

Article

Assessment of Chain-of-Custody Certification in the Czech and Slovak Republic

Hubert Paluš^{1,*}, Ján Parobek¹ , Roman Dudík² and Mikuláš Šupín¹

¹ Department of Marketing, Trade and World Forestry, Faculty of Wood Sciences and Technology, Technical University in Zvolen, T. G. Masaryka 24, 960 53 Zvolen, Slovakia; parobek@tuzvo.sk (J.P.); supin@tuzvo.sk (M.Š.)

² Faculty of Forestry and Wood Sciences, Czech University of Life Sciences, Prague, Kamýcká 129, 165 00 Prague, Czech Republic; dudik@fld.czu.cz

* Correspondence: palus@tuzvo.sk; Tel.: +421-455-206-444

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Abstract: Forest certification is a voluntary verification tool that has been gaining importance within the global sustainability issues as an independent verification tool for sustainable forest management and wood processing industry and as an influencer in private and public purchasing policies and a component of emerging wood harvesting and trade legality schemes. This study focuses on the chain-of-custody (CoC) component of forest certification. A survey of CoC certified companies in the Czech Republic and Slovakia was carried out to explore the understanding of the concept and role of forest and CoC certification as an environmental, economic, and social tool. It aimed to determine expectations following from the implementation of CoC certification by companies and to identify difficulties in existing certified wood product supply chains and costs related to purchase and sales of certified forest products, respectively. Results indicate that respondents demonstrated a high level of understanding of the CoC concept and that they link forest certification mainly to the issues of legality, tracing the origin source of supply and promotion of sustainable utilisation of wood. The main expected benefits are linked to the improvement of an external company image followed by penetration of new markets and increase of sales volume. CoC is not considered a tool to improve internal company performance and efficiency. The key problems connected to certified supply chains relate to the sufficient quantity of certified forest products, low margins and overpriced certified material inputs. Respondents reported none or minimum price premiums for their certified products over non-certified alternatives. Several differences related to the understanding of the sustainable forest management concept and the level of price premium paid for certified inputs were identified between the PEFC (Programme for the Endorsement of Forest Certification) and FSC (Forest Stewardship Council) certified companies as well as between the different forest products sectors.

Keywords: certification; chain of custody; sustainable wood utilisation; certification cost

1. Introduction

Forest certification was initially introduced as a voluntary mechanism by environmental groups to ameliorate the consequences of tropical deforestation and forest degradation [1]. Forest certification is a process by which forest owners voluntarily submit their forests to inspection by an independent certification body to determine whether their management practices meet clearly defined standards, particularly those regarding sustainability [2]. It was quickly accepted as a means to promote sustainable forest management [3–5] and directly influenced forest management practices [6–9]. Cabarle et al. [10] argued that the objective of certification is to link the informed consumer with products produced in an environmentally and socially responsible manner. Companies that can

prove that they are environmentally responsible by being certified may benefit by differentiating their products, potentially increasing market share [11], and gaining market advantage [12].

Rickenbach and Overdevest [13] stated that the dominant model for understanding the effectiveness of certification views forest certification as a market-based incentive for forestry enterprises whereby firms that adopt certification practices expect direct market benefits. Premiums or advantages of market access must also offer sufficient incentives for suppliers to bear the costs of certification [14]. Ulybina and Fennell [15] suggested that certification is a signal to external stakeholders that enterprises are meeting high forestry standards or improving forestry practices and production.

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 [16]. It may also serve to improve their corporate images and access to markets [17,18] or may be part of business system innovations [19].

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 [20]. Tuppura [21] 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 [22]. 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 [23].

A number of studies dealt with the issue of willingness to pay for certified products and receiving "green price premium" by companies for selling certified products, respectively. Vlosky and Ozanne [24] found out that in the early stages of certification, manufacturers were not willing to bear any cost of certification and pay any price premium for input material unless it was offset by higher prices of manufactured products received by their customers. The number of manufacturers in the US value-added wood products sector receiving a premium for certified products tended to increase over time [25,26]. Owari et al. [23] and Hrabovsky and Armstrong [27] also found that certified wood products companies were not able to charge any price premium and willingness-to-pay a premium was low. Besides this, two of the main identified barriers to certification was that certification systems do not add value to the products and the lack of certified raw material [28]. Vidal et al. [29] found that company size is an important variable to be considered when analysing the adoption of CoC certification by primary wood producers and larger companies are more likely to be certified than smaller ones.

