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ENHANCING KEY ELEMENTS OF THE VALUE CHAIN FOR PLANTATION GROWN WOOD IN LAO PDR

Global Markets for Plantation Teak; Implications for Growers in Lao PDR

Stephen Midgley, Khamphone Mounlamai , Aidan Flanagan and Kaisone Phengsopha

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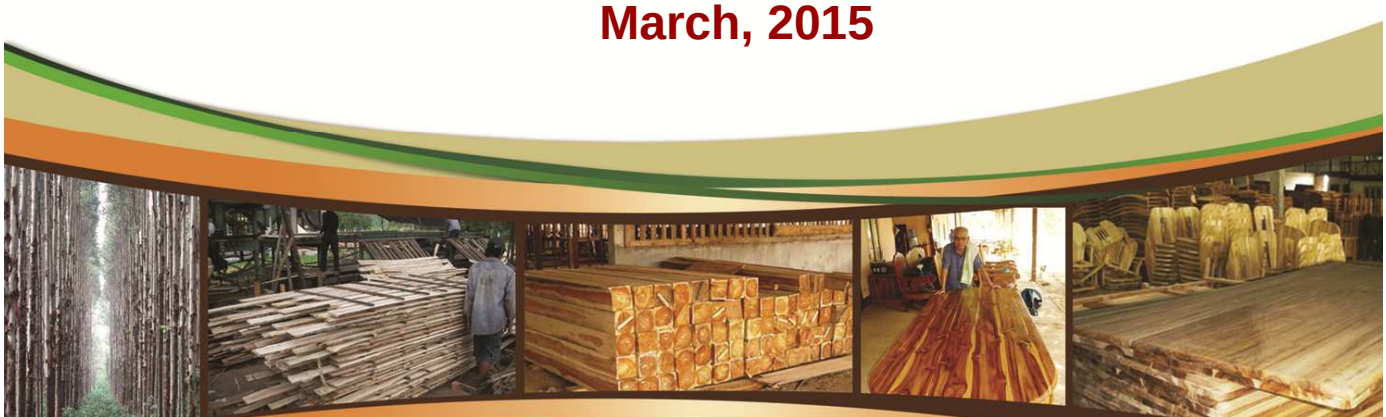

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GLOBAL MARKETS FOR PLANTATION TEAK; IMPLICATIONS FOR GROWERS IN LAO PDR

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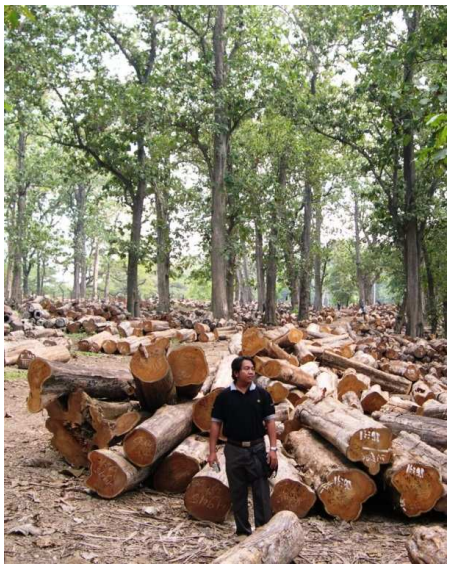

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Abstract.

Teak (*Tectona grandis* L. f.) is one of the most highly-valued tropical timbers and among the world's most popular plantation species. There are only four countries in the world (Myanmar, Lao PDR, Thailand, and India that have indigenous teak forests. Global areas of planted teak have increased to an estimated 6.8M ha with a theoretical capacity to produce over 30M m^3 of wood annually. Whilst only 2.5 M m^3 of this annual plantation production is harvested and 1.2 M m^3 traded internationally, this is expected to increase as plantations mature and logs reach a commercial size; often as small sized logs from thinnings and early clearings as growers seek early economic returns.

Whilst the markets for mature teak from both native forests and older plantations are well established, markets for small-sized, fast-grown teak logs are still emerging. An understanding of the magnitude, location and requirements of the global markets for these smaller plantation-grown logs is essential when considering policy options for governments encouraging plantation investment and for growers as they consider management and market options. Information about trade flows is fundamental to understanding the suite of external factors influencing the global trade for plantation teak and assessing their impacts. This understanding raises basic questions such as "How much teak is traded and where?", "What are the characteristics of these markets?", "What prices can be expected for small and large logs?" and "What makes some sources of teak commercially attractive and others struggle?". This study seeks to provide answers to these questions.

India constitutes some 75% of the global trade in teak, followed by Thailand, China and Vietnam. Myanmar is the largest supplier to all of these markets; a supply maintained through harvesting of native forests. A large number of teak growers in countries of Central and South America, Africa and Asia make up the remainder of the trade, all based upon plantation-grown resource. Using a combination of data sourced from the Global Trade Atlas, the Indian Directorate General of Commercial Intelligence and Statistics (DGCIS) and the databases of Chinese, Vietnamese, Thai and Lao Customs, pricing and patterns of trade flows for these four major importing countries and Lao PDR and other suppliers have been established, quantified and trading partnerships identified.

Constraints to efficient market linkages were identified. For example, the global trade of teak is frustrated by a lack of standards and consistency in establishing prices for teak logs. Lack of information and misinformation results in widespread uncertainty and confusion around teak investments, particularly in relation to prices. Another source of misunderstanding in the teak trade is the confusion between log volume measurements using Hoppus and Brereton scaling. Some producer countries use one method for calculating log volumes and dimensions (e.g. Brereton) and a purchasing country (e.g. India) may use Hoppus as their standard. . Stakeholders must be equipped with credible conversion factors to move between the two systems if they are to avoid misunderstanding and strengthen market links.

Other emerging considerations influencing trade efficiency include certification and legality of logs and supply chains. . Teak is widely sought-after in furniture industries, some of which are not

influenced by such issues whereas others are sensitive to the demands of legality and certification. It appears that these requirements meaningfully influence growers and processors, especially those who are dependent upon tertiary markets in North America and Europe. Some markets are influenced by differential tariffs applied to the import of round logs and sawn timber; some are influenced by the need to trade in containers or as break-bulk consignments.

Lao PDR has an estimated resource of 40 000 ha of plantation teak, 26 000 ha of which is grown by smallholders in the north. This resource is maturing and becoming of commercial interest to wood industries within Lao PDR and its neighbours China, Vietnam and Thailand and the more distant markets of India. To make best use of their resource, Lao stakeholders must be familiar with the broader international markets, both in regards to demand and access requirements, as part of decision making processes. Without knowledge of market drivers, prices and trends, policy makers, managers and smallholder growers are at a disadvantage. Conclusions are reached regarding the nature of the existing and potential demands of the wider global market place and specifically from China, Vietnam and Thailand. The likely influences of these demands upon the maturing resource of teak grown in Lao PDR are addressed.

Abbreviations

€	European Euro
ACIAR	Australian Centre for International Agricultural Research
ASEAN	Association of South East Asian Nations
AusAID	Australian Agency for International Development
BAF	Bunker Adjustment Factor
BDI	Baltic Dry Index
CIF	Cost Insurance Freight (CIF) at port of unloading
CIFOR	Centre for International Forestry Research
CITES	The Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNY	Chinese Yuan (Renmenbi)
CoC	Chain of Custody
CoO	Certificate of Origin (Thailand)
cubm	cubic metre
dbh	diameter breast height
DGCIS	Directorate General of Commercial Intelligence and Statistics, Government of India
DIMEX	Department of Import and Export (Lao PDR)
DoF	Department of Forestry (Lao PDR)
EU	European Union
EUTR	European Union Timber Regulation
FAO	Food and Agriculture Organisation
FAS	Free Alongside Ship
FEU	Forty-Foot Equivalent Units (40' intermodal shipping container)
FIO	Forest Industry Organisation, Thailand
FLEGT	Forest Law Enforcement Governance and Trade (EU)
FOB	Free on Board (FOB) price at port of loading
FSC	Forest Stewardship Council Certification Scheme
GDP	Gross Domestic Product

GFTN	Global Forest Trade Network (WWF)
GTA	Global Trade Atlas, Global Trade Information Services, Inc.
HS	Harmonised System, World Customs Organisation
ICD	Inland Container Depot
ICS	International Carrier Surcharge
IGES	Institute for Global Environmental Strategies
IRSG	International Rubber Study Group
ITC	International Trade Centre
ITTO	International Tropical Timber Organisation
JAS	Japanese Agriculture and Forestry Standards
JICA	Japan International Cooperation Agency
KD	Kiln dried
LAS	Legality Assurance System
MAF	Ministry of Agriculture and Forestry
mai	mean annual increment
MDF	Medium-density Fibre Board
MIS	Market Information Service of the International Tropical Timber Organisation
MoF	Ministry of Forestry
MoIC	Ministry of Industry and Commerce (Lao PDR)
MoNRE	Ministry of Natural Resources and Environment (Lao PDR)
MSA	Maritime Safety Authority Surcharge
NFPDP	National Forestry Plantation Development Program
NGO	Non-governmental Organization
NTFP	Non Timber Forest Product
OCF	Ocean Freight
PDR	Peoples' Democratic Republic
PEFC	Program for the Endorsement of Forest Certification Schemes
RFD	Royal Forest Department

RWE	Round wood equivalent
sed	Small end diameter
SFM	Sustainable Forest Management
SME	Small and Medium Enterprise
SPC	Secretariat of the Pacific Community
SVLK	Timber Legality Verification System (Indonesia)
T&G	Tongue in groove
TDC	Terminal Destination Charge
TLAS	Timber Legality Assurance System (Vietnam)
TEU	Twenty-Foot Equivalent Units (20' intermodal shipping container)
TFT	The Forest Trust
US$	United States dollar
VPA	Voluntary Partnership Agreement
WB	The World Bank
WCS	Wildlife Conservation Society
WCO	World Customs Organisation

Exchange rates.

Exchange rates (July, 2013) used for this report are:

US$1.00 = SBD 7.25

US$1.00 = CNY 6.14

US$1.00 = INR 60.00

US$1.00 = VND 21,204.00

US$1.00 = THB 30.00

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Chapter 1 Introduction and methodology

"Among timbers, teak holds a place which diamonds maintain among precious stones and gold among metals."

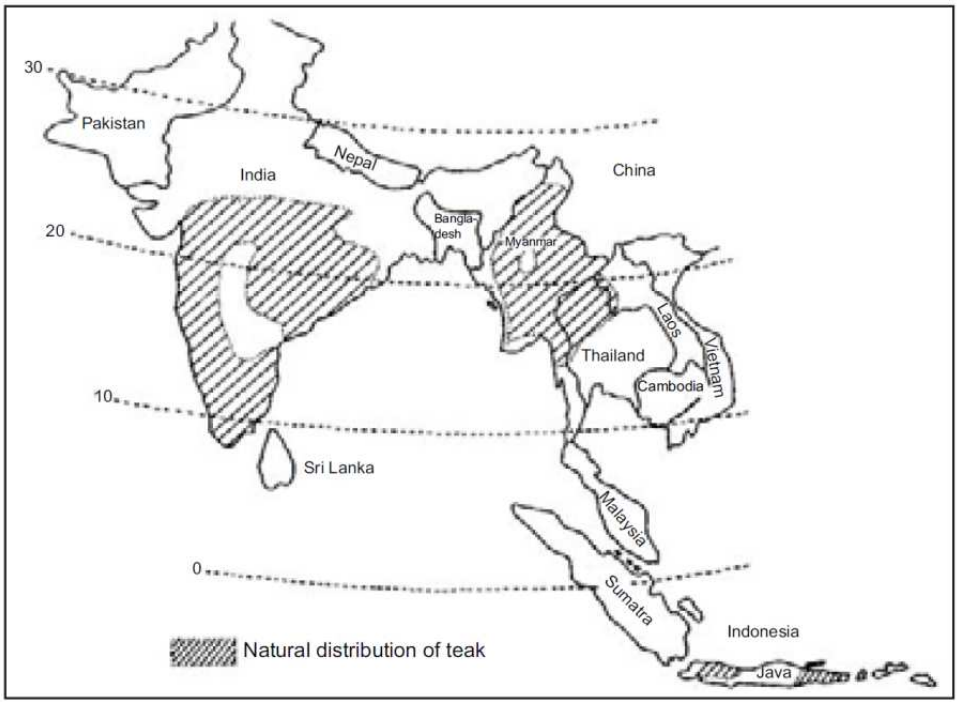
Dietrich Brandis, Inspector General of Forests, India, c. 1855

Global production of teak

Teak is one of the world's premier timbers for which demand outstrips supply. The timber is mellow in colour, ranging from golden to brown, with a fine grain and smooth texture. Compared with other industrial woods, teak is a medium weight, strong wood of average hardness. Because of its strength, pleasing colour, attractive figure and favourable working and finishing properties, teak is one of the most popular tropical hardwoods, in high demand for furniture, shipbuilding, decorative building components (such as doors, window frames and flooring), construction materials and reconstituted products.

Teak is a tall deciduous tropical hardwood which occurs naturally in a discontinuous distribution in peninsular India, Myanmar, Lao PDR and Thailand (Figure 1). The area of natural teak is about 27.9 million hectares (Gyi and Tint 1998), generally occurring on fertile, well-drained soils up to 1000 m altitude; it does not tolerate flooding or infertile lateritic soils (Phengklai *et al*. 1994). It grows best on sites with a marked dry season, annual rainfall 1250–3750 mm, minimum temperature 13–17°C and maximum temperatures or 30–43^{o}C (Pandey and Brown 2000). As a highly valued hardwood, teak has been widely established in plantations throughout the seasonally dry tropics.

Figure 1. Natural distribution of teak (Gyi and Tint, 1998)



However, the natural distribution of Teak has significantly reduced in area. For example, Thailand's natural Teak forests were estimated to be over 12 million ha in the late 18th century, but by the 1970's the area was estimated to be in the thousands, leading to a ban in harvesting 1982[5].

