Hard Law (e.g. Australian Illegal Logging Prohibition Act, European Union Timber Regulation, US Lacey Act. & Others)	4.01	0.775
Ensuring Compliance with International Soft Law (e.g. multilateral environmental agreements & and others)	3.72	0.662
Incentive		
Tax Deduction for the Company	3.63	0.946
Incentives and Support from the Government	3.60	1.066
Incentives and Support from the Certification Provider	3.70	0.983
Moral		
Sensitive to Forestry/ Environmental Concerns	3.85	0.805
Commitment to Reduce Forestry/ Environmental Impact	3.87	0.794
Learning		
Improve Product Quality	3.77	0.836
Improve Procedure & Documentation Efficiency	3.72	0.762

* Score Likert-Scale. 1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, 5 = strongly agree

contact lists of the MTCS/PEFC CoC certificate holders were obtained from the Malaysian Timber Certification Council (MTCC), and the PEFC Certified Database which is available on the PEFC official website. There were a total of 341 CoC certification certificate holders under the MTCS/PEFC as of 1 January 2023. An official email and questionnaire link were sent to all 341 MTCS/PEFC CoC certificate holders respondents. A total of 86 completed questionnaires were received from the respondents between February and April 2023. The respond represented a rate of 25.22%, with the margin of error being 9% for a confidence level of 95%. This response rate was comparable with similar studies on drivers of forest certification surveys (Galati et al. 2017, Zubizarreta et al. 2021). Consequently, these completed questionnaire data were analysed descriptively using Statistical Package for the Social Sciences (SPSS) Version 26. Additionally, Faggi et al. (2014) and Galati et al. (2017) used the similar method to analyse drivers of forest certification in the Italian and Argentinian forestry sectors, respectively.

RESULTS AND DISCUSSION

Company characteristics information

The results of the company characteristics information can be seen in Table 2. For the company business type, primary processing companies recorded the highest at 55.8% compared to secondary processing companies (27.9%) and traders (16.3%). This was in line with the MTCS/PEFC CoC certificate holders where the primary processing companies hold about 70%, compared to secondary processing companies (20%), and traders (10%) (MTCC 2021). For the certification program, companies with the MTCS/PEFC CoC certification were recorded at 72.1% compared to the companies holding dual certifications (e.g. MTCS/PEFC + FSC certification programs) were recorded at 27.9%. Most of the MTCS/PEFC CoC certificate holder companies without any other management certification program recorded at 55.8% compared to companies with MS ISO Standards certifications (e.g. MS ISO 9001, MS ISO 14000) were recorded at 44.2%. For the years of certification category, majority of the companies were certified for 0–5 years (34.9%), followed by 6–10 years (27.9%), 16–20 years (20.9%), and 11–15 years (16.3%). Most of the MTCS/PEFC CoC certificate holders companies were export-oriented individuals recorded at 88.4% compared to non-export individuals recorded at 11.6%. Subsequently, the percentage of exports of 100% was recorded at 34.9%, followed by 25% (20.9%), 75% (18.6), and 50% (14%). This was obvious as the Malaysian timber industry is export-oriented based. For the major export market, the Europe region recorded the highest with 44.2%,

Table 2 Company characteristics

Company characteristics	Percentage (%)
Company business	
Primary processing	55.8
Secondary processing	27.9
Traders	16.3
Company size	
Small	25.6
Medium	60.5
Large	13.9
Certification program	
MTCS/PEFC	72.1
MTCS/PEFC + FSC	27.9
Other management certification program	
MS ISO Standards	44.2
None	55.8
Business mode	
Export	88.4
No export	11.6
Years of certification	
0–5	34.9
6–10	27.9
11–15	16.3
16–20	20.9
Percentage of export	
0	11.6
25%	20.9
50%	14.0
75%	18.6
100%	34.9
Major export market	
Asia	34.9
Europe	44.2
Oceania	2.3
North America	7.0
None	11.6

followed by Asia region (34.9%), North America region (7%), and Oceania region (2.3%). The findings could be related to the export markets of the MTCS/PEFC-certified timber products, where European countries particularly the Netherlands, United Kingdom, and Germany, and Asia particularly Japan dominate the export markets (MTCC 2021).

