

Evaluation of chain of custody (COC) cost components in the Malaysian certified plywood mills

Abstract

Chain of custody (COC) certification is often seen as a significant challenge and cost increment activity by mill operations which involve hundreds of wood raw material suppliers as well as continuous processing such as those of plywood mills. This includes the cost of implementation and maintenance of COC certification. This paper discusses COC certification of the Malaysian plywood manufacturing companies. The study was conducted on plywood mills that were certified by the Forest Stewardship Council (FSC), the Malaysian Timber Certification Scheme (MTCS) and/or Program for the Endorsement of Forest Certification (PEFC). The aim of the study was to identify cost components and evaluate the main cost that contributed to the COC certification of plywood mills. A 100% survey through personal interview was conducted on certified plywood mills in Peninsular, Sabah and Sarawak. Only primary data (data obtained from the interview) was used in the study.

The results revealed there are seven basic cost components to attain, implement and maintain COC certification which include: certified raw material, consultancy (plus training), auditing fees charged by certification body, documentation for reporting, recording and preparation of standard operation procedures (SOP), marketing or promotional including the use of logo, printing of brochures and pamphlets for promoting certified product, continuous training and cost for hiring additional staff and/or reward given for successfully getting certified. Amongst the above components, certified raw material cost was identified as the biggest contributor to the average certification cost (41%, valued at USD0.73/m³) of COC certified plywood mill in Peninsular, Sabah and Sarawak.

Keywords: timber certification, forest stewardship

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Abbreviations: TC, timber certification; COC, certification cost; FSC, forest stewardship council; MTCS, Malaysian timber certification scheme; PEFC, program for the endorsement of forest certification; CP, certified plywood

Introduction

Malaysia started a timber certification pilot programme with the Netherlands Timber Trade Association (NTTA) in 1999 targeting sawn timber manufacturers, suppliers and exporters. In 2000, Malaysia developed its own certification standards based on the International Timber Trade Organisation (ITTO) Sustainable Forest Management which is known as Malaysian Timber Certification Council (MTCC) Scheme. Shortly after the MTCC scheme was later changed to the Malaysian Timber Certification Scheme (MTCS). Most of sawn timber manufacturers, suppliers and exporters that were initially registered with the Malaysian-Netherlands Pilot programme have continued with the MTCS programme.

By 2006, MTCS certified products have expanded to include solid wood moulding, furniture and furniture parts, plywood, finger-jointed products, laminated moulding, laminated veneer products, dressed timber (S4S), picture frames, flooring, door and window components. Cumulatively, the total volume of MTCS certified product exported between July 2002 and December 2012 reached 650,320.59m³.³ The Netherlands remain a leading destination for the MTCS certified products. Sawn timber and plywood are the two-major certified product exported. The trends continued in December 2013 where

total cumulative certified volume exported since July 2002 was 814,932.87m³. The Netherlands remains a leading destination for certified products consisting mainly of sawn timber and plywood, accounting for 97,995.15m³ and 47,275.82m³, respectively.⁴ At the end of 2014, the total MTCS/PEFC certified product exported was 168,094m³. Although there was a slight decrease in the total volume of plywood exported, it remained the second largest (26%) of certified product exported after sawn timber (65%) in 2014 (MTCC, 2015). In 2015, the export of certified timber products had increased by 18% to 198,992m³. But, export of certified plywood in 2015, showed further decreasing trend to also 18% that forced plywood to be on the third place of certified products exported after mouldings and sawn timber (MTCC, 2016).

Timber certification has been regarded as a solution for gaining market confidence due to depletion of forests particularly for tropical countries. Basically, timber certification can be divided into two parts, forest management (FM) and chain of custody (COC). While FM certification relates to forest management practices, the main focus of COC certification is on manufacturing and trading activities. Groves et al.,⁵ describes COC as “an unbroken trail of accountability that ensures the physical security of samples, data and records.” It provides the ultimate link between the consumer and the producer.