Where is teak grown?

Although teak occurs naturally over a wide range, it is only in Myanmar that native forests are commercially managed for production of teak wood. Myanmar is the only country with a sizeable export industry based upon native teak. However, the impacts on markets, following the introduction of Myanmar's log export ban to China, which came into force on 1April 2014, has yet to be fully realised. For example, between April 1 and July 18, 2014, exports to China reduced nearly 90% to 14.44 million USD worth of timber (35% by state-owned companies and the balance by private companies), compared to the total export from the 2014-15 fiscal year was 158 million USD[6]. In January 2015,and despite predictions, the market price for Myanmar teak remained stable[7], with the Myanma Timber Enterprise (MTE), reporting strong domestic demand after log export ban. However, the International Tropical Timber Organisation March 2015 Market report shared concerns by analysts "that MTE will be unable to meet its harvest target of 60,000 hoppus tons of teak logs for this fiscal year"[8].

The global resource of planted teak continues to expand. FAO's recent global study of teak (Kollert and Cherubini, 2012) suggests that a conservative global area of planted teak forests in 2010 was 4.3 million ha, of which 83% grew in Asia, 11% in Africa, and 6% in tropical America and the Caribbean[9]. Another study, completed by ITTO (ITTO, 2009), concluded that there were an estimated 5.9 million ha of teak plantations globally in 2005. The two studies differed significantly on estimates for commercial teak plantations in Asia, particularly India, Myanmar and Thailand, some of the world's largest growers. In addition, many plantations are smallholder owned and are usually not included in formal forest inventory data. Keogh (2009) suggested a global figure closer to 7M ha which is close to a moderated estimate of 6.8 million ha presented in Table 1.

Table 1. Moderated estimated of areas of teak plantations (ha) (FAO 2010; ITTO 2009; other sources)

Source	FAO (2010)	ITTO (2009)	Moderated Estimate
Location	**Area (Ha '000)**	**Area (Ha '000)**	**Area (Ha '000)**
Asia			
India	1667	2561	2561
Indonesia	1269	1470	1470
Myanmar	390	0	390
Thailand	128	836	836
Lao PDR		0	15
Bangladesh	73		73
Others		726	726

[5] http://www.teak.net

[6] http://www.burmanet.org/news/2014/08/26/china-wood-restrictions-on-myanmar%E2%80%99s-teak-export-throws-chinese-market-into-chaos/

[7] http://www.ihb.de/wood/news/Myanmar_auctions_teak_hardwood_prices_40038.html

[8] https://itto-d2.r-cms.jp/files/user/mis/MIS%201-15%20Mar%202015.pdf

[9] The study did not receive data from 22 teak-growing countries, thus offers conservative data.

Asia Total	**3527**	**5593**	**6071**
Africa			
Ghana	214	40	214
Nigeria	146	74	146
Cote d'Ivoire	52	66	66
Benin	26	0	26
Sudan		25	25
Tanzania			10
Others		51	51
Africa Total	**470**	**256**	**538**
Latin America			
Brazil	65	50	65
Panama	55	0	55
Ecuador	45	0	45
Costa Rica	32	30	32
Guatemala	28	0	28
El Salvador			
Others		53	53
Latin America (Total)	**225**	**133**	**278**
GLOBAL TOTAL	**4346**	**5982**	**6887**

FAO found that planted areas of teak are increasing fastest in countries of South and Central America and West Africa where their resources have expanded from between 4 and 45% between 1995 – 2010 (Kollert, 2013).

How much teak wood is grown and traded globally?

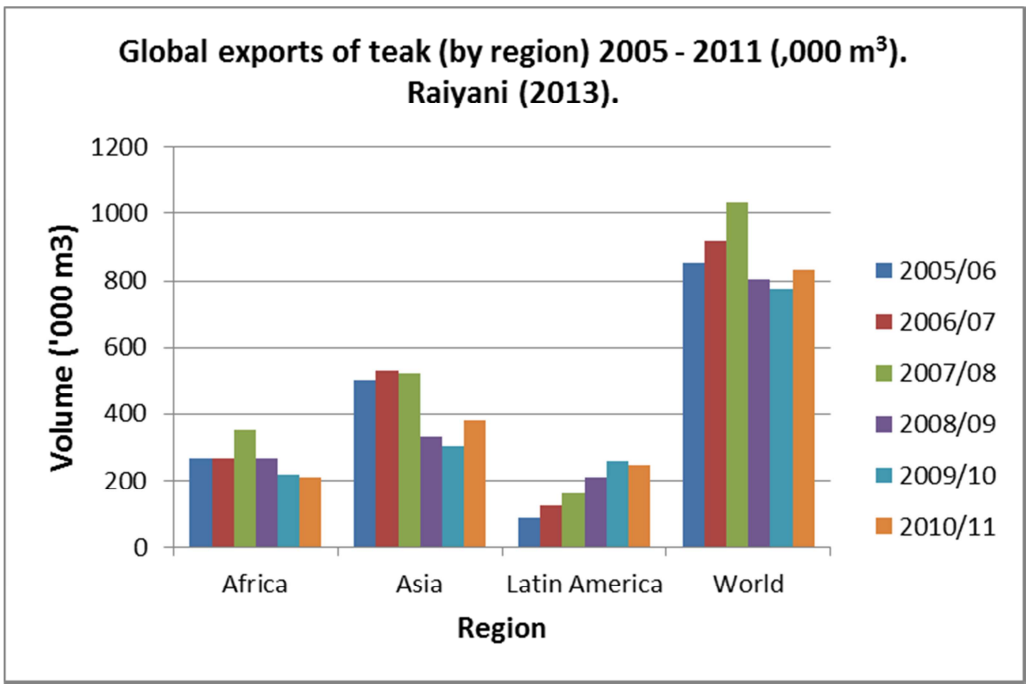
Using generalised growth data from several sources, the ITTO report (2009) estimates that globally, some 31 million cubic metres of plantation teak wood is grown annually. The production of mature teak is currently restricted to the traditional producers Myanmar, India and Indonesia, the latter two of which produce some large dimension logs from planted forests. FAO (Kollert, 2013) reported on log removals from teak forests from 26 countries and estimated that total teak harvests accounted for 2 – 2.5 million cubic metres in 2010; Asia reported the highest removals of planted teak at 523 000 m^3 and some 500 000 m^3 from natural teak forests in Myanmar and the remainder (presumably) from planted resources elsewhere. Africa, South America and Central America have about the same share of 15% or roughly 140,000 m^3 per year. Kollert (2013) reported that several teak-growing countries did not participate in the study and their unaccounted harvesting volumes and volumes from unaccounted thinnings tally to up to 1 million m^3 annually.

Among the countries reporting significant log removals in the FAO study (2010) were:

- Asia: Indonesia, 453 613 m^3; Thailand, 53 472 m^3. India did not report on log removals.
- Africa: Benin, 64 460 m^3; Tanzania, 60 000 m^3
- Central America: Costa Rica, 74 153 m^3; El Salvador, 54 259 m^3.
- South America: Ecuador, 73 630 m^3; Brazil, 67 282 m^3.

Raiyani (2013) demonstrated the changing nature of global teak trade (Figure 2). Whilst Asia remains the largest global supplier of teak (influenced by Myanmar's dominant position), Africa has remained a constantly large supplier over the past 6 years and supplies from maturing resources in Latin America have expanded at over 20% annually over the same period.

Figure 2. Global exports of teak 2005 – 2011 (Raiyani, 2013)



Myanmar's role in the teak trade

Myanmar is a major player in the global teak trade with exports totalling 371,000 metric tonnes in 2011-2012 and most of these exports are derived from teak grown in native forests[10] . Myanmar is the only country that offers commercial quantities of natural teak legally to the international market. Neighbouring countries Thailand, China and India are particularly dependent upon teak supplies from Myanmar. In an effort to stem alarming loss of forest area and to promote domestic wood processing industries, and aligned with changing business practices associated with political reform, the Government of Myanmar implemented a log export ban in April 2014. ITTO (March 2015) reports that the MTE –(the sole agency responsible for harvesting, extraction and distribution of logs in Myanmar) reports a reduction in harvest of native teak in Myanmar from totals of about 484,020 m^3 in 2012-13 and324,000 m^3 in 2013-14 (ITTO: 2003a) to around 60,000 from State owned forests (ITTO: 2015) and additional volumes from plantation forests. However, it is unclear from Myanmar's export data, what proportion of the exports are derived currently from the country's 360 000 ha resource of planted teak.

ITTO (2013(a)) and Somaiya (2013) foreshadow impacts on global trade in teak, particularly for neighbouring countries which will have to find alternative sources of teak.

[10] Note, in the financial year before the enforcement of the export of teak logs, Myanmar exported 1.6 million cubic meters of teak logs earning 637.5 million U.S. dollars. http://www.globalpost.com/dispatch/news/xinhua-news-agency/141006/myanmar-teak-hard-wood-export-fy-2013-14-breaks-record

Methodology and sources of data

The study relied upon a review of available published and "grey" literature such as market analyses through subscription, project reports from producing and importing countries and unpublished data. Trade data was extracted from several sources: the databases of the Global Trade Atlas (GTA), the Indian Directorate General of Commercial Intelligence and Statistics (DGCIS), the Customs Departments of China, Vietnam and Thailand and the Department of Import and Export within the Ministry of Finance of the Lao PDR. Data queries were concentrated upon trade data for the World Customs Organisation's (WCO) Harmonized System (HS) commodity code categories which involve international trade, specifically in teak: 44034910 (teak wood in the rough) and 44072910 (sawn teak wood). The Governments of Vietnam and Lao PDR do not contribute at this stage to the databases of the GTA and data was provided through commissioned studies.

Myanmar will continue to play a substantial role in the global trade of teak and is likely to remain a dominant world supplier teak sawnwood; "Burmese teak" sets international standards for quality. Trade from Myanmar is dominated by wood from natural forests although the country has a maturing resource of some 360 000 ha of plantations. There is no distinction made in the trade data between natural or plantation grown teak from Myanmar although information from traders in India suggest that the trade is almost all teak from natural forests. In an attempt to maintain a focus upon trade in plantation-grown teak, data analysis in this study excluded all teak exported from Myanmar, recognising that this may cause a conservative underestimate in global plantation production. Since harvest and export of native teak from other countries is prohibited (or strongly limited) the analysis assumes the rest of the global teak trade comes from planted trees.

Other limitations which challenge the approach taken include inconsistencies in trade statistics and the tension between commercial-in-confidence information and that available in the public domain. Whilst these contribute to a lack of precision, common themes from different sources, suggest that the data offers a reliable indication of market trends.

Visits have been made to teak plantations in Thailand, Lao PDR, Indonesia, Papua New Guinea and the Solomon Islands and field interviews held with growers, traders and processors in India, China, Vietnam and Lao PDR.

Chapter 2 Products and end uses

Teak has long been acknowledged for its excellent wood properties, making it one of the most sought-after multi-purpose timbers in the world. These properties, particularly for heartwood, include strength with lightness; durability; dimensional stability (due to a very low coefficient of expansion and contraction); non-corroding properties; ease of working and seasoning; termite, fungus, chemical, water and weather resistance and attractiveness (Keogh, 2009). The versatility of teak makes it suitability for a broad array of end-uses that are well documented - the best quality being used for high value furniture and boat decking and the smaller sizes used as a cheaper, utility timber. Specifically, where there is high humidity teak is ideal because it does not warp, twist or expand and its natural oils and resins (technoquinines) repel water and reduce insect or fungal attack. The dominant uses are in the furniture, doors and windows sectors (Somaiya, 2013).

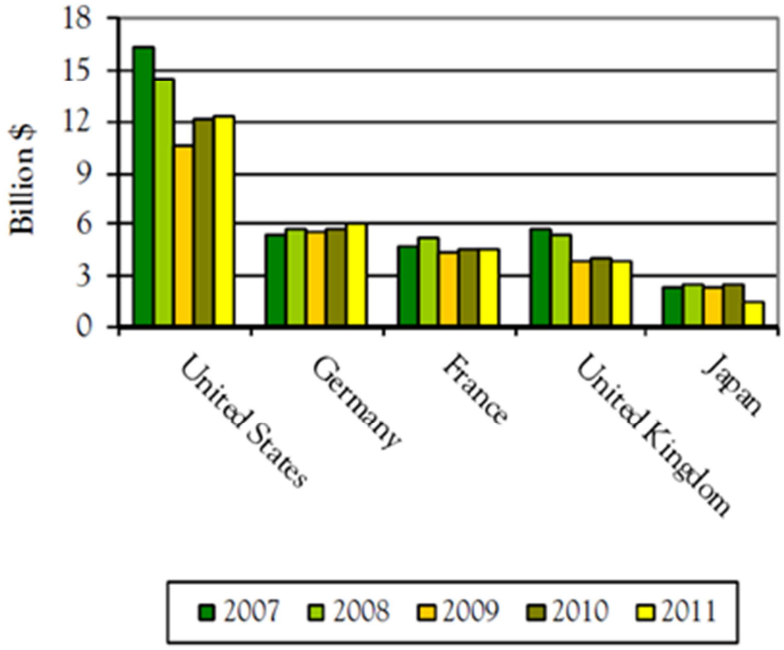
Global furniture industry

The world's top producers of furniture are China, USA, Italy, Germany, India, Japan, France and Poland whilst the world's top exporters are China, Germany, Italy, Poland, USA and Vietnam. China remains both the world's largest producer and exporter (CSIL, 2013). The furniture industry has expanded along with the recovery and expansion of the global economy since the financial crises of 2008. In 2012, global furniture production continued to recover and was valued at $370 billion in 2011 and by 2015, the global furniture market is expected to reach $436.5 billion. The value of global furniture trade in 2011 was $109 billion. The United States is the largest furniture-importing country, with imports valued at $12.4 billion in 2011 (United Nations, 2012).