Drivers of the MTCS/PEFC CoC certification

The results of the drivers of the MTCS/PEFC CoC certification can be seen in Figure 1. The Signalling mechanism (4.14) has ranked first followed by the Market mechanism (3.91), the Legal mechanism (3.87), the Moral mechanism (3.86), the Learning mechanism (3.74), and the Incentive mechanism (3.64). The findings showed that the external drivers (e.g. Signalling mechanism, Market mechanism, and Legal mechanism) were most valued compared to the internal drivers (e.g. Moral mechanism and Learning mechanism). The results revealed that the external drivers were ranked according to Signalling > Market > Legal > Incentive mechanisms, meanwhile, the internal drivers are ranked according to Moral > Learning mechanisms.

The results of the driver's mechanism items of the MTCS/PEFC CoC certification can be seen in Table 1. The mean measurements for access to markets (4.27), certify product traceability (4.26), attracts customers (4.08), improve company image (4.07), diversify sales channel (4.07), ensuring compliance with international hard law (4.01), increase the market share (3.94), increase company competitiveness in the market (3.92), and differentiate company products from the competitors (3.88) have emerged as the top 50% among the 18 analysed items (Table 1). The driver mechanisms that were listed in the top 50% are Signalling, Market, and Legal. This is in line with several research that revealed Signalling and Market mechanisms have been the most valued drivers in the adoption of CoC certification in Spain, Romania, and Italy (Galati et al. 2017, Halalisan et al. 2019, Zubizarreta et al. 2021). On the contrary, the bottom 50% of the 18 analysed items were commitment to reduce forestry/ environmental impact (3.87), sensitive to forestry/ environmental concerns (3.85), improve product quality (3.77), improve procedure and documentation efficiency (3.72), ensuring compliance with international soft law (3.72), incentives and support from the certification provider (3.70), tax deduction for the company (3.63), incentives and support from the government (3.60), and increase the selling price of the products (3.33) (Table 1). The driver mechanisms that were listed in the bottom 50% were Legal, Moral, and Learning. This was in line with several research that revealed Legal and Learning mechanisms were the least valued drivers in the adoption of CoC certification in Spain and Italy (Galati et al. 2017, Zubizarreta et al. 2021).

