AcademicPres

Available online at www.notulaebotanicae.ro

Print ISSN 0255-965X; Electronic 1842-4309

Not Bot Horti Agrobo, 2011, 39(2):305-311

Notulae Botanicae Horti Agrobotanici Cluj-Napoca

Sustainability of the Rubberwood Sector in Malaysia

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Abstract

Hevea brasiliensis (popularly known as rubber tree) was introduced to Malaya almost a century ago. The wood from the tree has been traditionally regarded as a waste, but since the 1980s' it has found widespread utilization in the wood industry. The total export value of rubberwood products had grown by 39.44% in 2009 compared to 2000 [Malaysian Ringgit (RM) 5100.4 million]. However, the Malaysian export of rubberwood sawn timber declined since 1990, after the imposition of sawn timber export levy. On the other hand, the biggest export proportion of rubberwood products is represented by furniture. Rubberwood furniture accounted for 80% of the total export value of wooden furniture. Meanwhile, the contribution of panel products, such as MDF and particleboard is also substantial. Rubberwood is referred as an environmental friendly material with a low price, but issues related to its sustainable supply are becoming a major concern nowadays. The total area of rubber plantation has been steadily declining over the years as planters claimed less profit and shifted to oil palm cultivation. In this context, unless the profitability of rubber growers is ensured by increasing the net value of the wood resource, the future sustainability of rubberwood in Malaysia will remain debatable.

Keywords: export value, Malaysia, productions, rubber plantation, rubberwood, sustainable

Introduction to Rubberwood

Hevea brasiliensis or popularly known as rubber tree is indigenous to the Amazon forest in Brazil. The plantation of rubber tree in Malaya (now known as Malaysia) was introduced by Sir Henry Wickham. The rubber seeds were brought to Kew Garden, United Kingdom from Brazil in 1876. Some of the seedlings were then transported to Singapore Botanical Garden through Ceylon (now known as Sri Lanka) in the same year but it failed to germinate. The rubber seeds were transported again a year later to Singapore Botanical Garden. Nine of rubber plants which were successfully germinated in Botanical Garden were shipped to Malaya and the initial plantation began in Kuala Kangsar in 1879 (Ratnasingam and Scholz, 2009).

A mature rubber tree is usually in the range of 20 to 30 m tall, and the diameter can reach up to 30 cm (Balsiger *et al.*, 2000). The trunk is generally free of branches up to the height of 3 to 10 m (Lim *et al.*, 2003). Rubberwood (also known as Malaysian Oak) has a pleasant appearance in colour, which is white to pale cream, and sometimes include a pinkish tinge. However, the colour changes to light straw or light brown, due to weathering (Ratnasingam and Scholz, 2009). Rubberwood is less durable, owing to no differences between the sapwood and heartwood and the high starch content in the wood (Lim *et al.*, 2003).

Rubber trees are now widely planted in 20 countries around the world for the production of latex (Teoh *et al.*, 2011). According to Shigematsu *et al.* (2011), more than 80% of total rubber plantation areas are in Asia, with Malaysia, Indonesia and Thailand covering almost 70% of the rubber cultivation. Malaysia was the largest producer of rubber in the world until the late of 1980's (Balsiger *et al.*, 2000). Indonesia then took over as the biggest rubber cultivator in the world followed by Thailand. To date, Malaysia remains the 3rd most important country in the world in rubber plantations (Shigematsu *et al.*, 2011).

However, in Malaysia the rubber plantation which was cultivated by estate owners and smallholdings has been decreasing from 1990 to 2009 (Tab. 1). The total rubber plantation area in 1990 was 1836.7 hectares and become 32.24% smaller in 2009 (Tab. 1). The plantation areas from smallholders, namely Rubber Industry Smallholder Development Authority (RISDA), Federal Land Development Authority (FELDA) and Federal Land Consolidation and Rehabilitation Authority (FELCRA) still showed better performance in rubber cultivation, although it has been declining every year. It can be noticed from this table that very few estates owners maintained their rubber cultivations. The key problem was mainly the low profit, so the estate owners converted their plantations to the more profitable commodities particularly oil palm plantations (Teoh *et al.*, 2011).