There is a strong relationship between housing and furniture: housing has been a leading indicator of economic recovery; a house purchase being a discretionary expenditure and sensitive to interest rates. Lower interest rates are usually effective in stimulating demand for new houses. When people buy new houses they also tend to buy new furniture and other objects for their house.

Wood furniture is a sub-set of the broader international trade in furniture and production/export patterns generally follow the broader furniture pattern. The largest importers of wooden furniture are the markets in Europe and North America (Figure 3), both of which are becoming increasingly sensitive to the needs of legality and certification in wood trade.

Figure 3. Value of wood furniture imports by the 5 dominant importers, 2007 - 2011 (United Nations, 2012)



Chapter 3 Factors influencing global teak trade and prices

Apart from the common suite of challenges to all international trade such as fluctuating exchange rates, government regulations and changing tax regimes and tariffs there are several other considerations which influence efficient global trade in teak.

Standards.

A lack of standards and consistency in establishing prices for teak logs has been a longstanding and common theme of discussions of international teak markets. Several expert observers have reflected upon this issue. Keogh (2009) observed "*…due to lack of standards, lack of information and misinformation there is widespread uncertainty and confusion around teak investments, particularly in relation to prices"* and suggested the establishment of an international pricing mechanism for teak, designed to provide standard, transparent, widely published and up-to-date information on plantation teak prices. Moya and Perez (2008) also reflected that "*…it is difficult to get accurate and regular wholesale and export prices for teak wood*". Ladrach (2009) concurred with these sentiments, observing "*The creation of uniform international log grades for plantation teak, along with standardized lumber and product grades would be of great help to improving the marketability of teak wood products. Standardized descriptions are needed so that buyers know the exact quality of the products being offered for sale*". Kollert (2013) reflected upon this theme in reporting FAO's detailed 2010 study on teak "*….the 2010 survey of teak prices proved to be particularly difficult. Firstly, there are no common international log grading rules established and the perception by the countries of a small size and big size logs proved to be rather different*".

Measurement of log volumes

There is no single internationally-accepted method for measuring logs which can allow reliable comparison of prices between countries. Log volumes can be calculated in several ways, each offering a legitimate (but different) result. What the grower produces in real cubic metres may not be the same volume which is traded. This can be a source of considerable misunderstanding and confusion - a grower wants to be paid for wood grown and the trader wants to pay only for wood which can be processed. Conversion factors have been developed to assist this important dialogue but are yet to be uniformly applied.

FAO (2010) offers a practical example of the importance of adopting agreed conversion factors:

> *A practical example would be a timber sale appraisal that a sawmill is conducting to determine a bid price. The stand volume may be reported in cubic metres over bark but the purchaser may need to convert these volumes into inside bark volumes, weight or board feet[3] to match their units of measure. To determine the value of the timber, the purchaser will need to know the cost of getting the timber from the stump to the mill site, thus weight to volume ratios are likely to be an important parameter for determining weight-based transport costs. Primary product recovery will need to be estimated using conversion factors from roundwood to the primary product, e.g., 2 m^3 roundwood will produce 1 m^3 sawnwood. A material balance will be used to determine the quantity and thus value of the residual products made, and finally, ratios may be used to estimate the quantity of unmeasured*

products from the timber sale such as bark and logging residue (top-wood, limbs, foliage) which may be profitable to utilize for energy or other purposes.

Some producer countries may use one method for calculating log volumes and dimensions and a purchasing country may use another as their standard. For example, producer countries in West Africa use the Brereton scale for calculating volume whereas in India (the world's largest teak market) the Hoppus system is used. A standard 20' container can hold up to 15 m^3 (real volume) of small logs, but this may convert to about 13 m^3 if the Hoppus system is applied and this can cause considerable confusion. There is an acknowledged need for producers and buyers to agree on a common form of log measurement or standardise allowances or agree on standard conversion factors to convert volume to true cubic volume.

Logistics and trade

The fragmented nature of the global teak estate across continents, countries and landholdings offers logistical challenges to the efficient sale of teak grown in plantations. Trades of teak logs may be shipped as break bulk cargoes, in containers or, where conditions permit, by truck. The commercial attractiveness of a planted teak resource is strongly influenced by the proximity to a suitable port, adequate road transport and infrastructure and sympathetic government regulations and services related to export procedures (such as tax, customs and quarantine clearance). International shipments of teak require an understanding of concepts of global shipping including containerisation, intermodal transport, non-vessel operating carriers and freight forwarders.

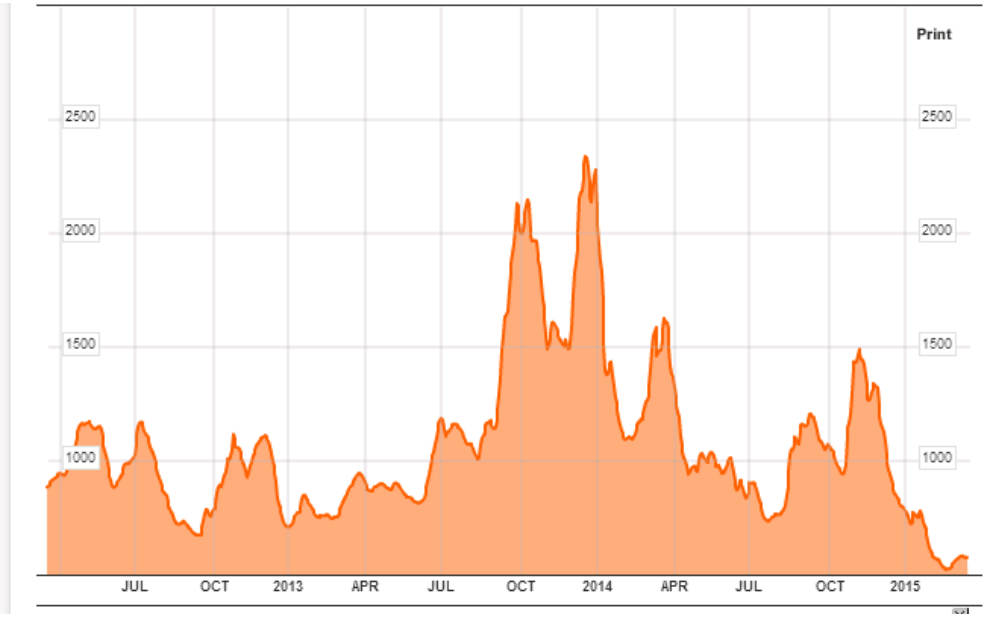
Break bulk

Break bulk consignments offer advantages in accommodating large volumes and long log lengths which offer considerable savings in handling and processing. Break bulk shipments are general cheaper than those by container and can be run from a wider range of ports. Typically, break bulk shipment of teak logs from West Africa to ports in western India would cost about USD100/m^3 whereas shipments over the same route in containers cost about USD125/m^3 (Somaiya, 2013).

The general rate of movement of bulk cargo is tracked by the Baltic Exchange, an exchange that brings together the shipping community to buy and sell bulk commodity shipping space in the global market (Roos *et al*, 2011). The Baltic Dry Index (BDI) is an index based on the average shipping prices for dry cargoes on the Baltic Exchange and can be used to demonstrate the fluctuations which occur in ocean shipping prices (Figue 4)[11] including those for teak shipments which in turn influence the delivered price of teak.

[11] Source : http://www.bloomberg.com/quote/BDIY:IND/chart

Figue 4. Fluctuations in the Baltic Dry Index (BDI) 2013 – 2015) reflect changes in costs of ocean shipping)



Whilst break bulk shipment offers efficiency and cost savings, it can be challenging for teak growers and traders to assemble commercially viable consignments of a minimum 3000m^3 to fit with defined shipping schedules (Somaiya, 2013).

Containers

Standard 20- and 40-foot shipping containers are becoming an increasingly common part of shipping for teak consignments. They offer efficiency for loading and unloading and transfer of cargo to other forms of transportation such as rail or truck plus a faster and more reliable delivery and logs arrive in better condition (Somaiya, 2013). However, containers do have limitations and cargoes are limited by dimensions and maximum weight limits (Table 2). Typically, a 20' container (TEU) can hold up to 15m^3 of teak logs up to 5.8 metre length (13m^3 Hoppus) or up to 19 m^3 of sawn timber or squared logs (up to a maximum weight of 22 tonnes). A 40' container (FEU) can hold about 22 m^3 logs, generally cut to 3.9 metre lengths or sawn timber up to a maximum weight of 26 tonnes.

Table 2. Standard dimensions of shipping containers (adapted from Roos *et al*, 2011).

Container size	Inside length (m)	Inside width (m)	Inside height (m)	Door width (m)	Door height (m)	Capacity (m^3)	Tare weight (kg)	Maximum cargo (kg)
Standard 20'	5.89	2.33	2.38	2.33	2.28	33	2230	21700
Standard 40'	12.01	2.33	2.38	2.33	2.28	68	3701	26780

In addition to the costs of ocean freight, containerised shipments need to meet charges for BAF (Bunker Adjustment Factor), ICS (International Carrier Surcharge) and port charges such as MSA (Maritime Service Authority), TDC (Terminal Destination Charge) and a series of agents' fees. Shipping costs for consignments of teak round and squared logs in 20' containers between the Solomon Islands and ports in China, Vietnam and India are of the order US$84 – 112/m^3 and a breakdown of these costs is offered in Table 3 (Midgley *et al*, 2015).

Table 3. Notional shipping costs for teak consignments in containers: Solomon Islands to China, Vietnam and India (US$). Source: Midgley *et al* (2015).

Notional Shipping Costs for Teak consignments in Containers: Solomon Islands to China, Vietnam and India (US$)												
Origin	Destination	Container Size	Est Cost (US$)					Teak logs. Volume/container (m^3)	Teak Sawnwood and squared logs. Volume/ container (m^3)	Teak Logs. Notional cost/m^3	Teak Sawnwood and squared logs. Notional cost/m^3	Shipping Route
			OCF	BAF	ICS	Standard Fees	Total					
Honiara	Huangpu (Chin	20 ft GP	1000	620	12	79	1711	13	18	132	95	via Singapore & Hong Kong
Honiara	Ho Chi Minh (V	20 ft GP	800	620	12	79	1511	13	18	116	84	via Singapore
Honiara	Mundra (India)	20 ft GP	1300	620	12	79	2011	13	18	155	112	via Singapore
Standard fees: MSA surcharge = USD95/container + tax; THC = SBD 275.00 / container and Bill of Lading fee = SBD 300.00. Total USD79												

A consideration in the use of containers for log shipments has been the glut of empty Asia-bound containers located in the EU and the west coast of the USA. The EU and the USA import large quantities of goods from Asia and export smaller quantities. The need to return empty containers has resulted in competitive rates for container shipments, benefitting exporters of teak who can gain access to these rates. For example, notional costs for a container of squared teak logs from Ecuador to China are of the order of US$2400 /TEU (approximately US$160/$m^3$) and from the Solomon Islands to China, US$3300; approximately US$220/m^3 (informal interviews, this study).

Wood quality differences between native and plantation teak

Within the global teak markets, there is a fundamental distinction between native teak and plantation teak with a considerable price premium for teak from natural forests. Within the plantation teak component of the market, there are again some distinctions with higher prices being paid for large, long rotation (>50 years), slow grown teak from Java, West Africa and elsewhere. Small size logs from fast grown plantations on 20 year rotations or plantation thinnings occupy a different (and cheaper) market niche.

The premium prices of teak from natural forests can be many times higher than domestic prices for plantation grown logs, demonstrated by Kollert (2013) (Table 4).

Table 4. Price premiums paid for teak from natural forests (Kollert, 2013)

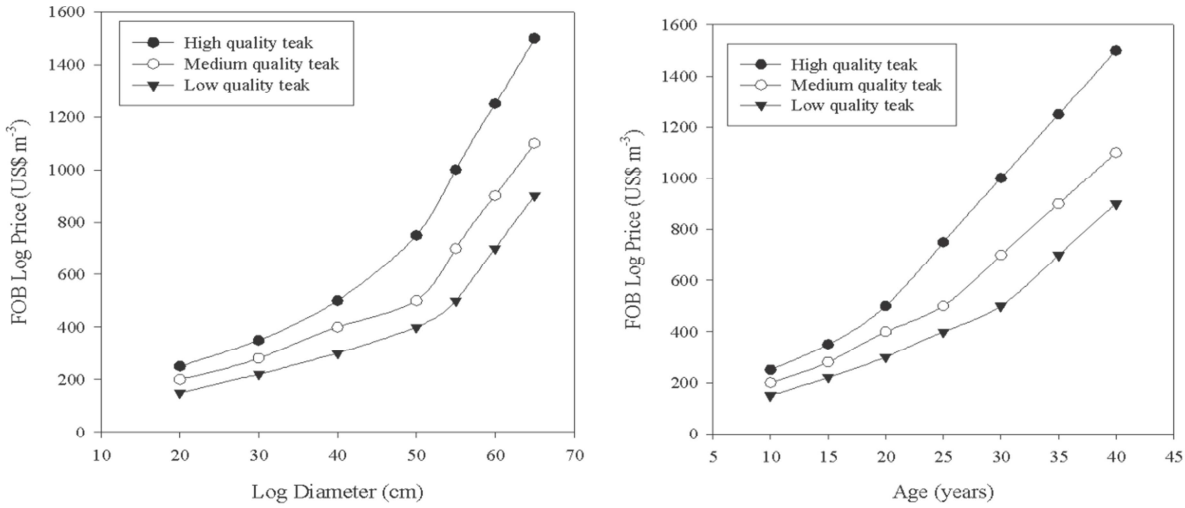
Natural teak	Export market price (USD/m^3, FOB)		
	Low grade	Sawing grade	Veneer grade
Myanmar	1022	1864	4111
Planted teak	Domestic market price at the log yard (USD/m^3)		
	Small	Medium	Large
Africa*	124	203	271
Latin America	129	199	267
Asia	149	282	448

* In Africa export process are reported to be 1.8 times the domestic market prices

Among the factors considered in estimating prices for plantation teak logs are;

Log dimensions. For teak logs, dimensions matter: the FAO study (2010) demonstrated that in Asia, Latin America and Africa prices for large plantation logs were 2 to 4 times higher than prices for small logs. Moya and Perez (2008) (Table 5) also demonstrated the importance of both size and age as influences in FOB prices in Costa Rica.