Cost of timber certification in plywood mills

Mill operations which involve hundreds of wood raw material suppliers as well as continuous processing such as those of plywood mills, often seen COC certification as a significant challenge and cost

increment activity. The International Tropical Timber Organisation⁶ in their Biennial Review and Assessment of the World Timber Situation 2015-2016 reported that the production of Malaysian plywood was 8% less in 2015 at 3.4 million m³ compare to 2014. This is due to reduction in log supply, following Malaysia's policies to achieve sustainable forest management in addition to periodic bad weather conditions and logistical supply problems that restricts log supply to domestic plywood mills. Besides aggressive log purchasing by Indian importers, these had pushed up log prices in the domestic market, thus increase plywood manufacturing costs. The rising labour costs, introduction of 6% commodity and service tax in 2015 and costs associated with chain of custody (COC) certification compliance had also pushed up the plywood production costs.

It was reported that the direct cost (i.e. certification or auditing fees) of chain of custody certification is typically around USD3,000 to USD5,000.⁷ Nevertheless, little is known about the indirect costs, which includes costs of meeting a particular certification standards and marketing of certified product. Apart from auditing cost there is very limited or no information available on other additional costs of certification. Baharudin & Simula⁸ associated this issue with the lack of systematic accounting or a mere ignorance accurate information on the additional costs of certification.

Similar to other management activity, cost involves in timber certification also include direct and indirect costs (Table 1). Direct

costs are to cover the actual certification activities while indirect cost refers to costs of activity required for achieving assessment criteria and for establishing adequate management and information system.⁹ Amongst the cost given in Table 1, only item A2(ii), Information costs of certification-Chain of custody, and B, direct costs, are applicable to plywood mills.

Another study by Nor Suryani et al.,¹⁰ who conducted a study on timber certification in sawmills revealed that there are three types of costs in obtaining COC certification. They are costs in meeting the COC standard requirements (indirect cost), auditing costs (direct cost) and surveillance cost (direct cost). The costs for COC standard requirements costs include training, documentation, storage, packaging, and labelling that contribute about 96% of the total certification costs.

Currently, there is no or little information available with regards to certification cost of certified company for plywood mills. Therefore, the objectives of the study were to identify and evaluate the basic cost components in COC certification of certified plywood mill operations. Further examination on the factors influencing the decision for certification of plywood mills was also carried out. Thus, a survey on the cost components and factors influencing in COC certification was conducted on certified plywood mills in Peninsular, Sabah and Sarawak.

Table 1 Costs related to timber certification

A. Indirect costs	
1.	Incremental costs of forest management to meet certification criteria
	(i) Investment
	(ii) Silviculture
	(iii) Harvesting
	(iv) Other management costs
	a. Conservation areas
2.	Information costs of certification
	(i) Forest management
	a. Resources inventories and surveys (timber, biodiversity, soil, waste, and so on)
	b. Socio economic surveys
	c. Forest management planning
	d. Recording and reporting on activities carried out, production volumes, and so on
	e. Internal inspections and other management costs
	(ii) Chain of custody
	a. Marking of logs and products
	b. Recording and reporting
	c. Additional costs of transportation, storing, processing, and distribution
	d. Internal inspection and other management costs
B. Direct costs	
1.	Application
2.	Inspection (initial)
3.	Annual auditing
4.	Fixed fees (royalties and other)

Source: Simula⁹

Material and methods

The target population of the study was plywood mills within Malaysia which have been certified against the Malaysian Timber Certification Scheme (MTCS) or Programme of the Endorsement of Forest Certification (PEFC) and Forest Stewardship Council (FSC) chain of custody certification standard. At the time of the study, there were 16 Plywood mills certified under both schemes in Malaysia. The Plywood mills were scattered within three regions of Malaysia, Sabah (2 mills), Peninsular (5 mills) and Sarawak (9 mills). Plywood mills which have been certified for at least one year were selected from the MTCS/PEFC and FSC chain of custody list. Other conditions for the

study include the validity of the COC certificate, where it must still valid, and not under suspension. Based on the criteria, only 16 mills were qualified for the study.

Prior to the interview, a questionnaire was developed. The content of the questionnaire was submitted to an expert panel for validation and confirmation to ensure the questionnaire was sufficient in measuring the parameters set for the study and valid for its intended purpose.¹ In addition, it is to ensure the topic and variables presented in the questionnaire are relevant to the respondent and the confidentiality issue is respected. Some of the information collected in the survey is presented in Table 2.