The benefits of CoC certification include improved supply chain management performance, communications in supply chains, inventory controls, market knowledge, transparency, profitability [29], lower overall costs [30,31], wood legality assurance, company's image and competitiveness of wood products [32], good reputation and international recognition [33], and sales increase [34].

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 [35]. Gavrilut et al. [36] stated that forest certification (FSC) is a useful source in providing information required by EUTR even though the certification standard does not explicitly refer to each of EUTR's requirements and therefore it cannot be automatically considered to be in full compliance

with the EUTR. 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 [37]. The impact will mainly be on small and medium enterprises importing timber from outside the EU without existing traceability systems [38]. EUTR as a public policy may potentially have a positive effect on the acceptance of certification [39].

Despite research that has been carried out worldwide, there is limited information on CoC certification in the Czech and Slovak Republics. There have been several studies focusing on the establishment and development of forest certification [40–43], but only few concentrating on the attitudes of certified companies towards the forest and CoC certification [44]. The historical geographical and political coexistence of both countries under the common system of government as well as the common forest management legislation and planning background was the reason why this research was carried out in the Czech and Slovak Republics in particular. At the same time, these two countries demonstrate a similar way of utilisation of their available forest resources. In 2016 they produced almost 26 mil. m³ of roundwood, thus accounting for 5.7% of the EU roundwood production. High dependence of wood processing industries on domestic wood resources and their export orientation is another joint feature of both countries.

The main objective of this research is to analyse the current state of CoC certification from the perspective of certified companies in the Czech and Slovak Republics, with the focus on (i) understanding of concept and role of forest and CoC certification, (ii) the expectations of companies following the implementation of CoC certification, (iii) perceptions of any difficulties connecting to certified supply chains, and (iv) costs related to purchase and sales of certified raw materials and wood products, respectively.

2. Materials and Methods

The Czech and Slovak Republics play an important role in terms of available forest resources. Timber produced in this region represents an important source of raw material not only for the domestic wood processing industry and energy production but also for the export markets situated mainly in the neighbouring countries. Moreover, there is also a significant export orientation of these countries once the intermediate and value added wood products trade is concerned. The study was carried out using an online questionnaire survey. Companies selected for the survey were identified from the international registers of CoC holders of the PEFC [45] and FSC [46] certification schemes. A database of companies holding a valid CoC certificate with available email addresses was constructed and adjusted for double certification users, thus giving the total number of 487 (342 in Czechia and 145 in Slovakia) companies to be contacted in the survey. Email-based survey development and implementation was based on the modified methods recommended by Dillman [47], including a pre-notification email, as well as first and second survey emails three weeks apart. Data were collected in October and November 2015. A total of 131 of responses was received, thus giving the adjusted return rate of 26.9%.

The questionnaire consisted of a cover letter explaining the content and of a number of sections. The first section contained questions regarding the business profile of companies in terms of geographical location, company size, sector represented, and certification scheme used. Recipient companies were categorised according to the European Commission [48] classification into micro, small, medium-size, and large size categories. Twenty wood products and levels of trade activities were defined for companies to determine their main production and trade orientation, that were grouped into one of the main three sectors for further analyses, namely primary wood processing, secondary wood processing and trade. From the point of view of certification scheme used the companies were classified as PEFC, FSC, or double (both PEFC and FSC) CoC certificate holders. The second section of the questionnaire contained questions examining company level of understanding of sustainable forest management and CoC certification, determine the level of agreement with a number

of certification-related statements. The researchers provided definitions of forest and CoC concepts to assure a consistent frame of reference for respondents.

The certification statements included the main objectives and purposes of having CoC certification, including promotion and management of sustainable forest resources [3–5], traceability and confidence in sourcing certified raw materials and products [31], legality issues [32,36,38], market access [14,17,18], potential for improved communication [49], and possible improvements in internal efficiency of material flows, and effects on corporate management [18,30].