Table 5. Estimated average prices for plantation teak wood in relation to (a) age and (b) log diameter (Moya and Perez, 2008)



***Log form and defects*.** Log form factors such as straightness, taper, fluting, and eccentricity around the pith have an impact on sawn wood recoveries and thus on prices offered. Defects such as knots, branch stubs or splits from harvesting will also be taken into account

***Heartwood*.** Markets are attracted by teak's darker heartwood. In some cases the lighter sapwood can be used as a feature but most markets prefer a greater proportion of heartwood. In some countries, logs are downgraded if there is excess sapwood; for example, if less than 60% heartwood (by volume) in Lao PDR or 50% in Solomon Islands then the logs become B grade logs

Insects and fungi. Logs and log shipments should be free from insects and fungi Apart from possible damage to wood quality, insects and fungi can present phytosanitary problems requiring expensive quarantine procedures.

There are significant differences in properties between natural grown teak and mature, plantation-grown teak and young, planted teak commonly traded. These differences are highlighted when dealing with small sized, fast-grown logs from plantations. However, Hopewell *et al.* (2011), found that teak wood processed from plantations as young as 6 years old had sufficient material and mechanical properties to be used in some typical teak products such as garden furniture and yacht decking.

Wood colour influences prices and appears to be influenced by site. Thai sources report that the colour of teak wood from natural forests on wetter sites along river banks or in low moist forests is usually darker than that from drier sites (Kaosa-ard, 1998). The colour of plantation-grown teak wood is also strongly controlled by planting site and in Lao PDR, village artisans believe that teak

grown on rich alluvial soils has inferior strength properties compared to slower-growing teak grown in upland conditions (Sookmixay, *pers. com*[12]).

Bhat and Ma (2004) reported that teak wood from plantations differs to that from native forests in colour, grain and texture, and for this reason plantation teak is unlikely to attract the high prices of premium teak from native forests. They also reported that recent research indicates that short-rotation teak wood is not significantly inferior in density and strength compared to teak from natural forests, although with lower heartwood and extractive contents, it is less durable and attractive. Sanyal *et al*. (1987) studied the strength properties of teak timber from 20-year-old trees grown alongside canals and found properties matched closely with standard teak.

Bhat (2000) summarised findings which show that young trees (13–21 years of age) are not necessarily inferior in wood density and strength compared to older trees (55–65 years), and rotation length of fast-grown teak can be reduced without compromising timber strength. Studies of 22-year-old and 14-year-old teak in Brazil demonstrated that teak at both these ages had decay resistance comparable to that of naturally-grown teak (Laming and Sierra-Alvarez 2000).

In addition to these differences are those created by squaring logs. This applies mostly to small sized logs which are often sold as 'squared logs' where most of the sapwood has been removed as 4 outer flitches. This offers value to the buyer and facilitates easy loading and efficient transport by container.

Teak wood prices are generally determined based on subjective (generally experienced) visual assessment of logs. There are no commonly accepted, systematic or consistent international grading rules with corresponding price values. An example of the many factors considered for calculating values of plantation-grown teak logs are combined in a draft set of Log Grading Rules established for the Solomon Islands (Appendix 1) (Laity and Ahsan, 2012).

International regulations, legality and certification

The global wood markets have become increasingly sensitive to timber sourced illegally or unsustainably, with consumer companies applying voluntary verification (sustainability) standards and/or governments introducing involuntary regulatory (legality) compliance systems that influence market access and acceptance.

There is now increased focus within trade and aid policies to encourage developing countries to adopt higher levels of sustainability in forest management approaches and reduce incidences of illegal trade in forest products. It is now apparent that the major change occurring within international markets is that a demonstration of sustainability is no longer a primary requirement to access markets; management and governance systems must now demonstrate a commitment to legality of product and transparency of supply.

The large markets of North America and Europe have responded legislatively, building on the principles of certification and associated sustainability and environmentally responsible production.

[12] Sookmixay, Ban Xieng Lom, Luang Prabang, Lao PDR (*pers. com*.) 2013

These changes are having an impact upon the international trade in teak and teak products by specifying prescriptive compliance measures. Initiatives include the *United States Lacey Act 1900*[13], the European Union's FLEGT *Action Plan and Regional Programming for Asia* (including Regulation No. 995/2010[14]) ; and *Australia's Illegal Harvesting Prohibition Act* (2012). Additional legislative responses include the Japanese *Law Concerning the Promotion of the Procurement of Eco-Friendly Goods and Services by the State and Other Entities* (Law No. 100 of 2000) (including the 2013 *Basic Policy on Promoting Green Purchasing*) which incorporates a definition of 'legal wood' that extends to cover 'forest laws of timber producing countries and areas'.

Legality verification, which underpins primary market access requirements, is now emerging as a dominant trade and market access instrument which is designed to reduce forest degradation and deforestation associated with illegal harvesting. These systems achieve this by imposing a 'duty of care' (DoC) or requiring a company to exercise 'due diligence' or 'due care'[15] to importers/traders in wood products to demonstrate products are sourced legally (that is, they comply with national laws).

Significantly for businesses, DoC requirements are also important when addressing commercial reputation, the values of a company, and customer demands (Mitchell 2012).

Importantly, the development and adoption of DoC compliance processes should provide the market access framework under which all forest products will be deemed 'legal' under legislative provisions, and the proof of legality and DoC will require governments to adopt more transparent export/imports monitoring and reporting practices.

For example, countries that supply forest or timber products into markets which have adopted legislative 'proof of legality' standards will require all suppliers to meet mandatory import standards, that meet the EU's Forest Law Enforcement, Governance and Trade (FLEGT)/Voluntary Partnership Agreement (VPA) requirements. Establishing a 'proof of legality' system requires good governance in partner countries and offers a framework for the development of a Chain of Custody (CoC) control and licensing system to verify the legality of timber exported to the EU. Signing a VPA should lead to a FLEGT legality license which will fulfill the requirements of the EUTR and facilitate the marketing of a country's produce.

These measures will require major furniture exporting countries which source Teak from FLEGT/VPA source countries, or which seek to access markets where 'proof of legality' legislation exists, will need to consider changes to their import requirements so that verification of legality can be demonstrated.

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[13] The *Lacey Act* covers the entire supply chain and makes it 'unlawful to import, export, transport, sell, buy, or possess…"and " prohibit all trade in plant and plant products (e.g. furniture, paper, or lumber) that are illegally sourced from any US state or any foreign country.

[14] Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market.

[15] These terms are used to describe a process by which individuals or organisations identify, consider and address the potential for illegal or unregulated or unapproved timber or other forest products to enter the supply or value chain. These processes extend the principles detailed within international agreements by specifying prescriptive compliance measures.

it is likely that the VPA system will meet other legality requirements, such as those required under the *Lacey Act*.

Currently, Myanmar and Lao have entered into FLEGT/VPA negotiations and Vietnam is actively progressing VPA negotiations and is positioning itself to be a dominant supplier of timber furniture into developed markets.

However, India (the largest global importer of Teak) and China (the largest global furniture manufacturer) have shown little interest in adopting more robust 'proof of legality' requirements on imported timber, and while their domestic markets for Teak remain strong, there is no strong market pressure to change policies.

Consequently, it is unclear what the level of influence the market access requirement for 'proof of legality' is in regards to Teak as markets are divided, with dominant consumer countries like India and China indifferent, yet source countries (like Myanmar) prepared to consider formal requirements in exchange to access alternative markets.

Certification

Voluntary, non-legal initiatives have generally evolved independent of national or international trading systems and the evolution of these systems has led to the development of similar objectives, standards and verification requirements.

While these systems have contributed to the development and adoption of more sustainable forest and land management practices, they have only had limited success in addressing illegal or unsustainable forest trade practices. However, they remain an important mechanism which can contribute to demonstrating legality within supply chains and thereby meet legislative and international trade requirements.

Certification is a voluntary system that verifies standards are being met. These standards are generally independent of governments. The voluntary adoption of verifiable standards usually encompass sustainability criteria and has played a major role in developing concepts of sustainability (with an emphasis on environment) as a basis for facilitating market access. However, certification is not a demonstration of legality, and the reverse is also true.

While voluntary standards, as well as legislative and sustainability pressures, are influencing forest management practices and the trade in illegal forest products, currently no certification or verification standard is officially recognised by consumer countries' legality requirements as being automatically compliant.

There are two dominant, international forest based certification initiatives: FSC and PEFC. Both schemes support sustainable forest management outcomes, which are endorsed under verifiable certification systems based on clearly defined environmental, economic and social criteria.

Over the last decade, global markets (from suppliers through to consumers and financiers) have encouraged sustainable management of forests, as demonstrated through verification systems, dominated by FSC and PEFC.

The adoption of a certification standard offers several potential benefits to growers and consumers of forest products (Scheyvens, *et al.* 2010, Figure 5). Importantly, for processors of teak wood, certification facilitated access to the European and North American markets by being able to differentiate responsibly harvested wood in the marketplace with an 'environmentally and socially-responsible' seal of approval . The requirement applies for both teak from native forests and from plantations.

Figure 5. Potential benefits offered by forest certification (Scheyvens, *et al.*, 2010)

Actors		Benefits
Forest managers	Companies	Demonstrating expertise in forest management; market access
	Community and indigenous people's groups	Securing land tenure; local employment opportunities; forest management with reduced environmental impacts
Manufacturers and suppliers		Green credentials; product differentiation; improved product chain management
Producer country governments		Encouraging legal compliance
Consumers		Assurance that wood materials are from well-managed forests

An underlying assumption in forest certification has been that consumers would be prepared to pay price premiums for certified products. In turn, these higher market prices for certified forest products would encourage forest managers to improve their forest management and embrace certification. Scheyvens *et al.* (2010) found that this expectation has largely not been met and that market signals in the form of either improved access or premiums for certified products are mostly too weak.

The low level of adoption of FSC within the South-East Asia may reflect the failure to deliver higher returns, and that there is little net benefit in adopting certification standards. FSC data from 2014 indicates there were 82,846 ha of certified forests in Lao PDR (0.4% of the national estate), 41,359 ha in Vietnam (0.3% of the estate) and 25,586 ha in Thailand (0.2% of the estate).

Nonetheless, manufacturers of teak furniture who wish to maintain market access have a preference for certified wood. According to Vietnamese furniture companies in 2005, about 20% of all contracts signed in 2003 required certification (Williams 2005). Williams' study found that companies with certification and eco-labelling could differentiate their products more easily, an important marketing strategy in a competitive environment. These findings were supported by a 2014 ACIAR project examining Vietnams plantation supply chain (unpublished ACIAR report. Byron, N, et al, 2014._

Chain of custody

Certification systems support independent chain of custody (CoC) systems which require a commitment to legality across supply and value chains and provide certainty to consumers that labelled wood products they are using are sourced from sustainably managed forests.

In order to process and sell legally sourced or certified wood products, businesses must ensure that wood harvested legally or from certified forests is kept separate from non-certified wood through the manufacturing process to the end user. CoC systems (and subsequent assessments and

documentation) allow for the tracking of a product from the raw material growing in the forest, through every step of processing, to the marketplace. Only by carefully controlling each step in the process can customers be assured that the products they buy come from legal sources or a well-managed forest that is certified to the standards and principles of a particular certifying agency.

Interviews with furniture manufacturers in both Lao PDR and Vietnam, indicate that demand for CoC certification has grown substantially in recent years to the extent that, for many companies, the ability to prove that a timber product has been derived from a well-managed source has become a key factor in the specification of timber products.

The two major certification systems, PEFC and FSC, offer CoC certification and the International Organisation for Standardization (ISO) is proposing to develop an international CoC standard. An ISO CoC has the potential to replace existing verification systems, and would be automatically recognised under consumer countries' legality requirements, where such countries are members of the WTO. Importantly, ISO standards provide outcomes that are similar to certification systems in terms of legality[16].

The impacts of the changing legal framework on international trade in teak and teak products

The annual *Tropical Timber Supplement* published by the *Timber Trades Journal* (quoted in ITTO, 2011) noted that the continuing willingness of European manufacturers and retailers to pay premium prices for certified tropical wood will be challenged by the lack of willingness by final consumers to pay extra for certified wood. This leads to questions regarding payment for the substantial costs which underpin certification. If final consumers in the EU are satisfied with wood which meets the requirements of the new laws, will there be a market demand for more expensive certified wood?

The timber products industries of countries purchasing plantation-grown teak have been affected by the introduction of the EUTR. For India alone, products listed under the EUTR have an annual export value of around US$1.3 billion, and in 2012, six EU Member States accounted for more than 12% of this total value (Manoharan, 2013).

Other countries exporting teak products are also dependent upon the markets of North America and Europe for their processed wood products. Over one half of Vietnam's exports of wood furniture (valued at over US$2 billion) are directed towards these markets (Figure 20) as are almost 50% of China's wood furniture exports worth over US$5 billion (Table 13) . Vietnam is currently developing a Timber Legality Assurance System (TLAS) which will conform with the VPA being currently negotiated.

The positive impact of these emerging regulatory mechanisms upon timber exports from Asia has been demonstrated in Indonesia which now exports legal forestry products under the terms of the

[16] Note: ISO 14001 is currently under review. ISO/DIS 14001:2015 is likely to be amended to facilitate the alignment and compatibility of the EMS standard with other management system standards such as occupational health and safety (OHSAS 18001) and quality (ISO 9001). There is also likely to be an increased focus on the actual environmental performance of the organisation, cycle analysis, communication and auditing, and a strengthening of CoC compatibility.