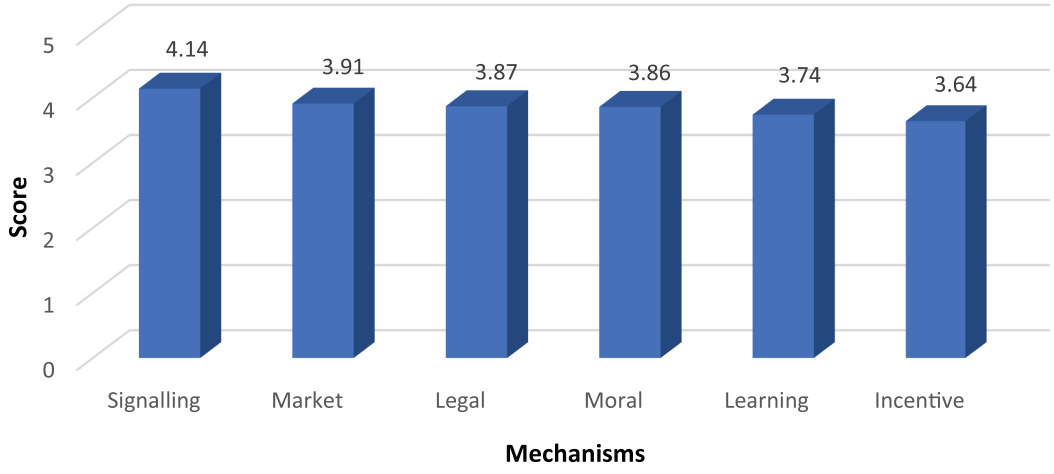

Figure 1 Drivers of the MTCS/PEFC CoC certification

The MTCS/PEFC CoC certification holder companies have valued the most items namely certify the product traceability, attracts customers, and improve company image (e.g. Signalling mechanism). The Signalling mechanism items were mentioned in several research where adopting forest certification improves a company's corporate image and status among stakeholders, businesses, and customers (Chen et al. 2011, Faggi et al. 2014, Galati et al. 2017, Halalisan et al. 2019, Zubizarreta et al. 2021). In addition, the CoC certification provides and ensures the traceability of timber and timber products between forests and consumers (Nussbaum & Simula 2005). The access to markets, increase company competitiveness in the market, increase the market share, differentiate company products from the competitors, and diversify sales channels (e.g. Market mechanism) are highly valued by these companies. Generally, forest certification is a market tool that is important to provide access to the markets and in particular to the specialised and sensitive markets (Chen et al. 2011, Galati et al. 2017, Halalisan et al. 2019, Zubizarreta et al. 2021) as well as to niche markets (Zubizarreta et al. 2021). Ensuring the compliance of item with international hard law (e.g. Legal mechanism) has been highly valued by these companies too. The Australian Illegal Logging Prohibition Act, the European Union Timber Regulation, the US Lacey Act, Japan Clean Wood Act, and the Republic of Korea Act on the Sustainable Use of Timbers, and others are hard laws that prohibit the trade of illegal timber and timber products into their respective market, and these laws impose penalties for violation of the act (Leipold et al. 2016, DAWRA 2023, EC 2023, KFS 2023, MAFF 2023, USC 2023). While there is no general standard to prove the legality of timber and timber products (Nussbaum & Simula 2005), forest certification provides due diligence that timber and timber products are sourced from a sustainably and legally managed forest (Durst et al. 2006, Palus et al. 2017, Palus et al. 2018). The information on the traceability of timber and timber products is important in order to adhere to these international hard laws. Similarly, Faggi et al. (2014) reported that Legal mechanism is the most valued driver among forest-based companies, where forest certification complies with both national and international forest-based laws. On the contrary, the increase in the selling price of the products (e.g. Market mechanism) has been least valued by these companies. While the increase in the selling price or price premiums for certified timber and timber products are motivation to adopt forest certification (Nussbaum & Simula 2005, Tian 2022), several research studies have mentioned that price premium has been least valued (Faggi et al. 2014, Galati et al. 2017, Halalisan et al. 2019, Zubizarreta et al. 2021). The observation is in line with Cubbage et al. (2010) and Halalisan et al. (2013), where price premium is the least benefit gained in adopting forest certification. The tax deduction items for the company, incentives, and support from the government, and incentives and support from the certification provider (e.g. Incentive mechanism) have been least valued by these companies too. Several research studies have recommended providing financial support namely subsidies, tax benefits, and cost-sharing programs, and non-financial support namely technical and non-technical support for the uptake of forest certification (Stavins 2002, Leahy et al. 2008, Ebeling & Yasue 2009, Ma et al. 2012, Tian 2022). Items on Moral and Learning are no less valued by these companies. Research studies have revealed that forest-based companies which are concerned about the forest and environmental issues recognise the importance of forest certification to manage the forest sustainably and legally (Carlsen et al. 2012, Faggi et al. 2014, Tuppura et al. 2016, Galati et al. 2017, Zubizarreta et al. 2021). Studies by Faggi et al. (2014), Galati et al. (2017), and Zubizarreta et al. (2021) showed that Moral mechanism was the most valued after the Signalling mechanism. On the contrary, few previous studies have valued least on the Learning mechanism (Faggi et al. 2014, Galati et al. 2017, Zubizarreta et al. 2021). While forest certification may provide knowledge, skills, and practices of forest management systems, it is not perceived as a learning platform (Chen et al. 2011). Similarly, studies by Faggi et al. 2014, Galati et al. 2017 and Zubizarreta et al. 2021 have valued the Learning mechanism as the least valued driver as well.

CONCLUSION

Malaysia has the highest number of MTCS/PEFC CoC certificate holders in the Southeast Asia region, and the number of certificate holders under this certification has been increasing significantly since 2001. The market, signalling, legal, incentive, moral, and learning mechanisms have been identified as the driver to adopting the MTCS/PEFC CoC certification among these Malaysian timber and timber products companies. The findings revealed that the external drivers (e.g. signalling, market, and legal mechanisms) expect the Incentive mechanism to be more valued than the internal drivers (e.g. moral and learning mechanisms). Malaysian timber and timber products companies adopted the MTCS/PEFC CoC certification. Generally, the adoption of the certification provided the traceability of origin source, to improve companies' image and credibility among businesses and consumers, to maintain, enter, and expand market access, in particular, in the sensitive and niche markets, and to adhere to stringent consumer-side laws related to illegal logging and associated trade. Meanwhile, commitment to addressing forest and environmental matters, to increasing management efficiency and product value, and to gaining both financial and non-financial support is important to adopting this certification as well. Thus these findings revealed that both the external and internal drivers are important for the adoption of MTCS/PEFC CoC certification among Malaysian timber and timber products companies.

ACKNOWLEDGMENT

This study was supported by the Universiti Putra Malaysia (UPM) / 9729900 fundings.