In the third section, participants were asked to provide internal information on their involvement in the certification process, and expectations motivating them to enter certified products market. Factors included possible linkages of internal economic performance to increased sales and profit [30,50], diversification of product portfolios, increase of market share and penetration of new markets [23], commitment to environmental issues [14], and improvement of company image [18,26,32].

Additionally to these, questions linked to the purchasing process, difficulties in certified wood supply chain, and costs related to procurement of certified material were included. Respondents were also asked about the origin of certified material they purchase and the regional and consumer structure of selling their certified wood products. The final section of the questionnaire contained a series of questions oriented on the marketing and sales of certified wood products including the level of price premium received for certified products [25,26].

Five-point Likert scales were used to measure many of the perception, motivations, and experiences items. They were anchored on: 1 = “strongly disagree” or “do not understand not at all” to 5 = “strongly agree” or “completely understand”. In one set of Likert-scale items, the mid-point was “somewhat understand”, while the remaining item mid-points were “neither disagree nor agree” (a neutral mid-point). The designed rating scales with labelled endpoints were considered to be approximation to interval scales allowing us to treat responses as if they fell on an interval scale. The reliability of factors regarding the agreement of companies with the main objectives and purposes of CoC certification, expectations that motivated companies to enter into the certified products market as well as difficulties in the certified wood supply chain was tested by using the Cronbach’s alpha coefficient. A reliability coefficient of 0.7 and above was considered acceptable for item consistency level [51].

Data were analysed using SPSS. The Mann-Whitney U test was used to measure differences in distribution of categorical variables between the two countries. To test mean differences in a given set of factors between the selected demographic data (company size, company sector, certification scheme used), one-way analysis of variance (ANOVA) was used. By performing significance tests and obtaining a multivariate F value (Wilks’ λ), we were able to test a null hypothesis that there are no differences between companies across a number of items. For the ranked statements, Duncan’s multiple comparison test was applied to determine if there were significant differences between group means. To eliminate unequal group sizes, the harmonic mean was used.

3. Results

The number of companies contacted in both countries and the respective adjusted response rates are shown in Table 1. From the total number of 131 respondents 62% of the respondents were from the Czech Republic and 38% from the Slovak Republic.

Table 1. Number of companies contacted by country and respective adjusted response rate.

Country	Contacted Companies		Adjusted Response Rate
	N	%	%
Czech Republic	342	70.23	23.68
Slovakia	145	29.77	34.48

The company size was determined by the number of employees for each respondent. 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). In the Czech Republic, micro companies represent 20%, small up to 30%, medium-sized 39%, and large companies 11%. In Slovakia, micro companies accounted for 16%, small 36%, medium-sized 34%, and large companies 14%.

The basic characteristics of the respondents are shown in Table 2. The table presents the absolute number and the percentage share of the respondents according to the considered countries. The value 19.75 for micro-sized companies represents the share of small companies among the respondents in the Czech Republic (100% constitutes the complex for one country, not the whole complex of respondents).

Table 2. Basic characteristics of the respondents.

Parameter <i>n</i> = 131		Czech Republic		Slovakia	
		<i>n</i>	%	<i>n</i>	%
Company size	micro	16	19.75	8	16.00
	small	24	29.63	18	36.00
	middle	32	39.51	17	34.00
	large	9	11.11	7	14.00
Sector	primary	39	48.15	25	50.00
	secondary	7	8.64	9	18.00
	trade	35	43.21	16	32.00
Certification scheme	PEFC	40	49.38	20	40.00
	FSC	31	38.27	18	36.00
	both	10	12.35	12	24.00

PEFC—Programme for the Endorsement of Forest Certification, FSC—Forest Stewardship Council.

The biggest group among the respondents were the primary wood processors (Czech Republic (CZ) 48%, Slovak Republic (SK) 50%), followed by the trading companies (CZ 43%, SK 32%), and then secondary wood processing companies (CZ 9%, SK 18%) representing manufacturing of a variety of products including paper products, doors, windows, furniture, and wooden construction materials.