Table 2 Information collected in the questionnaire through personal interview during the survey

Section	Category	Variables
	Demographic and certification information.	These include company's background, workers, type of certification scheme employed, certification duration, certification status either valid or not and type of product certified.
	Production information, before and after certification.	Production capacity, overhead cost before and after certification, total annual production before and after certification, and total production volume of certified product and non-certified product.
	Raw material information, before and after certification.	Type of raw material purchased, annual volume, source and price before and after certification.
	Sales and marketing of product, before and after certification.	Annual sales volume, product price before and after certification and market destination for certified product.
	Other costs involved.	These include raw material and product transportation cost. Training, promotion and cost for any structural changes such as installing new equipment after certification.
	Cost for adopting, implementing and maintaining certification	Consultancy service including documentation preparation, assessment, surveillance and renewal fees.

A pilot study to confirm the reliability of the questionnaire was conducted by testing it on certified plywood mills (which certification period is less than one year). Based on nature of COC system, the plywood mills that were selected for the pilot study are expected to have similar criteria and behaviour with those of actual samples. Thus, the number of different variables to be used and decision whether a particular variable can be measured with one or more questions can be determined. For example, if one variable has ten or fifteen possible explanatory variables, the choice can be made whether to take all fifteen and use a few questions on each one only or to take few explanatory variables to measure them comprehensively.² In other word, since the criteria and behaviour of the pilot study sample is expected to be closed to the actual sample, it is assumed that the questionnaire will sufficiently provide the required data.

Personal interview was chosen as data gathering-technique since it gives flexibility in terms of observing the subject and situation, clarifying questions and their meaning if the questionnaires were not understood, and also opportunity to ask for additional information should the response was found irrelevant. It is estimated that at least 90% or more response rate was received through personal interview.¹

Out of 16 qualified plywood mills, 13 mills, at 81% responding rate, had agreed to participate in the study. Due to small number of sample, a 100% survey through personal interview was carried out. Only primary data was used in the study. Region or location of the certified plywood mill, type of certification scheme (MTCS/PEFC and FSC) and, interaction between region and certification scheme are among the factors studied. A descriptive statistics analysis was

applied in reporting results on data related to certified product production cost. SPSS version 17 was used to carry out the ANOVA at significance level $\alpha=0.05$. Data on cost components obtained was calculated using the below equations.

Equation 1;

$$\sum_{(n=1)}^6 X = \frac{x_1 + x_2 + y_1 + \dots + x_n}{y_1 + y_2 + y_3 + \dots + y_n}$$

where;

X = Average cost component, MYR/m³

n = Certified plywood mill that produced certified product

x_n = Average cost for each component within certification period for nth plywood mill, MYR

y_n = Average volume of certified product within certification period for nth plywood mill, m³

Equation 2;

$$\sum_{(n=1)}^6 X = \frac{x_1 + x_2 + y_1 + \dots + x_n}{y_1 + y_2 + y_3 + \dots + y_n}$$

where;

X = Average cost component, MYR/m³

n= Number of plywood mills that are certified to FSC

x_{ij} = Average cost for each component within certification period nthplywood mill, MYR

y_{ij} = Average volume of certified product within certification period nthplywood mill,m³

Equation 3;

$$\sum_{(n=1)}^6 X = \frac{x_{1j}+x_{2j}+y_{1j} +...+x_{nj}}{y_{1j}+y_{2j}+y_{3j}+ ...+y_{nj}}$$

where;

X = Average cost component, MYR/m³

n = Number of plywood mills that certified to PEFC

x_{ij} = Average cost for each component within certification period nthplywood mill, MYR

y_{ij} = Average volume of certified product within certification period nthplywood mill, m³

Statistical analysis for the average certification costs was done on the mills with different types of certification scheme. The ANOVA test was conducted on three main variables which are type of certification

(MTCS/PEFC and FSC), region (either in west or east Malaysia) and interaction between types of certification and regions.

Results and discussion

The study revealed that there are three categories of certified companies: (1) Certified to both MTCS/PEFC and FSC, (2) Certified to FSC only and (3) Certified to MTCS/PEFC only. Two plywood mills were certified to both MTCS/PEFC and FSC schemes were located in Peninsular Malaysia. Three mills that are certified to FSC only which are located in Sabah and Sarawak, while five MTCS/PEFC certified mills are located in Peninsular and three in Sabah and Sarawak.