REFERENCES

Carlsen K, Hansen C & Lund JF. 2012. Factors affecting certification uptake – Perspectives from the timber industry in Ghana. *Forest Policy and Economics* 25: 83–92. https://doi.org/10.1016/j.forpol.2012.08.011

Cashore BW, Auld G & Newsom D. 2004. *Governing through Markets: Forest Certification and the Emergence of Non-state Authority*. Yale University Press, New Haven.

Chen J, Innes JL & Kozak RA. 2011. An exploratory assessment of the attitudes of Chinese wood products manufacturers towards forest certification. *Journal of Environmental Management* 11: 2984–2992. https://doi.org/10.1016/j.jenvman.2011.07.012

Chew LT. 2019. *Twenty Years Pushing Boundaries Advancing Sustainability Malaysian Timber Certification Council*. MTCC Publication, Kuala Lumpur.

Chew LT, Harnarinder S & Yong TK. 2009. *The First Ten Years Malaysian Timber Certification Council*. MTCC Publication, Kuala Lumpur.

Cubbage F, Moore S, Henderson T & Araujo M. 2009. *Costs and benefits of forest certification in the Americas*. Pp. 155–183 in Paulding Jeanette B. (eds), Natural Resources: Management, Economic Development and Protection. Nova Publishers, New York.

Dawra. 2023. *Australia Illegal Logging Prohibition Act (AILPA). Department of Agriculture and Water Resources*. http://www.agriculture.gov.au/forestry/policies/illegal-logging

Durst PB, Mckenzie PJ, Brown CL & Appanah S. 2006. Challenges facing certification and eco-labelling of forest products in developing countries. *International Forestry Review* 8: 193–200. https://doi.org/10.1505/ifor.8.2.193

Ebeling J & Yasue M. 2009. The effectiveness of market-based conservation in the tropics: Forest certification in Ecuador and Bolivia. *Journal of Environmental Management* 90: 1145–1153. https://doi.org/10.1016/j.jenvman.2008.05.003

Ec. 2023. European Union Timber Regulation (EUTR). The European Commission (EC). http://ec.europa.eu/environment/forests/timber_regulation

Faggi AM, Zuleta GA & Homberg M. 2014. Motivations for implementing voluntary environmental actions in Argentine forest companies. *Land Use Policy* 41: 541–549. https://doi.org/10.1016/j.landusepol.2014.04.011

Galati A, Gianguzzi G, Tinervia S, Crescimanno M & Veca DSLM. 2017. Motivations, adoption, and impact of voluntary environmental certification in the Italian Forest-based industry: The case of the FSC standard. *Forest Policy and Economics* 83: 169–176. https://doi.org/10.1016/j.forpol.2017.08.002

Halalisan AF, Abrudan IV & Popa B. 2018. Forest management certification in Romania: Motivations and perceptions. *Forests* 9: 425. https://doi.org/10.3390/f9070425

Halalisan AF, Popa B, Heras-Saizarbitoria I, Ioras F & Abrudan IV. 2019. Drivers, perceived benefits and impacts of FSC chain of custody certification in a challenging sectoral context: The case of Romania. *International Forestry Review* 21: 195–211. https://doi.org/10.1505/146554819826606595

Halalisan AF, Marinchescu M, Popa B & Abrudan IV. 2013. Chain of Custody certification in Romania: Profile and perceptions of FSC certified companies. *International Forestry Review* 15: 305–314. https://doi.org/10.1505/146554813807700137

Kfs. 2023. Act on the Sustainable Use of Timbers. Korea Forest Service. https://english.forest.go.kr

Leahy J, Kilgore MA, Hibbard CM & Donnay JS. 2008. Family forest landowners' interest in and perceptions of forest certification: Focus group findings from Minnesota. *Northern Journal of Applied Forestry* 25: 73–81. https://doi.org/10.1093/njaf/25.2.73

Leipold S, Sotirova M, Freia T & Winkela G. 2016. Protecting "First world" markets and "Third world" nature: The politics of illegal logging in Australia, the European Union and the United States. *Global Environmental Change* 39: 294–304. https://doi.org/10.1016/j.gloenvcha.2016.06.005

Lombardo E, Crescimanno M, Vrontis D & Galati A. 2021. Driving forces affecting the adoption of certifications in the forest-based industry: A systematic literature review. *Journal for Global Business Advancement* 14: 453–478. https://doi.org/10.1504/jgba.2021.118747

Ma Z, Butler BJ, Kittredge DB & Catanzaro P. 2012. Factors associated with landowner involvement in forest conservation programs in the U.S.: Implications for policy design and outreach. *Land Use Policy* 29: 53–61. https://doi.org/10.1016/j.landusepol.2011.05.004