Tab. 1. Rubber Plantation Areas (Hectares)

Year	Estates	Small holdings	Total ('000 ha)
1990	348.7	1488.0	1836.7
1992	314.1	1478.2	1792.3
1994	275.0	1462.1	1737.1
1996	223.9	1420.4	1644.3
1998	179.9	1363.7	1543.6
2000	123.8	1306.9	1430.7
2001	95.5	1293.8	1389.3
2002	84.4	1264.0	1348.4
2003	78.5	1247.1	1325.6
2004	64.4	1214.4	1278.8
2005	58.7	1212.6	1271.3
2006	54.2	1209.4	1263.6
2007	52.7	1194.7	1247.4
2008	50.9	1196.1	1247.0
2009	48.5	1196.1	1244.6

Source: Department of Statistics (2010a)

Production of Rubberwood

Rubberwood emerged as an alternative source of timber for the wood industry, when restriction in logging activities was implemented by the Malaysian government. The commercial production of rubberwood in the wood based industry, particularly sawn timber, furniture and wood based panel began in the 1980s. In fact, the vast potential of rubberwood in sawn timber and other wood products application has been evaluated since 1950s. Perhaps, the low durability of rubberwood and the abundance of tropical logs available at low cost from the natural forests hindered rubberwood from entering into the wood industry. Therefore, commendations should go to the Forest Research Institute of Malaysia (FRIM) for their efforts in evaluating the potential of rubberwood for the wood industry (Hong, 1994).

Fig. 1 depicts the production of rubberwood logs based on the replanting rate. The production of rubberwood

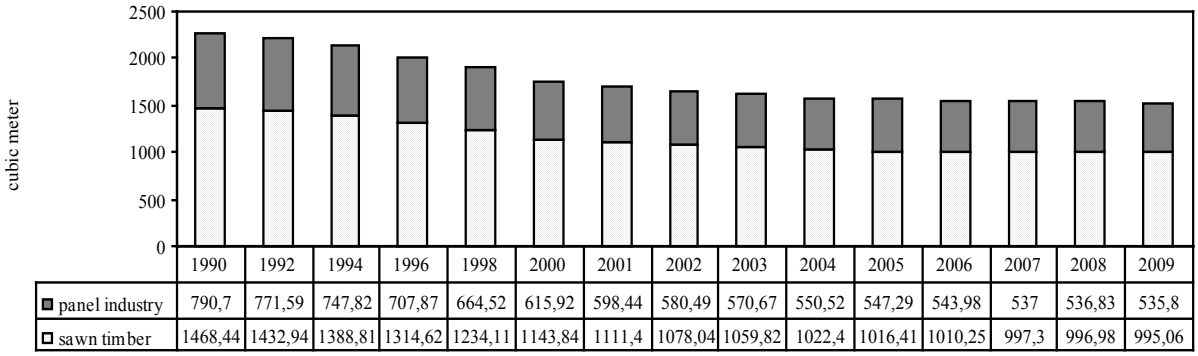


Fig. 1. The rubberwood log production based on replanting rate

Tab. 2. The export value of rubberwood sub-sectors (RM million)

Products	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Sawn timber	0.0	87.3	91.6	60.3	137.1	386.2	69.8	55.2	27.1	34.3
Furniture	3535.2	3022.9	3339.4	3735.8	4350.8	4665.3	5127.4	5331.9	5536.9	4998.6
Mouldings	313.2	224.3	228.8	208.1	646.5	698.1	796.3	915.3	744.1	686.4
MDF	823.0	873.3	866.8	978.6	1020.9	1106.7	1144.9	1180.9	1156.1	1033.4
Chipboard	160.0	134.0	115.7	102.2	195.8	266.7	266.9	364.9	391.7	250.1
Builders, Carpentry and Joinery	269.0	243.4	261.0	281.3	109.5	116.1	102.7	101.8	100.5	98.8
Wooden Frames	-	-	-	-	11.6	12.7	12.2	13.2	12.4	10.5
Total	5100.4	4585.2	4903.3	5366.3	6472.2	7251.8	7520.2	7963.2	7968.8	7112.1

To date, there have been debates about the consistent supply of rubberwood to the booming wood industry in Malaysia due to the declining rubber plantations. Therefore, in this paper, the first section will focus on the sustainability in rubberwood productions and the utilization of rubberwood products. The following section will be on the challenges of rubber plantations for continuous supply of the logs to the wood industry, and the final section of the paper will highlight the rubberwood market perception and certification issues.