COC certification cost components of certified plywood mills

The ANOVA (Table 3) revealed there is no significant (P≤0.57) interaction between schemes and regions suggesting that both factors do not depend on each other and has different effects on the average cost of certification. Region appears to be not important than scheme type as indicated by the level of significance at P≤0.74. This implies, irrespective of the mill location, Peninsular, Sabah or Sarawak, the average certification cost of certified plywood mills is the same which is only influence by the type of scheme they have chosen.

Table 3 Summary of ANOVA for the effects of schemes (MTCS/PEFC and FSC) and regions (Peninsular, Sabah and Sarawak) on certification average cost

Dependent variable: Avcost					
	Type III Sum of Squares	df	Mean Square	F	Significance ¹ p≤
Corrected Model	8367741.58	3	2789247.19	2.00	0.19 ^{ns}
Intercept	20727597.24	1	20727597.24	14.98	0.00 ^{***}
SCHEME (S)	5524789.56	1	5524789.56	3.97	0.08 [*]
REGION (R)	167654.32	1	167654.32	0.12	0.74 ^{ns}
S*R	488308.35	1	488308.35	0.35	0.57 ^{ns}
Error	11139386.75	8	1392423.34		
Total	50572702.76	12			
Corrected Total	19507128.33	11			

¹**Significance level; NS, not significant at p>0.1; *significant at p≤0.1; ***significant at p≤0.01

The study also revealed that there are seven fundamental cost components involved in the certification activities which can be generally categorised as (1) cost to attain COC, and (2) cost to implement and maintain COC. The seven cost components are;

1. Certified raw material cost including certified logs and veneer,
2. Consultancy including training cost,
3. Auditing fees charged by certification body,
4. Documentation cost for reporting, labelling and preparation of standard operation procedures (SOP),
5. Marketing or promotional cost which include use of PEFC logo on the product, website, brochures and pamphlets for promoting certified product
6. Continuous training cost and cost for hiring additional staff (where in addition to his or her work, he or she is also responsible for managing certification),

7. Reward given for successfully obtain certification.

As shown in Table 4, cost for certified raw material is the highest with an average cost of USD0.73/m³. It contributed about 41.3% of total average cost for certified product production. This is followed by auditing cost, USD0.56/m³ or 31.4%. The auditing cost includes professional fees and expenses incurred during the main assessment, annual surveillance and renewal fees after three or five years of COC certification cycle. Based on the interview, auditing fee was charged differently among certification bodies depending on the number of auditors and days required for each company. The fee varies from USD100 to USD2000 with an average of USD500 per audit per company.¹¹ There are two audit costs charged by certification body. First, the initial cost which is an assessment fees, and second, surveillance fees which would be charged every twelve months. The initial fees will be re-occurred after three or five years as re-assessment fees when the company decides to continue its certification programme.

Based on the 13 mills surveyed, the average cost for marketing and promoting of certified products was USD0.17/m³. It is slightly higher than consultancy cost which averaged at USD0.16/m³. Some services also include COC training in the package since it was part of the COC standard requirements that companies were required to provide training for which costs averaged at USD0.07/m³.

The rest of the costs include documentation and hiring a new staff and/or reward given to employee for successfully obtaining COC certification, was about USD0.05/m³ and USD0.02/m³, respectively. Descriptive statistical analysis conducted on the seven COC fundamental cost components between the two schemes, MTCS/PEFC and FSC show that the total average cost of COC certification by using MTCS/PEFC is higher than that FSC by 15% (Table 4). It was also found that the average cost for MTCS/PEFC certified raw material was about USD0.85/m³ which is much higher than that of FSC, USD0.43/m³.

The much higher MTCS/PEFC certified raw material can be associated to the type of species requires by the plywood mills. Demand for specific species such as Mixed Light Hardwood (MLHW) may lead to such result. For instance, during monsoon season where less number of logs production takes place, the price for MTCS certified logs may fluctuate substantially. In 2012, MTIB indicated that a domestic price for MLHW was fluctuated between USD476 to USD627 (24%) and, USD473 to USD508 (7%) in 2013.^{12,13} In April 2017, MLHW were traded at USD512 per tonne, an increase of 10.5% as compared to the previous month.¹⁴ Whereas for FSC certified logs, most of it were came from plantation forest where supply is almost

consistent throughout the year that lead to almost stable price. The FSC certified raw material was normally imported from other country such as New Zealand and Australia where company sometimes face limited supply and increase in freight cost.¹⁵ These two factors may influence in price fluctuation for FSC certified raw material. Morris & Dunne (2004) in their study found that FSC certified timber price was fluctuated between 6% to 40% more than non-certified timber. A one-way ANOVA conducted between each cost components as shown in Table 5 confirms the above findings. Results shows that amongst the cost components, certified raw material cost was found to be statistically significant at $P \leq 0.05$.¹⁶⁻²⁰