Timber Legality Verification System (*Sistem Verifikasi Legalitas Kayu*, or SVLK[17]) which was a part of the VPA process completed in late September, 2013.

SVLK is essentially designed to verify compliance with Indonesia's legal framework, is certified against the Indonesian Ecolabel Institute's (LEI) standards, and recognised in the Green Procurement Policy of Japan, as well as those in the EU and US. It includes additional criteria and indicators to verify compliance with the principles of sustainable forest management.

Reports from the Jakarta Post (13 August, 2013, Business Section) report that the exporters are only allowed to market SVLK-certified timber and that exports of forest products have increased threefold as a result. Despite this encouraging news, middle and small-scale producers struggle to meet the high certification, documentation and audit fees to meet the terms of the new legislation (CIFOR, 2013), an experience likely to confront others who wish to export to the EU.

Competition

Teak's physical and aesthetic qualities have given it a worldwide reputation as a premium timber with a strong cultural reputation in markets such as India and China and a reputation for quality in the dominant markets of Europe and North America. This reputation was built originally upon high quality timber from natural forests, which is now in short supply, with Myanmar being the only remaining exporter of saw logs from natural teak forests. Wood from mature teak plantations (>50 years of age) in India, Thailand and Indonesia commands high prices approaching those of native teak. It is likely that competition for these mature resources will increase and prices will rise and an expected market response will be a shift to younger teak of smaller sizes.

Other species

Mature teak is highly prized and competition with other species has not been an issue. However, smaller-sized, plantation grown teak produces utility timbers, with no special distinguishing features, which rely upon teak's traditional reputation to gain access to international markets. Small sized, fast-grown teak now constitutes a significant proportion of the international teak trade (Somaiya, 2013) and its ready availability and competitive price has seen an increase in its use as a timber for utility furniture. As such, it is now competing with other utility hardwoods such as rubberwood and tropical acacias, both of which are competitively produced commercially in SE Asia and which provide the basis for competitive furniture industries.

Rubberwood

The recovery of merchantable rubberwood logs once economic latex yield declines at age 30 to 35 years provides an important and valuable source of wood highly regarded as sawn timber, plywood and in furniture markets and as a fibre source for MDF. Its light colour and easy woodworking, machining and staining properties allows it to be used as a substitute for many other species in the furniture industry.

There are an estimated 10 million ha of rubber plantations in SE Asia (IRSG, 2009). Yields of rubberwood at harvest depend on the site, clone, management, age and quality and can vary from

[17] Source: www.SVLK.webuda.com

52 – 163 m^3/ha[18] suggesting an estimated standing stock of rubberwood in SE Asia exceeding 600 million m^3. The annual economically viable rubberwood harvest in the region is estimated to exceed 6.5 million m^3.

Shigematsu *et al.* (2011) found in Malaysia, rubberwood represented 35% of total exported wood products in 2007 (worth US$2.1 billion), mostly furniture. From a planted resource of 2.9 million ha in Thailand, an estimated annual rubberwood production of 5 – 6 M m^3 contributed to around 60% of total exported wood products in 2007, worth US$629 million. Huech *et al.* (2012) report that Thai exports of sawn wood were dominated by exports of sawn rubberwood to China. Prices for rubberwood are attractive and vary with commodity demand for rubber latex (Eastin, 2011) and Thai log yard prices were of the order of US$529/$m^3$ in 2013 (USDA, 2013).

Acacia.

There are over 2 million ha of tropical acacias (*Acacia mangium, A. auriculiformis, A. crassicarpa* and *A. mangium* x *auriculiformis* hybrid) planted in SE Asia with Indonesia, Malaysia and Vietnam being the major growers (Griffin *et al*., 2011). These plantings are used extensively as a source of wood fibre for pulp however, some of these plantations are making a far larger impact as a resource for solid wood products although smaller in terms of volume than pulpwood use. In SE Asia, substantial quantities of *A. mangium* wood are now traded for this purpose (Midgley and Beadle, 2007). This new industry is being driven by demand for plantation grown wood which can meet the certification requirements of furniture industries in Europe and North America; the reduced availability of logs from native forests; and increasing awareness that these acacias are very suitable for plywood, furniture, flooring and light construction. The wood of the *A. mangium x auriculiformis* hybrid is similar to *A. mangium* but has slightly higher density and is suitable for products where strength is important. *Acacia auriculiformis* is denser and has a rich heartwood colour though it is slower growing than the other taxa. The main acacia wood product manufactured for export from SE Asia is furniture sold into Europe and the United States. It has similar characteristics to teak but is much cheaper. The total value is difficult to estimate, but figures from Vietnam suggest that it comprises some 10% of the predicted total turnover of exported wood and wood products for 2013 of US$5.5 billion (Vietnam Business News, 2013)

[18] In Thailand at clearing, Chantuma (2009) estimates an average estimated production of stem and branch rubberwood above 15 cm diameter of 137 m^3/ha

Chapter 4. The Lao forestry sector and teak in Lao PDR

The Lao forestry sector

Lao PDR is landlocked and one of the least developed countries in SE Asia having a total land area of 23.68 million hectares, 79% of which is mountainous (Figure 6).

Figure 6 . Lao PDR in SE Asia

The country has considerable natural resources in its forests, water resources and minerals and retains the highest proportion of forest and woodland in mainland SE Asia. However, the total area of forest declined dramatically from 70% of the land area, or about 17 million hectares, in 1940 to 11.6 million hectares in 1982, and to only 40% (about 9.5 million hectares) in 2010 (DoF, 2011, Table 6).

Table 6. Land use in Lao PDR (Department of Forestry, 2011)

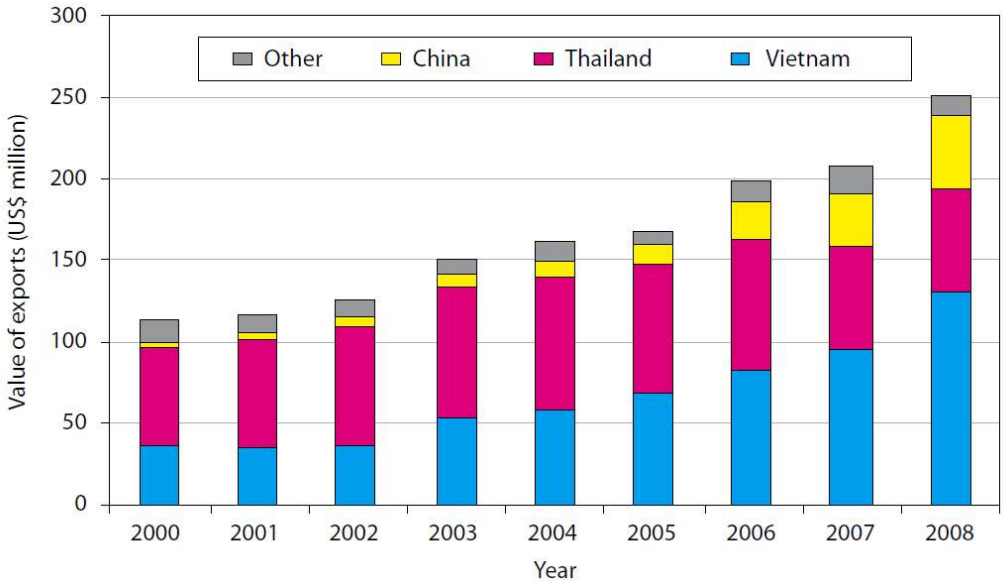
Land use type	Area (ha)
Current forest area	9 544 000 (40%)
Potential forest area (stocking <20% canopy—includes areas classified as degraded forests	8 272 000 (35%)
Other land use (incl. agriculture, urban areas etc.)	5 864 000 (25%)

All natural forests are owned by the national government, which plays a key role in their management and their economic use. In the 1990s, wood and wood products accounted for 40% of export earnings and this figure dropped to 20% in 2002–2003 as revenues from hydro-electricity sales and minerals increased(Tong 2009). Barney *et al*. (2010) estimated that timber sales accounted for roughly 12% of overall government revenue in 2006 or about US$57 million (Puustjarvi 2007).

The bulk of log and wood exports are either unprocessed wood or basic sawn wood and planks, with minor quantities further processed into strip parquet flooring, furniture and various other secondary products. The export of high-value wood products such as furniture remains extremely low, at between 1.7% and 3.2% of the total value (Tong 2009).

While bilateral trade statistics are not published by the Government of Lao PDR (GoL), importing-country statistics indicate that neighbouring countries of Thailand, Vietnam and, to a lesser extent, China are the dominant markets for Lao timber products (Figure 7).

Figure 7. Lao timber exports (all species), by country. 2000 - 2008 (Barney, *et al.* 2010)



To date, Lao PDR has not been able to extend wood processing up the value chain into value-added production, and logs and sawn timber still represent the vast majority of wood exports (Barney *et al*. 2010). In very broad terms, Vietnam imports a mix of logs and sawn wood, Thailand mainly sawn wood and China mainly logs. The Lao wood-processing industry has difficulties competing against established, sophisticated secondary and tertiary manufacturing centres in Vietnam and China: export of secondary or finished products from Lao PDR is extremely limited despite log and sawn-wood export bans (Barney *et al*. 2010).

The Government of Lao PDR (GoL) has recognised the plantation sector as one of the highest priorities leading towards economic growth and increased revenues in rural areas (Department of Forestry, 2011). Under the Forestry Strategy to the Year 2020 of the LAO PDR (revised 2010), ian ambitious target of achieving a total of 500 000 hectares of tree plantations, and 70% (natural and planted) forest cover, by 2020, has been a key strategy. To encourage achievement of these targets GoL provides incentives, including allocation or lease of land for tree planting, property rights on

planted trees, land tax exemption for registered plantations and free distribution of seedlings to farmers and organisations.

Teak and teak plantations in Lao PDR

In Lao PDR, teak is one of the country's most valuable timber species. The natural teak stands are a continuation of the large teak forests of Myanmar and Thailand. For a number of social and market-driven reasons, the area of natural teak forest in the north- western provinces of Sayaboury and Bokeo has declined from over 30 000 hectares to about 16 000 hectares. Harvesting teak from native forests is severely restricted by the Government, and harvesting is largely limited to old logs left in the forest from earlier logging operations.

Recognising the value of teak and the limitations of supply from Lao native forests, authorities began to establish teak plantations in Lao PDR in 1942. In response to strong and sustained market demand for teak timber and to perceptions of future wood shortages, the government has encouraged landowners to establish smallholder plantings of teak for the past 30 years. A large proportion of the current teak plantation estate was established and is being managed by many private, small-scale owners and for this reason accurate estimates of areas are difficult to make (Midgley, *et al.*, 2006); an international trend shared by Ball *et al.* (1999) who observed " *a general shift from establishment of large scale teak plantations by the public sector to increasing numbers of smaller plantations, grown largely by outgrowers and private investors who incorporate trees into farming systems, or as small blocks to meet long-term commercial needs*".

The total area of teak plantations in Lao PDR is undefined but probably in excess of 28 000 hectares (Midgley *et al.*, 2012) and approaching 40 000 ha (DoF, 2013). There is no formal inventory of the Lao resource of planted teak and this is holding back proposals for commercial investment in processing facilities. The northern province of Luang Prabang has the greatest concentration of teak plantations in the country—an estimated 26 500 hectares—of which 98% belongs to farmers and the private sector (Midgley *et al.*, 2012). Much of this resource is confined to areas close to road or river access for transport.

Teak is well-suited to northern Lao PDR, although is not suited to sites which are flood-prone, have gravelly or acidic soils or are above 700 m elevation (Hansen *et al.,* 1997). These factors exclude its cultivation from about 45% of northern Lao PDR and concentrate planting in the more populous areas where pressures of swidden agriculture are high. Teak plantations are usually established in association with swidden agriculture where trees are interplanted for 3 years with agricultural crops such as upland rice, sesame and pineapples (Midgley *et al.*, 2006).

Harvesting and marketing Lao plantation teak

Harvesting of teak generally begins 12 years after planting with trees reaching a merchantable size of 15 cm dbh. Most growers coordinate harvest with household needs for finance. Harvest levels of teak are steadily increasing as the resource matures. In 2006, it was estimated that over 7000 m^3 of plantation-grown teak was harvested in Luang Prabang Province; in 2010, 20 000 m^3 (Sawathvong 2010), and it is predicted that in 2012 this will rise to 40 000 m^3 (Midgley *et al*, 2012).

Midgley *et al* (2012) found that Lao exports of timber derived from plantations were dominated by teak, a large proportion of which was in the form of squared logs. The main markets are China,

Thailand and Vietnam (this study) and India is emerging as a purchaser of Lao teak. Sugimoto (2009) estimated that about 7,000 m^3 of teak was harvested annually in Luang Prabang province, of which 95% was exported. Sawathvong (2010) indicated that the annual teak harvest in Luang Prabang province was about 20,000 m^3. Both of these figures, based upon field studies, differ from the figures extracted from the records of MoIC whose records appear to be underestimates.