Two certification systems, FSC and PEFC, were used by the respondents. The situation is as follows: 50% of the respondents in the Czech Republic are certified by PEFC certification and 40% in Slovakia. FSC certificate holders accounted for 38% in the Czech Republic and 36% in the Slovak Republic. Some 12% of the companies in the Czech Republic and 24% in Slovakia hold double certification (PEFC and FSC at the same time). On average, companies have been certificate holders for almost 6 years. Almost 62% of respondents stated that the main incentive to obtain CoC certification was the “requirement from our existing customer”, for over 18% it was the “requirement from our potentially new customer” and for almost 20% it was the “own internal decision” of the company.

Almost 57% respondents in the Czech Republic and 60% in the Slovak Republic buy certified forest products directly from domestic forest owners and wood manufacturers. On average, 55% of wood product purchase costs are from certified wood and wood products (CZ 53%, SK 60%) and 37.5% of total company sales revenue were from the certified products in the Czech Republic and 34.4% in the Slovak Republic. Some 47% of certified wood products were sold at domestic market, 29% to other EU countries and 24% outside the EU market. The main customers of respondents were represented by wood processing companies (sawmills, pulp and panel mills, furniture producers)—29.6%, followed by wholesale (21.3%), wood and wood products traders (19.8%), large retail companies (14.2), final residential consumers (9.9%), and institutional consumers (corporate offices, hotels, schools etc.)—5.14%.

In order to compare the basic characteristics of the respondents (company size, certification scheme, forest products sector) in the Czech and Slovak Republics, the U test was used. There were no significant differences found among the respondents regarding the company size ($p = 0.879$,

certification) scheme ($p = 0.141$), and sector ($p = 0.125$). Therefore, further analysis considering these three parameters were performed on the whole answers from Slovakia and the Czech Republic together.

The influence of company level characteristics (company size, certification scheme, forest products sector) on the understanding of certification concept and objectives of certification schemes was analysed. The reliability of examined factors using the Cronbach's alpha coefficient was 0.673. Results are illustrated in Table 3, which shows that companies are most familiar with the concept of CoC certification and less familiar with the objectives of FSC certification scheme.

Table 3. Understanding of certification concept and objectives of certification schemes.

Understanding $n = 131$	Mean	Std. Deviation
CoC certification concept	4.37	0.914
SFM certification concept	3.82	1.193
PEFC objectives	3.82	1.214
FSC objectives	3.69	1.208

CoC—chain of custody, SFM—sustainable forest management, PEFC—Programme for the Endorsement of Forest Certification, FSC—Forest Stewardship Council.

Using analysis of variance, only a significant influence of certification scheme on the understanding of certification concepts and objectives was found. PEFC and double-certified companies understand the SFM concept better than FSC certified companies ($F = 3.374$, $p = 0.04$). The influence of the scheme on the understanding of the scheme objective (PEFC and FSC) was also confirmed. PEFC-certified companies better understand the objectives of PEFC certification ($F = 18.517$, $p = 0.00$) and FSC-certified companies better understand the FSC objectives ($F = 10.842$, $p = 0.00$). These differences were confirmed using Duncan's multiple comparison test to identify differences between group means (Table 4). The influence of the scheme on the CoC concept perception was not found; all companies perceive it equally.

Table 4. Influence of certification scheme on understanding of SFM certification concept (Duncan test).

Certification Scheme $n = 131$	Group/Mean	
	1	2
FSC	3.51	
Double certification		3.73
PEFC		4.10

Table 5 presents the mean values and standard deviations of the level of agreement with basic certification statements. The reliability of examined factors using the Cronbach's alpha coefficient was 0.928.

Table 5. Level of agreement certification statement.

Certification Statement $n = 131$	Mean	Std. Deviation
Ensurance of legal origin of wood	4.13	1.055
Assurance of traceability to a sustainable source	3.95	1.087
Promotion of sustainable utilisation	3.93	1.083
Promotion of forest management	3.79	1.123
Confidentiality in sourcing of timber	3.56	1.104
Prevention from illegal logging	3.48	1.303
Improvement of market access	3.34	1.162
Improvement of communication	3.18	1.087
Improvement in efficiency of internal material flow systems	2.94	1.142
Improvement in efficiency of corporate management	2.89	1.139

Scale of agreement: (1 strongly disagree, 3 neither disagree nor agree, 5 strongly agree).