On the other hand, average cost of auditing fees for FSC scheme was 39% higher (USD0.57/m³) compared to that of MTCS/PEFC (USD0.35/m³). This is due to the fact that some portions of the auditing fees for FSC scheme was billed in US dollar where currency exchange plays a role. However, FSC scheme shows lower in average cost for documentation preparation (USD0.01/m³) compared to MTCS/PEFC (USD0.09/m³) because the mill either already certified to MTCS/PEFC scheme or ISO9001 certification. In order for the company to be FSC certified, only parts of the documentation need to be revised or updated. Thus, it does not require a preparation of whole new document to meet the COC requirements. On the continuous training, MTCS/PEFC show no cost incurred (USD0.00/m³) since most of all surveyed mills implement "on the job" training which occurs on a daily basis. Whilst, for FSC certification, the average cost for continuous training was USD0.07/m³ where training on the revised requirements of the COC standard was taken into account by the FSC certified mills.²¹⁻²⁹

Table 4 Cost components of chain of custody (COC) that constituted to average certification cost of certified plywood mill in Malaysia, and comparison between schemes (MTCS/PEFC and FSC)

No.	Cost Components	Average ¹ cost for both schemes			Average cost by scheme			
		*MYR/m ³ (N=6)	*USD/m ³ (N=6)	Percentage of cost (%)	FSC ² (n=5)		MTCS ³ (n=3)	
					*MYR/m ³	USD/m ³	*MYR/m ³	USD/m ³
1	Raw material	2.08	0.73	41.3	1.24	0.43	2.44	0.85
2	Consultancy (and training)	0.47	0.16	9.4	0.45	0.16	0.41	0.14
3	Auditing fees	1.59	0.57	31.4	1.64	0.57	0.99	0.35
4	Documentation	0.14	0.05	2.8	0.04	0.01	0.27	0.09
5	Marketing and promotional	0.49	0.17	9.7	0.35	0.12	0.38	0.13
6	Continuous training	0.21	0.07	4.2	0.21	0.07	0.00	0.00
7	Additional staff/reward	0.06	0.02	1.2	0.06	0.02	0.06	0.02
Total		5.04	1.77	100	4.00	1.38	4.54	1.63

*MYR1=USD0.35, N=13, ¹Equation 1, ²Equation 2, ³Equation 3

Table 5 Summary on analysis of variance (ANOVA) for the effects between each chain of custody (COC) cost components of certified plywood mill in Malaysia

Category of cost	Mean	F value	P value
Raw material cost	13451706.88 ^a	3.257	0.010**
Consultancy (and training)	8131.67 ^b		
Auditing fees	31141.00 ^b		
Documentation cost	2466.67 ^b		
Marketing and promotional	8059.71 ^b		
Continuous training	11064.87 ^b		
Additional staff/reward	1250.00 ^b		

**significant at $p \leq 0.05$, *not significant at $p \leq 0.1$, not significant at $p > 0.1$

Conclusion

The study revealed seven basic cost components of COC certified plywood mill which include raw material, consultancy and training, auditing fees, documentation, marketing and promotional, continuous training and, hiring a new staff and/or rewards. Raw material cost was found to be the highest contributor to the cost of COC certified plywood mill operations at 41% (USD0.73/m³) out of the total certification cost. This cost has influenced the total average cost of MTCS/PEFC scheme (USD1.63/m³) by 15% in comparison to FSC scheme (USD1.38/m³). The least cost for certification in plywood mills is the hiring of a new staff and/or reward given to employee for successfully obtained certification which accounted for only USD0.05/m³. All the seven cost components identified in this study appear to be the key factors influencing the overall certification costs of plywood mill.

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Conflict of interest

The author declares there are no conflicts of interest.

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