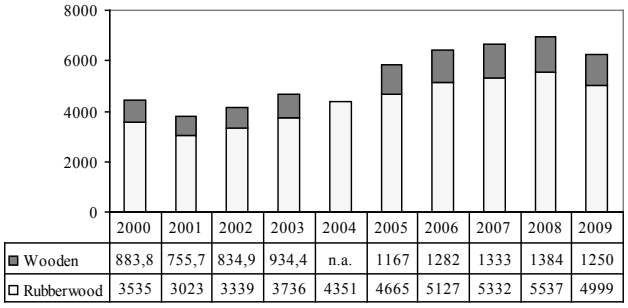
logs showed a downward trend from 1990 to 2009. The matter that should be of concern is if the supply of rubberwood logs can meet the high demand from the wood based industries particularly for industries that have been utilizing rubberwood as the main raw material. Further, the numbers of mills consuming rubberwood have been increasing every year. This does not include the many unregistered rubberwood plants in Malaysia.

The overall total export value (RM million) of rubberwood products which consist of sawntimber, mould-

ings, furniture, medium density fibreboard, chipboard, builders, joinery and carpentry and wooden frames have been steadily growing over the years except for 2009, when there was slightly declining of RM 856.7 million (Tab. 2). The high proportion of export of rubberwood products was due to logging control on the natural forest, and rubberwood is still the most widespread type of forest plantation in Malaysia (Shigematsu *et al.*, 2011).

The production of rubberwood in the wood industry began with sawn timber processing, mainly for export. India and Sri Lanka have a long history in using rubberwood as timber sources, due to the scarcity of logs. The turning point here was the fact that Malaysia was the first country to be successful in the export of rubberwood sawn timber in the late 1970s (Hong, 1994). The export of sawn timber from Peninsular Malaysia was RM140,000 in 1979 and increased to RM98.7 million in 1989 (Hong and Sim, 1994). The export of rubberwood sawn timber declined after the imposition of export levy in June 1990, followed by the export quota on sawn timber. The purpose was to ensure adequate supply of rubberwood sawntimber in the country, and also to encourage the upstream manufacturers to invest into the value added products industries (Hong, 1995). The current export value of rubberwood sawn timber from 2000-2009 was the lowest compared to the other rubberwood products (Tab. 2).

The downward trend in the export of rubberwood sawn timber marred the tremendous contribution in the export value of rubberwood furniture (Tab. 2). It should be emphasized that 80% of total export value of wooden furniture to the world markets was from rubberwood furniture (Fig. 2).



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Wooden	883,8	755,7	834,9	934,4	n.a.	1167	1282	1333	1384	1250
Rubberwood	3535	3023	3339	3736	4351	4665	5127	5332	5537	4999

Fig. 2. The total export of rubberwood furniture and wooden furniture. Source of total export wooden furniture: Malaysian Timber Council (2011)

Tab. 3. Comparative of physical and mechanical properties of rubberwood with selected commercial timbers

Species	Rubberwood	Dark Red Meranti	Sepetir	Nyatoh	Ramin
Moisture content (%)	17.2	16.7	16.6	17.5	18.6
Density (kg/m^3)	640	610	690	675	675
Side hardness	4320	3650	5210	5430	4580
Shear parallel to grain	11.0	8.7	13.6	11.0	8.5

Source: Ratnasingam and Scholz (2009)

The success of rubberwood furniture in world market is due to its good machining properties, acceptable durability, pleasant appearance and ease in finishing (Anonymous, 1993). In addition, the physical and mechanical properties of rubberwood are almost comparable with the other commercial timbers (Tab. 3) such as Dark Red Meranti (*Shorea platyclados*), Sepetir (*Sindora coriacea*), Nyatoh (*Palaquium gutta*) and Ramin (*Gonystylus bancanus*) (Mohd Shukari, 1994; Balsiger *et al.*, 2000).

In recent year, the furniture industry has been faced with the scarcity of rubber logs. On the contrary, the export value of rubberwood furniture was still increasing throughout the year. A survey presented by the Forest Research Institute of Malaysia (FRIM) explained that furniture manufacturers have taken earlier steps to sustain their productions due to the foreseen scarcity in rubberwood logs. Some manufacturers substituted rubberwood to other timber with similar properties, namely Keruing, Kapur, Meranti and Kempas. Meanwhile, some furniture manufacturers opted to import rubberwood timber mainly from Thailand to secure their productions (Ahmad Fauze *et al.*, 2010).

Rubberwood was also suitable for medium density fibreboard (MDF) production due to its homogenous structure, dimensional stability and uniform textures, which can be machined and routed to high quality, similar to solid wood finishing and overlaying (Anonymous, 1998). The acceptable properties of medium density fibreboard have contributed to economic growth, as medium density fibreboard (MDF) was the second largest in export value after rubberwood furniture (Tab. 2).