The ensurance of legal origin of wood was identified as the most agreed statement (4.13) by the respondents, followed by assurance of traceability to a sustainable source (3.95), and promotion of sustainable utilisation (3.93). Certification as a tool for the improvement of market access, communication, or the internal company efficiency was considered as the least important. There were no statistically significant differences in terms of the scheme, company size or the sector on the agreement with the above mentioned statements identified.

In the next step, the motivation why company entered the certified product market was analysed (Table 6). In this case, the reliability of examined factors using the Cronbach's alpha coefficient was 0.824.

Table 6. Main expectations motivating companies to enter into the certified products market.

Expectation <i>n</i> = 131	Mean	Std. Deviation
Improvement of external company image	4.11	1.020
Seeking to increase sales volume	3.63	1.132
To penetrate new markets	3.53	1.291
Business owner commitment to environmental issues	3.52	1.198
Seeking to expand market share	3.44	1.229
Seeking to increase profit margins	2.98	1.283
Seeking to diversify product line	2.58	1.228

Scale of agreement: (1 strongly disagree, 3 neither disagree nor agree, 5 strongly agree).

The most significant reason why to enter the certified market was the expectation of the improvement of external company image (4.11). This was followed by expectations relating to the increase of sales (3.63) and penetrating new markets (3.53). On the contrary, the least significant reason was the diversification of product line (2.58). There was a significant influence of certification scheme on the statement relating to penetration of new markets identified ($F = 3.107, p = 0.048$).

Table 7 shows the respondents' perception of the problems connected with the purchase of certified products.

Table 7. Perceived level of problems related to procurement of certified inputs.

Problem <i>n</i> = 131	Mean	Std. Deviation
Sufficient quantity	2.85	1.235
Margins are too low	2.81	1.053
Overpriced	2.80	1.091
Consistent supply	2.44	0.912
Punctual delivery	2.18	0.890
Contract fulfilment	2.18	0.975
Product quality	2.13	0.980
Transportation	2.11	0.897

Scale of agreement: (1 not problematic at all, 3 somewhat problematic, 5 very problematic).

The most significant problems perceived by respondents concerning the purchase of the certified products are connected with the sufficient quantity (2.85) followed by small margins (2.81) and overpriced inputs (2.80). Product quality (2.13) or transportation (2.11) were perceived as the least important problems. The reliability of examined factors using the Cronbach's alpha coefficient was 0.885. There were no statistically significant differences in terms of the scheme, company size or the sector on the agreement with the above mentioned perception of the problems connected with the purchase of certified products.

Respondents were further asked about the additional cost they have with the purchase of certified products compared to non-certified products. The results are shown in Table 8. Over 51% of respondents do not pay more for certified products, 29% pay more in the range from 1 to 5%,

and 14.5% pay extra 6 to 10%. On the one hand, only very small share of respondents (1.5%) pay up to 20% more for their certified inputs.

Table 8. Price premium paid by companies for buying certified inputs.

Price Premium Paid <i>n</i> = 131	Do not Pay More	1–5%	6–10%	11–15%	16–20%	Over 20%
No. of respondents	67	38	19	5	2	0
%	51.14	29.01	14.50	3.82	1.53	0.00

Using ANOVA, there was a statistically significant difference confirmed between the certification schemes ($F = 17.678$, $p = 0.00$). To determine which schemes differ from the others in particular the Duncan test was used. FSC- and double-certified companies pay more for their certified inputs compared to PEFC-certified companies (Table 9). The statistically significant difference was found also in case of the forest product sector influence ($F = 5.895$, $p = 0.004$) indicating that both primary and secondary wood processing companies pay more for certified inputs than traders (Table 10).

Table 9. Influence of certification scheme on price premium paid for certified inputs (Duncan test).