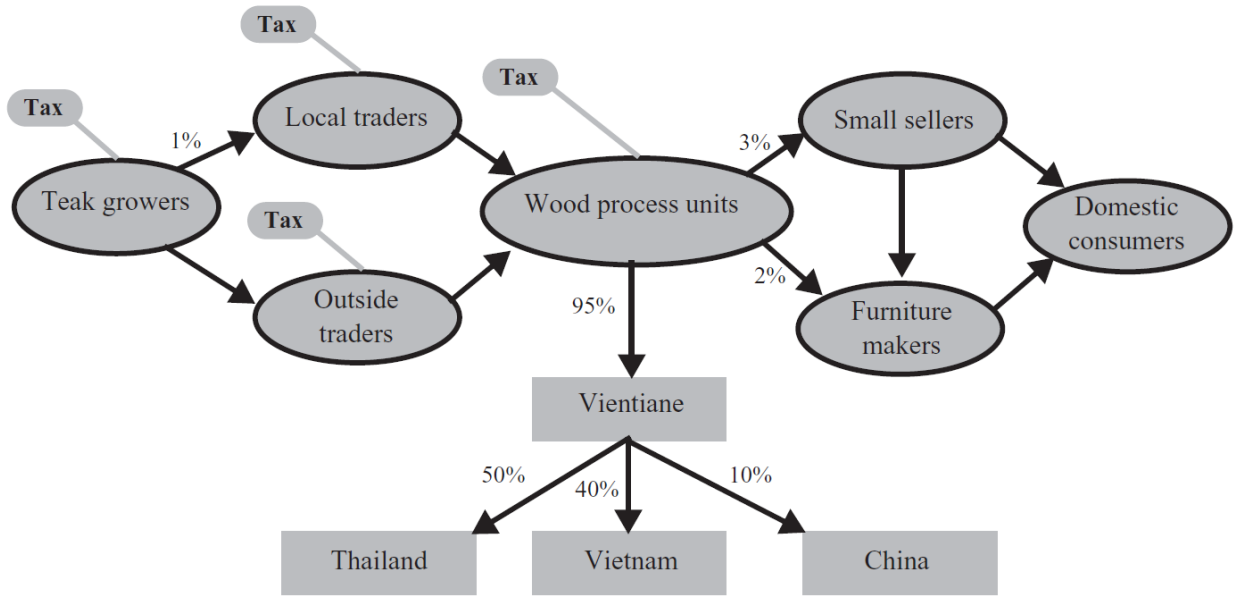
Adequate market information and effective linkages between growers, traders and processors are seen as critical to the success of the teak sector. Midgley *et al.* (2006) found that growers were disadvantaged through lack of access to market information and the prices they received for their standing trees were less than what could be reasonably expected in a transparent market.

Supply chains and market channels for teak

Very few growers market their own teak. Keonakhone (2005) described the teak market flow and concluded that most growers sold their teak trees via local and outside traders with an estimated 99 % of the teak logs in a village being purchased by outside traders and only 1 % of the teak logs by local traders. Traders play an important role in the harvest and sale or teak logs, paying growers promptly, and assuming responsibility for all paperwork and formalities for harvest and transport to the mill.

Keonakhone (2005) estimated that about 95 % of the teak wood produced in Luang Prabang was exported (Figure 8); five per cent of the teak was used locally which included teak residues produced in preparation of squared logs. Savathvong (*pers. comm*., 2006), estimated that about 50% of the squared teak logs produced in Luang Prabang were exported to Thailand, 40 % to Vietnam and 10 % to China.

Figure 8. Market channels for teak logs, Luang Prabang Province, Lao PDR (Keonakhone, 2005)



Based upon an assumed (and modest) average MAI of 5 m^3/ha/yr for teak smallholdings in Luang Prabang, and current annual establishment figures offered by Provincial authorities , log harvest in Luang Prabang will increase to 60 000 m^3 in 2020. A 2009 Asian Development Bank study estimated

that larger industrial plantation growers could produce up to 500,000m^3 by 2015 and over 1million m^3 by 2025 {Fraser, 2009 #147}. The potential wood supply available in the Lao PDR to 2030 from native forests (FMU), salvage timber from land clearing (LC), plantation logs suitable for small log processing (Pl-SLP), plantation logs for pulp (PL-Cos), rubber and Teak is provided in Figure 9.

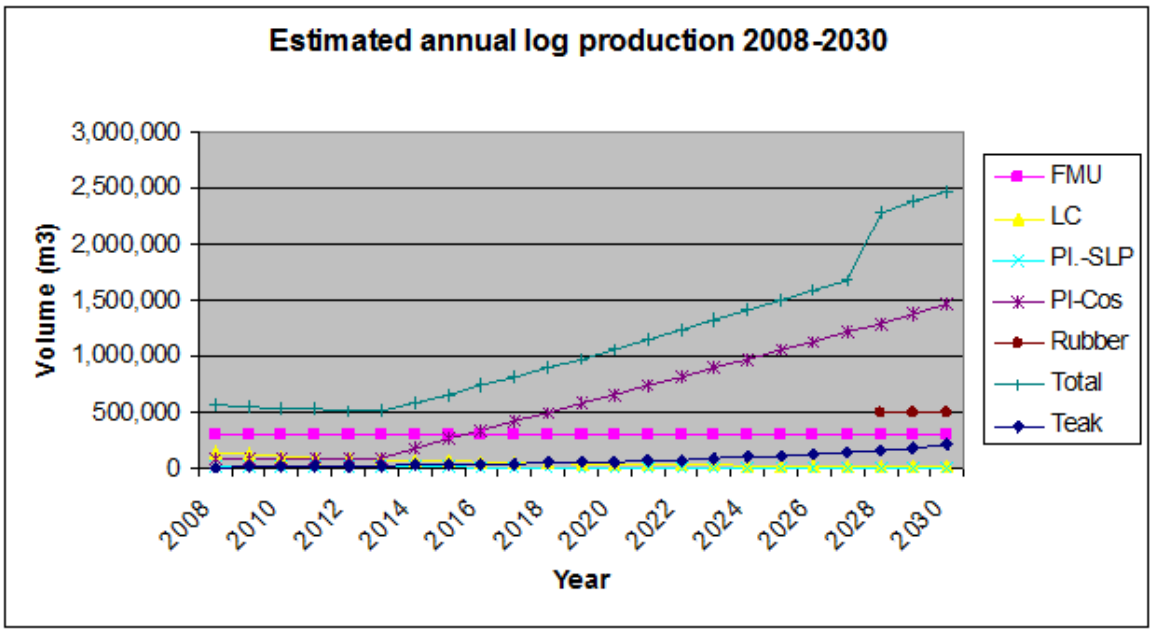


Figure 9: Estimated log production 2008-2030 from all sources in Lao PDR. Source: Fraser (2009).

The availability of a commercially significant volume of high-value plantation hardwood offers substantial opportunities for value-adding above that being currently processed.

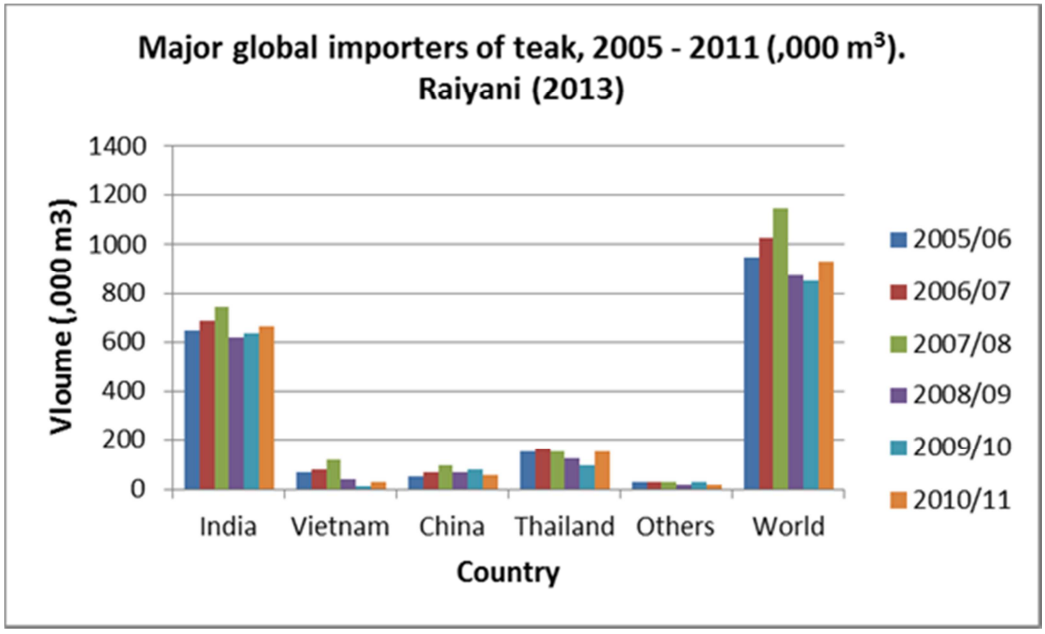
Recognising the challenges the GoL faces to address these international influences on global teak markets, WWF's Global Forest and Trade Network (GFTN), The Forest Trust (TFT) and local industry initiated the Lao Forest and Trade Platform in 2009 (http://www.tft-forests.org/news/item/?n=9868). This is a collaborative partnership in Lao PDR aiming to strengthen responsible forestry practices and encourage trade links between companies committed to achieving and supporting responsible forestry. The initiative was supported by the Swiss State Secretariat for Economic Affairs (SECO) and United States Agency for International Development (USAID) through the Responsible Asia Forest and Trade (RAFT) programme.

The major challenge for plantation growers in the Lao PDR is to produce quality teak wood that is acceptable in international markets. The adoption of an agreed set of log grading rules in collaboration with global buyers would be a good start to improving the marketability of teak wood products.

Chapter 5. Client countries for plantation-grown teak

Of the 1.5 – 2 million cubic metres of plantation teak harvested annually, in 2012 over 1.3 M m^3 was traded globally, worth over USD736 million (Table 7). Within this global trade, there are many "buying" countries and other countries which are simply 'trading" countries (such as Singapore and Hong Kong). India, China, Vietnam and Thailand are the most substantial importers of plantation teak (Figure 10) and the latter three border Lao PDR. Proximity combined with strong market demand suggests that these countries are logical markets for Lao teak. India is the world's largest importer of teak logs, comprising about 75% of the total global trade (Raiyani, 2013). China has a vast trade in forest products and is the largest wood products exporter in the world (Woodmarkets, 2013); China's forest trade value exceeded $US 118 billion in 2012, exports accounting for $US58 billion and imports $US 60 billion. Vietnam is now a major exporter of wooden furniture, ranking 6th in the world with US$4.6 billion of exports in 2012 (Binh, 2013); much of this export is based upon imported logs and lumber. Thailand is unusual in that it is a grower, an exporter and an importer of teak. In 2012, Thai imports of round and squared teak logs and sawn teak wood products exceeded 67 000 m^3 and were valued at over US$31 million, while exports of high quality logs and large cants and sawn wood (excluding furniture) exceeded 5000 m^3 and were valued at over US$12 million for the same year (this study).

Figure 10. Global and Indian imports of teak 2005 - 2010 (m^3) (adapted from Raiyani, 2013)



Between 2010 – 2012, global trade in teak logs and sawn wood grew by 47% in volume and 58% by value (Table 7), with all main importers (excluding Vietnam) recording substantial increases in import volumes and values.

Table 7. Value of teak logs and sawn wood imports by country, 2010 - 2012 (all sources)

Country	2010		2011		2012	
	Volume (m3)	Value (USD)	Volume (m3)	Value (USD)	Volume (m3)	Value (USD)
India	684467	332693284	1028372	498767010	1052926	549841250
China	123062	92074672	141699	105829809	170033	141294608
Thailand	59528	25969232	52717	26031172	73315	32963136
Vietnam	19841	12016982	15545	9638801	6716	5213695
Other	9250	4495855	13897	6740095	14229	7430287
World	**896,147**	**467,250,025**	**1,252,230**	**647,006,887**	**1,317,219**	**736,742,976**

Discrepancies in trade data

In extracting data for this survey, reliance was placed upon the integrity of the national data bases used and the Global Trade Atlas and a number of discrepancies were noted. Eastin and Perez-Garcia (2003) noted that such discrepancies within trade statistics are to be expected and anticipated within limits.

Trade flow data consists of two observations for each trade flow; the first being made by the exporting country and the second from the importing country. Observations of this same trade flow can produce contradictory outcomes. A user may find that what Country A declares as imports from Country B, may not correspond to what Country B, officially and reciprocally, declares as its exports to Country A. Janse (2004) observed that when a country reports to have exported a product to another country, it only means that it was shipped, but does not mean that it was actually received by the other country. Janse also offered a number of possible legitimate explanations for such discrepancies in data relating to global teak trade including;

- Time lags and shipping times between the exporter and the importer
- Misclassification of commodity codes (India uses 8 digit HS codes for teak products while Thailand uses 11 digit codes)
- Partner country mismatch – common in 'triangular trade" where two reporting countries may report the place of origin or final destination differently. Shipments of teak are often commissioned by traders in entrepots such as Singapore or Hong Kong or in countries where the trader may operate[19].

Under invoicing or mislabelling of wood products can be a problem for countries which have overvalued currencies, non-convertible currencies, foreign exchange controls, or restrictions on access to foreign exchange. In such countries, exporters and importers may collude to undervalue export shipments. In an effort to avoid high export taxes, high import tariffs or import quotas, exporters may misrepresent high value products such as mouldings as lower value products such as lumber (Eastin and Perez-Garcia, 2003).

Discrepancies may be used to raise doubts of legality. However, while they may reflect illegal activities ranging from harvesting to avoidance of taxes or duties (Flanagan *et al.,* 2013),

[19] In the course of this study supplying countries which are non-growing countries of teak included: AUSTRIA, BELGIUM, BOSNIA-HERZGOVINA, CANADA, CHINA P RP, CROATIA, CZECH REPUBLIC, ESTONIA, FRANCE, GEORGIA, GERMANY, IRAQ, ITALY, KAZAKHSTAN, KOREA RP, LATVIA, LITHUANIA, NEW ZEALAND, NETHERLAND, OMAN, QATAR, ROMANIA, RUSSIA, SINGAPORE, SPAIN, SOUTH AFRICA, SWEDEN, SWITZERLAND, TURKEY, UNITED ARAB EMIRATES, U K, U S A, UKRAINE

discrepancies in themselves are not necessarily a reflection of systemic corruption or unreported illegal trade (Ferrantino and Wang, 2008).

In some cases, as Janse (2004) observed, *finding possible explanations for discrepancies is one thing, proving the hypothesis right is another*.