MAFF. 2023. *The Act on Promotion of Use and Distribution of Legally Harvested Wood and Wood Products (Clean Wood Act)*. Ministry of Agriculture, Forestry and Fisheries Japan. https://www.maff.go.jp

MTCC. 2001. Malaysian Timber Certification Council (MTCC) Annual Report 2001. MTCC Publication. https://mtcc.com.my/annual reports

MTCC. 2011. Malaysian Timber Certification Council (MTCC) Annual Report 2011. MTCC Publication. https://mtcc.com.my/annual reports

MTCC. 2021. Malaysian Timber Certification Council (MTCC) Annual Report 2021. MTCC Publication. https://mtcc.com.my/annual reports

MTCC. 2023. Malaysian Timber Certification Council (MTCC) Certification Standard. MTCC Publication. https://mtcc.com.my/certification standard

Murughan M, Mohamad Roslan MK, Johar M, Zubaidah H, Seca G. & Pakhriazad HZ. 2024. Forest management certification growth in Malaysia: The case of the Malaysian Timber Certification Scheme. *The Malaysian Forester* 87: 37–50.

Murughan M, Mohamad Roslan MK, Pakhriazad HZ & Seca G. 2023. Forest certification research in Malaysia: A systematic review. *The Malaysian Forester* 86: 73–89.

Nussbaum R & Simula M. 2005. *The Forest Certification Handbook*. Second Edition. Routledge, London.

Palus H, Parobek J & Dudik R. 2017. Assessment of chain-of-custody certification in the Czech and Slovak Republic. *Sustainability* 9: 1898. https://doi.org/10.3390/su9101898

Palus H, Parobek J & Vlosky RP 2018. The status of chain-of-custody certification in the countries of central and south Europe. *European Journal of Wood and Wood Products* 76: 699–710. https://doi.org/10.1007/s00107-017-1261-0

PEFC. 2022. Programme for the Endorsement of Forest Certification (PEFC) Facts and Figures. PEFC Publication. https://www.pefc.org

PEFC. 2023. Programme for the Endorsement of Forest Certification (PEFC) Standards and Implementation. PEFC Publication. https://www.pefc.org/ standards-implementation

Stavins RN. 2002. *Lessons from the American experience with market-based environmental policies*. In Donahue JD, Nye Jr JS. (eds), Harnessing the Hurricane: The Challenge of Market-Based Governance. Brookings Institution Press, New York.

Suryani AN, Shahwahid HM, Fauzi PA, Alias R, & Vlosky RP. 2011. Assessment of chain-of-custody certification costs for sawn wood manufacturers in Peninsular Malaysia. *Journal of Tropical Forest Science* 23: 159–165.

Takahashi T. 2001. *Why Firms Participate in Environmental Voluntary Initiatives: Case Studies in Japan and Canada*. PhD thesis, The University of British Columbia, Vancouver.

Tian N. 2022. Nonindustrial Private Forest Landowners (NIPF) willingness to pay for forest certification in Arkansas. *Small-scale Forestry* 21: 681–695. https://doi.org/10.1007/s11842-022-09507-x

Tricallotis M, Kanowski P & Gunningham N. 2019. The drivers and evolution of competing for forest certification schemes in the Chilean forestry industry. *International Forestry Review* 21: 516–527. https://doi.org/10.1505/146554819827906870

Tuppura A, Toppinen A & Puumalainen K. 2016. Forest certification and ISO 14001: current state and motivation in forest companies. *Business Strategy and the Environment* 5: 355–368. https://doi.org/10.1002/bse.1878

Upton C & Bass S. 1996. *The Forest Certification Handbook*. St. Lucie Press, Florida

USC. 2023. US Lacey Act. United States Congress (USC) Control of Illegally Taken Fish and Wildlife, 16 USC 3371 (Amended, 2008). http://www.gpo.gov

Yong TK & Siti SM 2022. *Pushing Boundaries Advancing Sustainability: The case of MTCS*. XV World Forestry Congress 2022, South Korea.

Zubizarreta M, Arana-Landín G & Cuadrado J. 2021. Forest certification in Spain: Analysis of certification drivers. *Journal of Cleaner Production* 294: 126267. https://doi.org/10.1016/j.jclepro.2021.126267

Zubizarreta M, Landín GA, Wolff S & Egiluz Z. 2023. Assessing the economic impacts of forest certification in Spain: A longitudinal study. *Ecological Economics* 204: 107630. https://doi.org/10.1016/j.ecolecon.2022.107630