Certification Scheme <i>n</i> = 131	Group/Mean	
	1	2
PEFC	1.28	
FSC		2.10
Double certification		2.27

Table 10. Influence of forest products sector on price premium paid for certified inputs (Duncan test).

Forest Products Sector <i>n</i> = 131	Group/Mean	
	1	2
Trade	1.43	
Primary processing		1.91
Secondary processing		2.19

Table 11 shows the responses related to the green premium received by companies for selling certified products relative to comparable non-certified products. The absolute majority of respondents (92.47%) do not receive any price premium bonus. Only 7.63% of respondents get the extra bonus up to 5%. There were no significant differences between the companies in terms of certification scheme, company size, and forest products sector identified.

Table 11. Price premium received by companies for selling certified products.

Price Premium Received <i>n</i> = 131	No Premium	1–5%	6–10%	11–15%	16–20%	over 20%
No. of respondents	121	10	0	0	0	0
%	92.37	7.63	0.00	0.00	0.00	0.00

4. Discussion

When analysing responses from two or more countries it should be kept in mind that differences in results can originate either from different cultural, historical, legislative, and socio-economic conditions or can be related to the development and implementation of forest certification and availability of certified resources in a given country. A group of various factors, including the factors of non-economic nature, that influence the decision about the voluntary observance of the environmental norms is mentioned e.g., by van Kooten et al., (2005). However, in our research we can observe a lot of common

characteristics for both countries resulting from e.g., common political and geographical background, identical historical development of forest management legislation, principles and forest management planning etc. Moreover, both countries are characterised by a relatively high share of publicly owned forests: in the Czech Republic, the state owns 59.6% [52], and in Slovakia, 39.8% [53] of the total forest land is state-owned. In terms of forest certification development, both countries have developed their own national forest certification systems recognised by PEFC Council, and the PEFC is prevailing forest certification, with over 70% of the total forest area in the Czech Republic [52] and over 62% in the Slovak Republic [53]. The distribution and areas of certified forests, and consequently the number of CoC certified companies in the examined countries, affected the structure of respondents with regard to the certification scheme used. In total, 46% of respondents from both countries were holders of PEFC certification, 37% were holders of FSC certification, and 17% held certificates of both certification schemes.

Respondents are undoubtedly aware of the CoC certification concept, which means that they understand their commitment to monitor the stream of the certified raw material in the supply chain and not to use the raw material originating from controversial sources. PEFC-certified companies understand better the concept of PEFC certification than FSC companies' FSC certification. Observed differences in understanding of SFM concept between PEFC and FSC companies may follow from the targeted communication and promotional activities of PEFC national governing bodies in both countries aimed at national stakeholders.

CoC certification is mainly connected to the issue of legality and is seen as a tool to ensure the legal origin of wood, including its capability to trace the origin to a source. For all EU countries, including the Czech Republic and Slovakia, legality requirements for timber are defined by the EUTR, which also recognises good practice in the forestry sector such as certification or other third party verified schemes that include verification of compliance with applicable legislation to be used in the risk assessment procedure [35,36]. As in the case of criteria for legality covered by timber procurement policies that have been adjusted slightly to ensure consistency with the definition used in the EUTR [54], certification schemes also revised their requirements for legality to align with the regulation. PEFC international CoC standard [55] with its PEFC Due Diligence System is an example of such a practice. CoC-certified companies also see certification as a tool to promote sustainable forest management and sustainable utilisation of timber, which is in line with the results of WWF study [16]. Even if PEFC [55] and FSC [56] CoC standards contain the minimal requirements for the CoC management system in the organization our results show that respondents considered this aspect as not very important.

The respondents see the improvement of external company image as the main benefit of the certification. As a part of the communication policy and companies' consumer relation the improvement of external image was also perceived as a benefit by CoC certified companies in Japan [49] or the US [26], where an increase in perceiving improvement of company image as a benefit following from entering the certification arena was documented. Other perceived benefits following from certification were linked to business performance factors such as penetrating new markets and increase of sales volume, which is in line with findings of [17] or [18]. Our results also indicate that companies expect these market benefits with the existing production patterns and there is no need to diversify products portfolio to meet the increasing demand for certified products.