Chapter 6 India

India consumes over one half of all teak harvested globally; substantially more than other teak-importing countries. Of the estimated global harvest of 2 – 2.5 million cubic metres, India harvests some 300 000 m^3 domestically and, in 2012, imported almost 1 million m^3 of round and squared logs (DGCIS, 2013) suggesting a total annual consumption of 1.3 million m^3. Raiyani (2013) anticipates that this will increase to an annual 2.05 million m^3 per year by 2020. Raiyani also sounds a voice of caution, warning that India has a teak estate of over 3.37 million ha with a standing volume of 371 million m^3. Should the policies and the regulatory framework for Indian forests change, there is a possibility that domestic production from India's teak planting might increase.

India's imports of teak round and squared logs

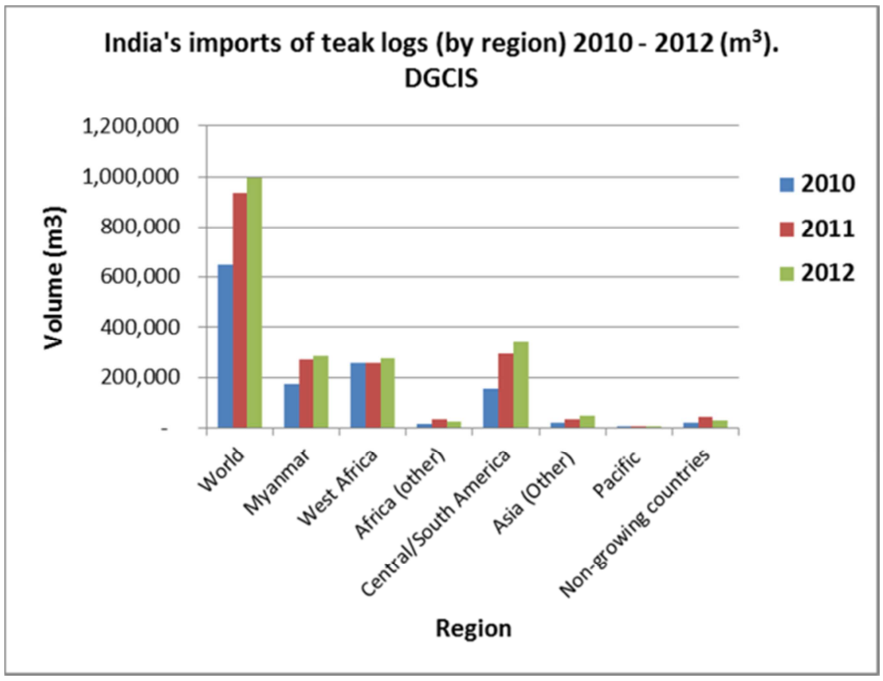
Both the volume and value of Indian import of round and squared logs have been increasing steadily since 2010 (Table 8) and these are expected to continue to grow at 5% (Raiyani, 2013). The value of rough teak imports has risen from US$320 million in 2010 to over US$528 million in 2012 (Table 8).

Table 8. India's volume and value of teak imports, 2010, 2012, 2012 (USD and m^3) (Source, DGCIS, 2013)

2010		2011		2012	
USD	Quantity (m^3)	USD	Quantity (m3)	USD	Quantity (m3)
319,316,669	647,746	470,629,047	934,268	528,525,501	996,943

India's imports are from a range of countries but dominated by Myanmar. It has been difficult to establish what proportion of Myanmar teak comes from natural forests and what from plantations. West Africa has been a consistent source of teak logs and imports from Latin America are increasing as resource becomes available (Figure 11). Sovereign risk as the result of political and civil unrest has made the teak timber trade in West Africa risky and long-term supply is uncertain. The West African markets have been forced to shift from the earlier high-quality, 20+ year old plantations material to younger/commercial teak offering lower yields and higher costs (Raiyani, 2013).

Figure 11. India's imports of teak (by region) 2010 - 2012 (m^3) (DGCIS)



Raiyani (2013) anticipated a solid Indian demand for teak of between 1.50-1.75 M m^3 per year till 2020 but expects that Indian imports from Myanmar will decrease in response to Myanmar's changing harvesting codes and export regulations.

India's imports of sawn teak timber

Imports of sawn timber have increased also in a similar fashion to logs and generally increased in both volume and value between 2010 and 2012 (Table 9). The relatively low volume of sawn timber imported is strongly influenced by the Indian preference to saw logs themselves and a willingness of major exporters (primarily Myanmar) to sell round logs.

Table 9. India's imports of sawn teak wood, 2010 - 2012. Source DGCIS.

India Import Statistics (Year ending 2010,2011,2012). Source of Data: DGCIS									
Commodity: 44072910, Sawn Teak Wood									
Partner Country	2010			2011			2012		
	USD	Quantity (m^3)	Av value/m^3	USD	Quantity (m3)	Av value/m3	USD	Quantity (m3)	Av value/m3
World	13,376,615	36,721	364	28,137,963	94,104	299	21,315,749	55,983	381
Myanmar	531,723	269	1,977	607,752	159	3,822	233,853	181	1,292
West Africa	1,209,029	2,976	406	1,625,847	3,707	439	2,162,969	5,137	421
Africa Other	6,877,187	17,058	403	6,417,127	14,456	444	5,414,464	11,877	456
Central/South America + Caribbaean	1,397,067	3,551	393	3,960,265	8,096	489	7,000,553	14,504	483
Asia Other	425,891	795	536	269,062	625	430	267,358	588	455
Pacific	65,791	141	467	45,783	107	428	163,833	348	471
Non-grower countries	2,869,927	11,931	241	15,212,127	66,954	227	6,072,719	23,348	260

Indian use and manufacture of teak products

Teak is a wood for which there is a strong cultural affinity in India. Traditional furniture styles and fancy plywoods use either large sized, mature age plantation teak (>60 years of age) or teak imported from Myanmar's natural forests. Imported teak is typically used for door and window frames, furniture, handicrafts and household goods and carpentry. The Government of India (2013) reports that a rapid rate of urbanization is driving an expansion in urban building and Somaiya

(2013), records that demand for teak has been strong in response to new buildings and an expanding housing sector; new houses require door and window frames, new furniture such as beds, wardrobes, cabinets, side tables, coffee tables, kitchens, dining tables, and chairs for homes, gardens and swimming pools. Teak is preferred for furnishings for hotels, resorts and schools.

Raiyani (2013) examined the demand for teak in India (Table 10) and provided estimates of future consumption of teak wood to 2020 underscoring the importance of the doors and windows segment as the largest component within the industry. However, the recent downturn in the Indian economy, the strong deprecation of the Indian rupee against the US dollar and a crumbling real estate market (Bradsher and Thirani, 2013) may cause these figures to be downgraded.

Table 10. India's future consumption of teak (Raiyani, 2013)

India's future consumption of teak (M m^3) (Raiyani, 2013)			
Consuming Sector	**2010**	**2015**	**2020**
Construction (Industrial)	460000	530 000	610000
Construction (Household)	200000	270000	380000
Doors and Windows	520000	660000	850000
Furniture	130000	170000	210000
Total Consumption	1310000	1100000	2050000

India's exports of teak furniture

The total Indian furniture market is substantial, estimated to have exceeded US$58 billion in 2011 and the organized furniture sector is expected to grow by 20% a year (Business Vibes, 2013). Raiyani (2013) (Table 10) confirmed this.

India's exports of wood products expanded by 27% in 2012/13 (ITTO, 2013 (b)) (Table 11) and wooden furniture was the largest component.

Table 11. Trends in Indian exports of wood products: 2011 – 2013 (ITTO, 2013(b)).

Export trends for Indian forest products 2011 - 2013 (USD million). Source: ITTO, 2013(b)		
Item	**2011/12**	**2012/13**
Cork and products	2.3	2.1
Hardboard	10	11.4
Sawnwood	16.8	28.4
Other articles of wood	114.2	162
Sandalwood chips	1.8	1
Tea chest panels	0.1	0.1
Veneer	11.6	14.4
Wooden Furniiture	274.8	333.4
Plywood products	16.1	14.8

Industry sources consulted in the course of this study suggest that teak constitutes a significant proportion of wood furniture exports from India. These exports were valued at $592 million in 2012 (DGCIS) and were directed mainly towards to markets of North America and the European Union (Figure 12), both of which are sensitive to the needs of legality and certification. This will have an inevitable impact upon the sourcing policies of industries involved in wood furniture manufacture.

Figure 12. India's export of wooden furniture 2012 (US$). Source: DGCIS

For India, products listed under the EUTR have an annual export value of around US$1.3 billion, and in 2012, six EU Member States accounted for more than 12% of this total value. India's exports of

value-added timber and timber products to the EU and other markets are increasing, with these products manufactured from both domestically sourced and imported timber. Although illegal logging for commercial production is not considered a serious problem in India, which has a long history of forest management policies and laws, the large volumes of imports could ultimately harm export markets unless sourced legally (Manoharan, 2013).

Chapter 7 China

China's wood products trade

Furniture, paper products, plywood, fiberboard and selected wood products play the most important roles in China's forest products exports. The value of China's trade in forest products was USD118.8 billion in 2012. Of the total trade, imports accounted for $61.3 billion, a decrease of 6% over 2011 and exports accounted for $57.6 billion, an increase of 5% over exports in 2011 and were dependent upon imports of raw materials (Woodmarkets, 2013).

Wood furniture and wooden doors, both sectors which use teak imports, were valued at over US$12.5 billion and growing at over 5% (Table 12).

Table 12. China's wood products exports, 2011 - 2012. Volume (,000 m^3) and Value (USD million). Source Woodmarkets, (2013).

Products Sector	Volume (,000 m3)		Value (USD million)	
	2011	2012	2011	2012
Wood Furniture (million pieces)	202	200	11321	11911
Wood Doors (tons)	307586	321273	579	619
Plywood	9372	10033	4340	4796
Fibreboard	3458	2532	1548	1670
Particleboard	191	208	50	63

Despite the magnitude of this trade and the size of the domestic markets, the rising costs of labour and raw materials and weaker export markets for furniture and wood products, present challenges for China's wood products sector (Woodmarkets, 2013).

China's furniture sector

China has become the world's biggest producer and exporter for furniture products. The China National Light Industry Information Centre reports that the total Chinese furniture manufacture value reached $154 billion in 2011, an increase of $39 billion (or 25% increase year-on-year). Exports from the Chinese furniture sector represent 35.3% of global furniture trade (Business Vibes, 2013). The wooden furniture export component of these exports reached $17.5 billion in 2012. A substantial proportion of the raw materials for the wooden furniture export markets are based upon imports.

Figure 13. China wood furniture export value 2006 - 2012 (USD mill) (Source: USDA, 2012)

China exported 200 million pieces of wood furniture in 2012, and their leading markets were USA, Japan, UK, Germany and Australia (Table 13) (Woodmarkets, 2013).

Table 13. China's exports of wooden furniture by country (Volume (mill pieces) and Value USD million)

Country	Volume (million pieces)		Value (USD million)	
	2011	2012	2011	2012
USA	63.8	64.8	3367	3771
Japan	19.6	18.9	701	764
UK	10	11	479	584
Germany	9.3	9.6	332	373
Australia	9	9.5	417	449
France	6.4	7.2	268	297
Canada	6.9	0.1	345	384
Holland	4.2	5.1	114	122
Others	73	74	5296	5166
Total	**202.2**	**200.2**	**11319**	**11910**

Manufacturers within China's wood furniture industry are concerned that, after years of rapid increase, China's wood furniture exports will stagnate over the next few years as prices and environmental sensitivity rises, causing their products to be less competitive (USDA, 2012). China has recently been losing furniture production to countries with lower labour costs such as Indonesia and Vietnam, as well as to some newer emerging countries including Bangladesh and Cambodia. To remain competitive, manufacturers are focusing on lowering manufacturing costs.

In addition to wood furniture, China exported wooden door products valued at US$619 million in 2012, an increase of 26% in value over 2011 (Woodmarkets, 2013). The main markets were the USA, Japan, Hong Kong, Romania and Canada. Plantation teak comprises a significant, but undefined, proportion of door markets.

Chinese imports of teak round logs and squared logs

In 2012, China's imports of teak roundlogs and squared logs exceeded 114 000 m^3 worth more than US$92 million. Myanmar remains the primary source for China's imports of teak round logs and squared logs (Figure 14) offering 78% of total imports.

Figure 14. Chinese imports of teak logs (round and squared) by region, 2010 - 2012 (m^3) China Customs.