A study conducted by Mohd Shahwahid and Abdul Rahim (2009) claimed that the production of medium density fibreboard from rubberwood is large. There were high competition and price war on rubberwood raw materials among mills. The situation was worse when independent suppliers or agents did not sign any long term contracts for rubberwood supply, but they sold to the highest bidder. As there is no assurance for sufficient rubberwood supply, MDF plants utilized mixed wood materials such as 40% Acacia, 20% mixed hardwood logs and slabs and 40% rubber logs for productions, and still, it was not profitable. The cost of mixed hardwood logs is expensive and more adhesive was needed for production, but the price of the final product was almost the same as rubberwood MDF. The consequence from this situation brought some MDF plants to intensify research and development activities to seek alternative agricultural residues, such as oil palm trunk, fronds and empty fruit bunch.

The rubberwood products of chipboard, mouldings, builders, carpentry and joinery (BCJ) and wooden frames have also been contributing to the country's economy. The

export value of these products, except builders, carpentry and joinery (BCJ) to the major markets has been fluctuated from 2000 to 2009. Meanwhile, the export value of builders, carpentry and joinery has been decreasing from RM 269 million in 2000 to 63.27% in 2009 (Tab. 2). The export of rubberwood wooden frames began in 2004. Although the export value of these rubberwood products is in a small scale, the scarcity of the logs shouldn't be a hindrance in developing the new value-added industries.

Utilization of Rubberwood

The abundance of rubber trees in the country has contributed to economic growth, due to the production and export of latex. The rotation for rubberwood is 25-30 years, as after this age the latex production becomes uneconomical. The trees which were considered waste, were left in the field and burnt away. Apart from that, the felled trees were traditionally used as fuelwood in drying and smoking sheet-rubber, tobacco curing and brick making industry (Balsiger *et al.*, 2000). Rubberwood was also used as charcoal in steel industry (Ratnasingam and Scholz, 2009).

The utilization of rubberwood in the wood industry is large. Rubberwood sawntimber and panel products basically were used in furniture industry. Medium density fibreboard as well as particleboard is extensively used in the manufacture of end-use products, such as cabinets, mouldings, flooring, wall panelling, window frames and door frames (Rajan, 2000). Cement bonded particleboard have found applications in the construction sector, as it appear to be highly durable, good insulating and resistant to fire, weather, insect and fungi (Anonymous, 1998). Rubberwood veneer for core parts is also produced (Anonymous, 1993), whilst the utilisation of rubberwood for face veneer is only at a small extent due to its latex residues (Anonymous, 1998).

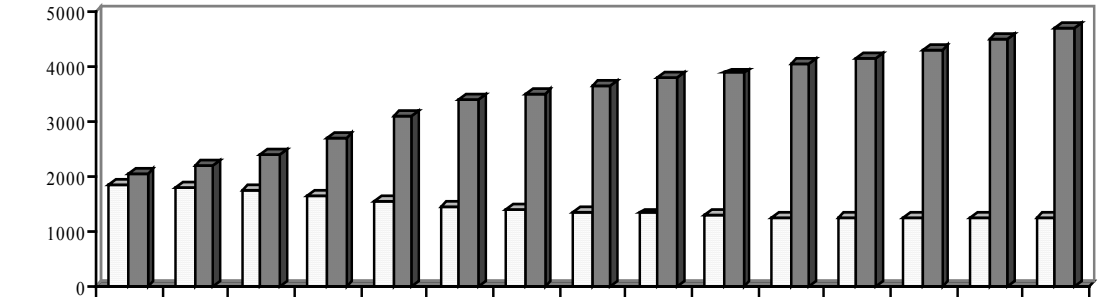
Rubberwood is used in the mouldings and joinery production, such as parquet flooring, strip flooring, staircase components and house-hold items. Small size and short lengths of rubberwood residues are glued together, which results in longer pieces, and better strength of joint (Rajan, 2000). Moreover, the branch and the stem of rubber trees are also suitable for the production of writing and printing paper (Anonymous, 1993). It is important to mention here that rubberwood has other non-timber uses as well, which is as a medium for mushroom growing (Anonymous, 1993) and for honey production (Ratnasingam and Scholz, 2009).

Constraints in Rubber Plantations

It is really surprising that there are constraints in the rubber plantations in Malaysia when the export of natural rubber, rubber-based products and rubber by-products has been extremely remarkable throughout the years and the demand for rubberwood products in the world market have contributed to the economic growth.