The research found that respondents face the problem of sufficient quantity of certified material inputs, too low margins, and overpriced raw material during its purchase. Even if there were no significant differences in terms of a lack of certified inputs identified between the PEFC and FSC certified companies, it can be assumed that this issue may relate to the FSC certified companies as the areas of FSC-certified forest are very low compared to PEFC-certified forest in both countries. This is reflected in a relatively high share of FSC certified companies that are also covered by FSC Controlled Wood certificates (25.2% in CZ and 35.9% in SK) [46] with the main purpose to check all non FSC-certified inputs for legality issues. Moreover, it needs to be stressed that all Slovak forests are

managed according to rather strict national legislation that is in compliance with all Forest Europe standards [57].

Another problem related to the certified supply chain is linked to the overpriced certified inputs, as almost 49% of respondents referred extra cost paid for such inputs (Table 8). Our findings suggest that overpriced inputs are more problematic for the double certified and FSC certified companies rather than for the PEFC certified companies (Table 9) that may relate to the better availability of PEFC certified raw wood material and a shortage of domestic FSC wood. At the same time, overpriced certified inputs are more problematic for producers of higher value added products and semi-finished products than for traders (Table 10).

The interesting question is whether the involvement of the companies in certification is of any economic benefit. For companies, one of the most important reasons for forest certification is the premise that customers are willing to pay a premium for products originating from well-managed forests [5,12,58]. Our research found out that 93% of the respondents do not receive any premium for sale of their certified products. The similar results were revealed by different authors in many other regions of the world, e.g., [27,49,59], who identified little or no premium associated with certified products. In companies the value of price premium is not able to cover the costs of CoC certification, and therefore the absence of premium is the most important reason why certification does not increase profitability and enhance business performance in the short term.

5. Conclusions

The objective of the research was to study the position and opinions of the CoC certified companies in the Czech Republic and in the Slovak Republic, particularly aimed at the analysis of the understanding of the concept and the role of the certification, expectations of companies following from implementation of CoC certification, difficulties connected to certified supply chain and cost related to purchase and sales of certified wood products. The following conclusions can be drawn:

- According to the survey results, there are no significant differences among certified companies from the Czech and Slovak Republics in the sphere of the company size, certification scheme, and forest products sector;
- in general, except for the below mentioned exceptions, company level factors such as size or sector have no statistically significant influence on respondents' attitudes toward CoC certification in both countries. However, in relation to the understanding of SFM concept and objectives of a particular certification scheme, several differences were identified between the PEFC and FSC certified companies;
- Respondents have a high level of understanding of the CoC certification concept and mainly link it to the issues of legality, tracing the origin source of supply, and promotion of sustainable utilisation of wood. The main benefits are expected from the improvement of external company image, penetration of new markets, and an increase of sales volume. The key problems related to the certified supply chain are connected to the sufficient quantity of certified forest products, low margins, and overpriced certified material inputs;
- In total, 49% of the respondents pay extra money for certified inputs. However, none of them pays more than 20%. There is a statistically significant difference supporting the finding that the respondents have extra cost in case they are involved in the FSC certification system or have double certification, rather than solely PEFC certification;
- Respondents reported none or minimum price premiums for their certified products over non-certified alternatives. However, several differences in the level of price premium paid for certified inputs were identified between the PEFC- and FSC-certified companies as well as the different forest products sectors.

There are several implication resulting from the study findings. In both countries, COC certification is well established, and certification users are appropriately aware of the role of certification

and its significance for their business. Surveyed companies are also able to define the benefits and problems resulting from entering certified forests products market and bear the cost of certification without gaining a compensation in price premium paid for their products. Understanding legality and sustainable utilisation of wood as the main issues provided by certification can be potentially utilised by policy makers to develop public purchasing policies for wood and wood products in both countries as so far there are no such policies in place.

This research examined the understanding and attitudes of certified companies toward CoC certification. As demand for certified wood and products is mainly created by the business-to-business market and not by the end-user market, future research areas could be extended to examine the links and understanding of mutual relations between certified companies and the final consumers of certified products in order to reveal whether the industry strategies are set properly to address the needs of individuals.

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