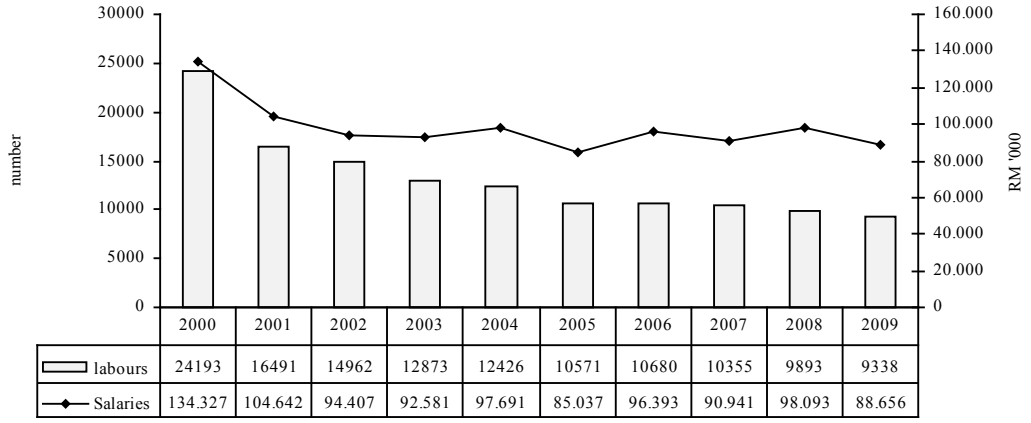
The main concern that should be highlighted here is the current total rubber plantation area. As mentioned earlier, the total rubber plantation area in Malaysia has declined throughout the years. Rubber planters, especially the estate owners converted their land to more profitable crops, mainly oil palm. Further, the large plantation groups in Malaysia, which consist of Guthrie, Golden Hope and KL Kepong are slowly converting the land to oil palm. The total plantation area of oil palm has been increasing throughout the years (Fig. 3). The planters claimed less profit in the rubber industry, due to low latex price in world market (Ratnasingam, 2000).

The next point that should be examined is the steadily declining of labour in the rubber plantations. The total number of workers in rubber plantations in 2000 was 24,193, and showed reduction of 61.40% in 2009 (Fig. 4). The possibility of lesser labourers in rubber plantations every year could be due to the low salaries, which brought to poverty. Chang and Ong (2000) mentioned that a rubber tapper needs to tap at least 30-40kg of latex in order to earn RM 25-RM 30 per day. Further, the annual total salary obtained by the estate worker declined by 34% from 2000 to 2009.



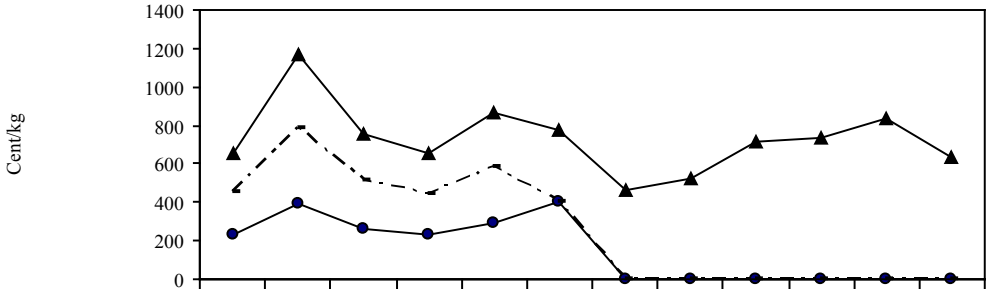
	1990	1992	1994	1996	1998	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
rubber	1836,7	1792,3	1737,1	1644,3	1543,6	1430,7	1389,3	1348,4	1325,6	1278,8	1271,3	1263,6	1247,4	1247	1244,6
oil palm	2029,5	2197,7	2412	2692,3	3078,1	3376,7	3499	3670,2	3802	3875,3	4051,4	4165,2	4304,9	4488	4691,2

Fig. 3. Total Plantation Area (hectares) of Rubber and Oil Palm from 1990-2009. Source of Oil Palm Plantations: Malaysian Palm Oil Board (2010)



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
labours	24193	16491	14962	12873	12426	10571	10680	10355	9893	9338
Salaries	134.327	104.642	94.407	92.581	97.691	85.037	96.393	90.941	98.093	88.656

Fig. 4. Number of employees in rubber estate plantations and total salaries from 2000-2009. Source: Department of Statistics (2010b)



	1990	1995	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
SMR 20	204,64	382,6	242,52	205,56	285,98	378,97	461,93	523,07	710,92	734,06	831,37	637,36
RSS 3	220,62	388,49	252,16	218,42	287,8	-	-	-	-	-	-	-
RSS 1	233,37	393,61	261,93	227,3	293,26	400,64	-	-	-	-	-	-

Fig. 5. The annual average F.O.B price of natural rubber (Cent/Kg). Source: Department of Statistics (2011). Note: Price for RSS 3 and RSS 1 have been stopped from 2003 and 2004 respectively. RSS-Ribbed Smoked Sheets grade 1 and 3; SMR20-Standard Malaysian Rubber-medium grade produced from field coagulation but may contain some RSS

The other reason for the decrease in the workforce in the rubber plantations was the preferences for working in a cleaner environment and the mismatch between the education levels and job opportunities (Aziz and Yatimah, 2007).

The next factor that should be considered is the latex prices. Most rubber planters shifted to oil palm cultivation when the latex price decreased in 1990s. In 2002, the annual average of natural rubber price went up to RM 2.93/kg, RM 2.87/kg and RM 2.85/kg for RSS 1, RSS 3 and SMR 20 respectively (Fig. 5). The SMR 20 latex price has shown an upward trend each year. The delay in the replanting of rubber occurred as a consequence of the high price of latex, although the yield was lower. The curb in felling the rubber trees has resulted in the shortage of rubberwood logs supply to the wood industries (Mohd Shahwahid and Abdul Rahim, 2009).

Tab. 4. The Domestic Price of Light Hardwood Logs in Peninsular Malaysia

Species	Logs (RM per m^3)
Dark red meranti	1200
Red meranti	1160
Yellow meranti	1150
White meranti	1080
Nyatoh	1180
Sepetir	900
Ramin	1750
Rubberwood	135

Source: Malaysian Timber Industry Board (2011)

Market Perceptions

Although rubberwood products particularly rubberwood furniture is well known and established, the perception of this products in the market among the consumers is not well explored yet. Generally, consumers have different market perceptions on different wood species. A survey carried out by Ratnasingam *et al.* (2007) to investigate the market perceptions of rubberwood furniture among the customers, found that rubberwood was not categorized as a premier furniture making material, compared to the other wood species used in furniture industry.

It appeared from this census that the success of rubberwood furniture in the market is its low price, as shown

in Tab. 4. The possible explanation for the low price of rubberwood log was due to the status of rubberwood as a residue and the low recovery rate in the sawing of the logs (Anonymous, 2000).

However, rubberwood which is a by-product of rubber plantations is known as environmental friendly. Rubber is cultivated in plantations, and the wood is available in renewable plantations at 25-30 year cycles. Thus, rubberwood products are easily acceptable both for the local and international markets, especially in countries where the 'green movement' is very strong (Hong, 1994).

Certification of Rubberwood

The certification of timber from natural forest is essential to ensure the sustainable supply of forest resources, preserve the nature and to enhance the economy. The two international organizations which actively involved in the certification process consist of Program for the Endorsement of Forest Certification (PEFC) and Forest Stewards Council (FSC). Malaysia has also established Malaysian Timber Certification Council (MTCC) in 2001 to be in charge of forest certification. Forest Management Certification (FMC) and Chain of Custody (CoC) certification have also been managed by the MTCC (Attah *et al.*, 2009; Azharizan *et al.*, 2011).

The awareness of certification of logs from forest plantations, such as rubberwood, among the wood products manufacturers is limited. A survey carried out by Ratnasingam *et al.* (2008) showed that there is a lack of understanding in the application of CoC in rubberwood plantations. The manufacturers presumed certification is only required for timber from natural forest. Further, manufacturers assumed that certification of rubberwood are no longer important, after the adoption of ISO 9001 quality system.

Conclusions

Rubberwood, a sustainable resource has been one of the driving forces for the success of the wood industry in Malaysia. The easy availability of rubberwood logs has been an advantage to the wood industry, particularly after the restriction of logging in the natural forest was enforced. However, in recent years, issues regarding the scarcity of rubberwood supply have been a growing concern due to the declining rubber plantation area. Further, the conversion of rubber areas to oil palm plantations is also adding further pressure to the supply of the material in the future. Although rubberwood is regarded a green, renewable wood material, the lack of certification and its apparent lower value in the market may emerge as major constraints to the sustainable supply of rubberwood in the future.

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