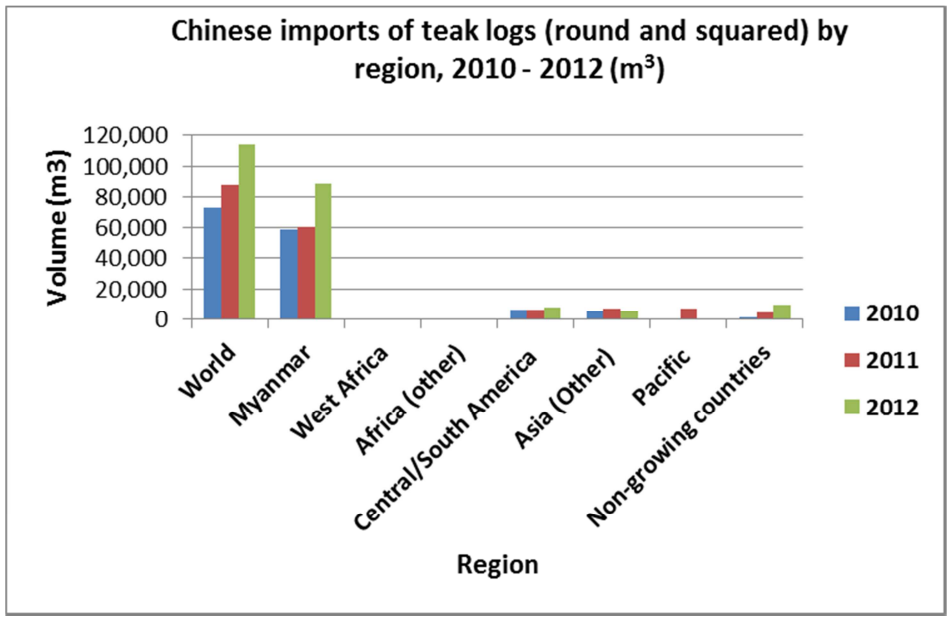


Table 14. Sources of supply for teak round logs and squared logs 2010 - 2012 (m^3, USD and USD/m^3)

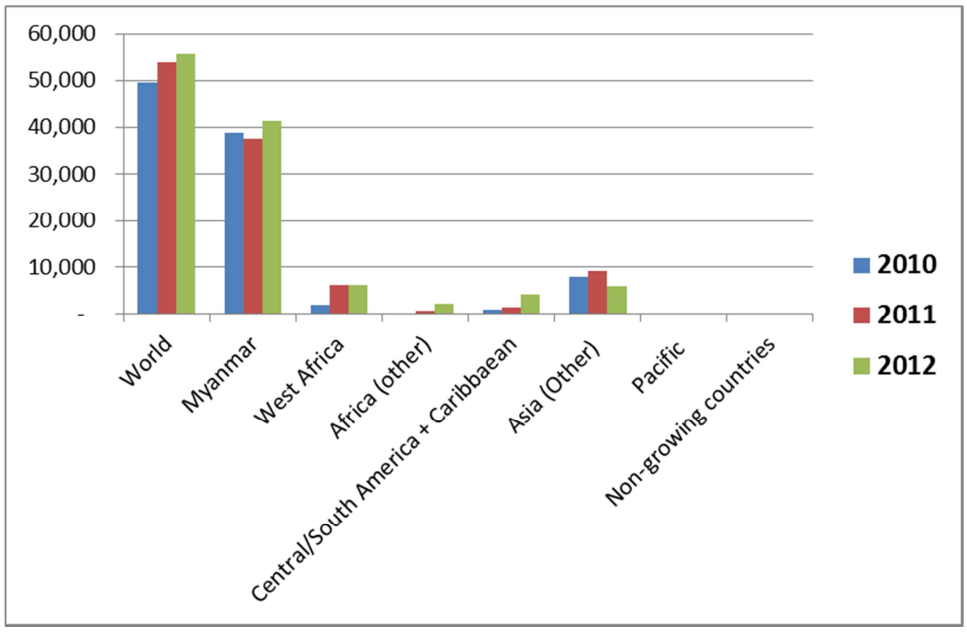
Supplying country	2010			2011			2012		
	Volume (m3)	Value (US$)	Av value/m3	Volume (m3)	Value (US$)	Av value/m3	Volume (m3)	Value (US$)	Av value/m3
World	30809	17201151	558	28372	15942010	562	20456	12010299	587
Myanmar	9930	7089649	714	4418	3686845	835	3736	3170627	1725
West Africa	848	458715	1069	230	138154	601	0	0	0
Africa (other)	0	0	0	0	0	0	0	0	0
Central/South America	17895	8819079	4473	22370	11636658	3280	16387	8599781	4341
Asia (Other)	667	222547	1037	282	89462	317	223	44570	200
Pacific	1033	381247	369	1046	379378	363	0	0	0
Non-growing countries	438	229914	525	26	11514	448	110	195321	1774

China's imports of sawn teak timber

Import patterns for sawn timber mirror those of teak logs with Myanmar remaining the primary supplier providing 78% of imports (Figure 15). In 2012, China's imports of teak sawn timber exceeded 49,718 m^3 worth more than US$41 million.

From 2010 – 2012, Chinese imports of teak sawn timber steadily increased in terms of both volume and value with the bulk of the demand being met from static supplies from Myanmar but with increasing amounts from West Africa (Figure 15)

Figure 15. Chinese import trends for teak sawn timber 2010 - 2012 (m^3) China Customs

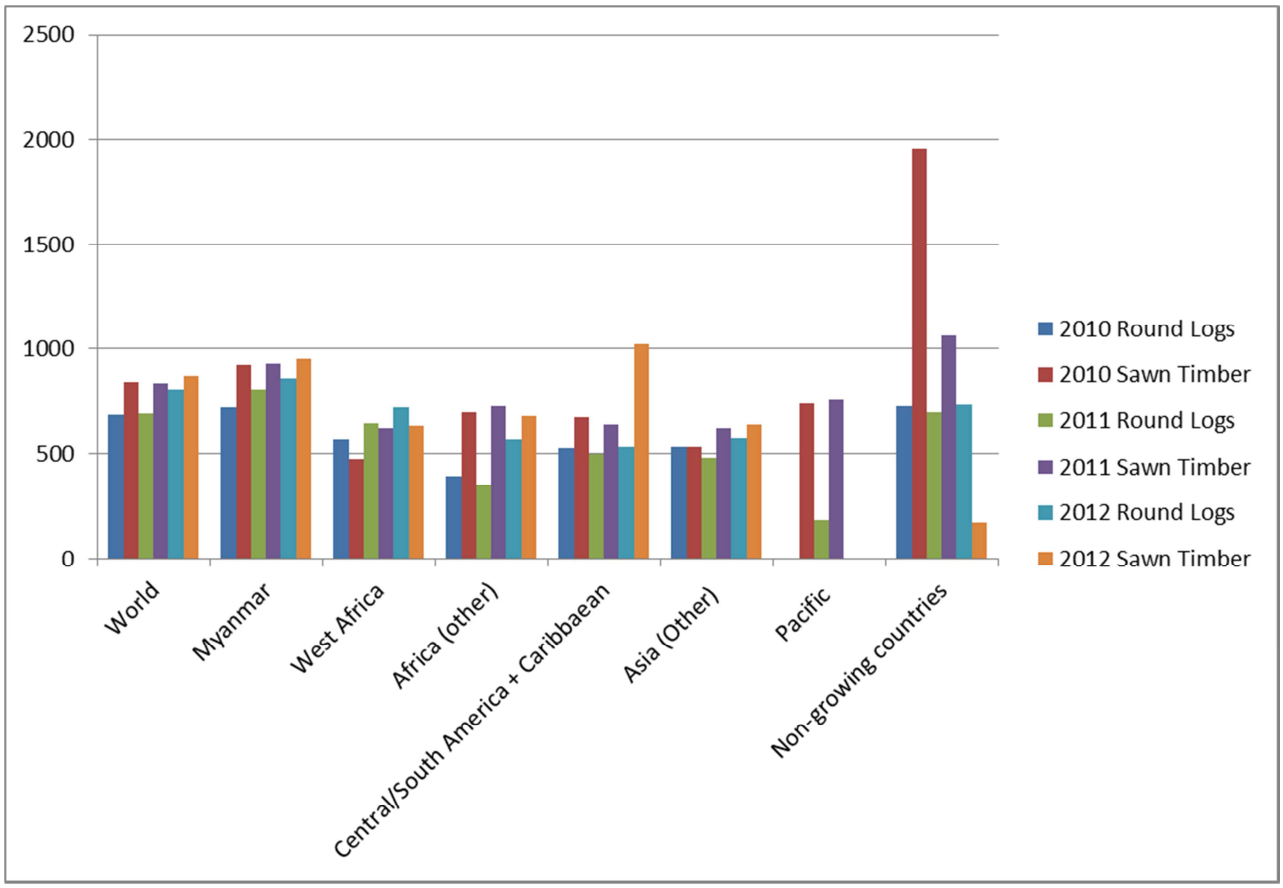


Over the 3 year period, the rate of increase in imports of roundlogs and squared logs (73,416 to 114,1569 m^3) was greater that the increase for sawn timber (49,718 – 55,846 m^3), perhaps reflecting an increased processing capacity in China.

Average Chinese prices for teak round logs, squared logs and sawn teak timber

Whilst the recorded CIF values for roundlogs, squared logs and for sawn timber vary greatly between shipments and with quality, an attempt has been made in Figure 16 to compare average prices for roundlogs and squared logs from different regions. The Figure also attempts to make the same comparison for sawn timber. The obvious conclusion is made that sawn timber is more highly valued than logs. The data suggest that there is an upward trend in average values over the past 3 years. This may be due to a number of factors including the influence of shipping costs upon CIF values. Understandably, values of shipments from Myanmar are high, reflecting the natural forest origins and larger sizes of logs and higher quality sawn timber.

Figure 16. Average values (USD/m^3) for teak logs and sawn timber from Regions



China's domestic demand for teak

China's domestic demand for teak products is linked to growth in the housing and construction industries which is forecast to expand by 10% annually over the next five years (Timetric, 2013). The country's immense need for greater housing supply and better infrastructure networks to cater for rapid, large scale urbanization is creating strong markets. Over 10 million workers migrate from rural areas to urban centres every year, creating a huge demand for housing. To meet real demand, housing sales nationwide are at record levels and demands for furnishings will rise (Timetric, 2013).

Chapter 8 Vietnam

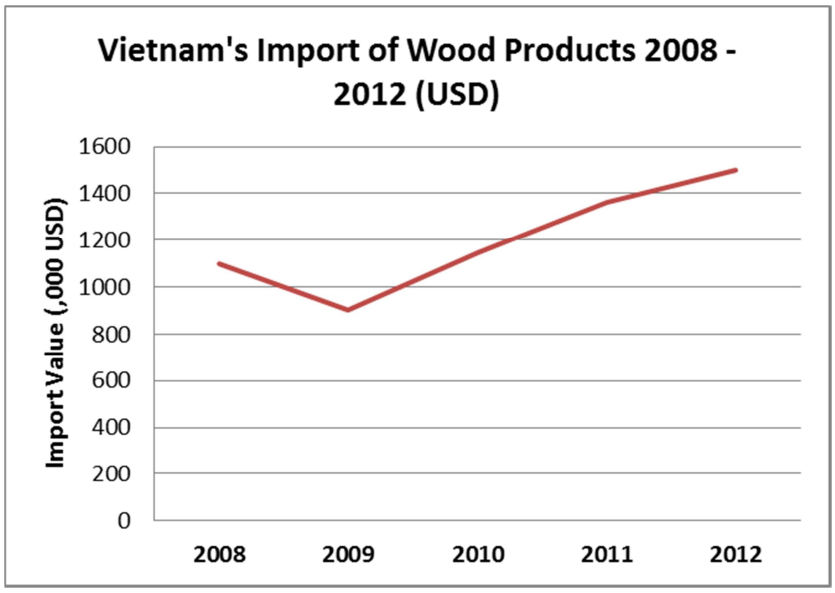
Vietnam's wood furniture sector

Vietnam is now a major exporter of wooden furniture ranking 6th in the world (second in SE Asia) behind other large manufacturers such as China, Poland, Italy and Malaysia: exports exceeded US$4.6 billion in 2012 (Binh, 2013). The industry plays an important role in the local economies of Vietnam, particularly in the south-east of the country and the sector employs over 300 000 people. Domestic consumption accounts for 10% of production while the remaining 90% is exported. The export industry of wooden furniture has increased steadily over the past 17 years (Figure 17)

Figure 17. Vietnam's exports of wooden furniture 1996 - 2012 (USD) (Source: Salwood Asia Pacific own compilations).

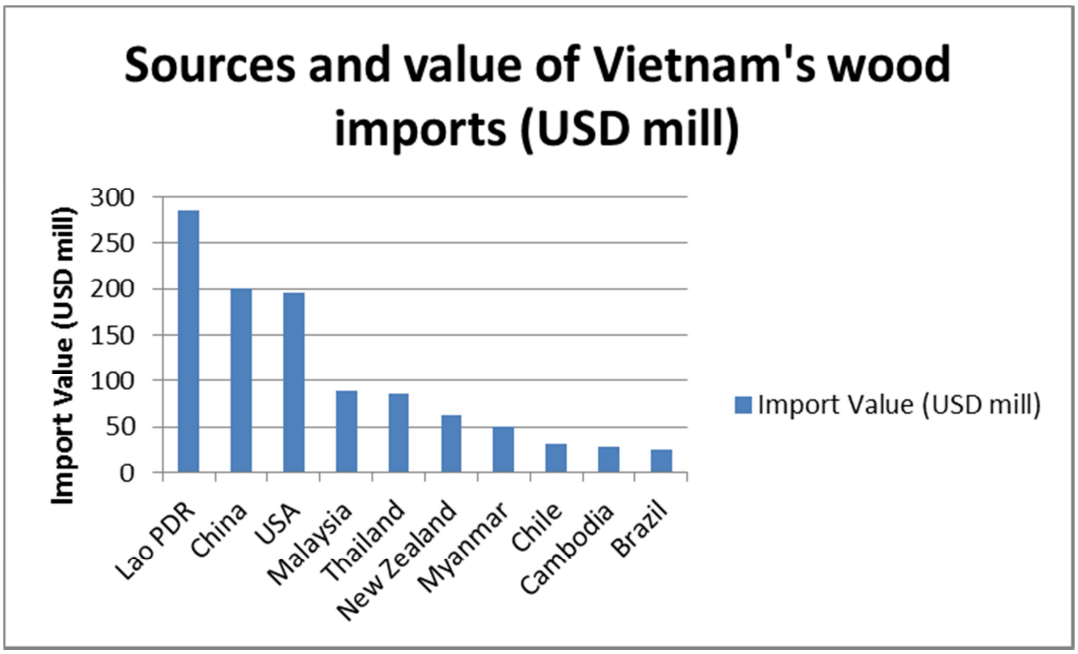
A significant part of this export is based upon imported logs, lumber and wood panels which reached 1.5 billion in 2012 (Binh, 2013)(Figure 18). Vietnam has a series of deep water ports and is well-positioned to receive ocean freight as break bulk or in containers. Vietnam also relies upon its domestic resource of acacia plantations (900 000 ha) for supply of wood to the furniture industries.

Figure 18. Vietnam's imports of wood products 2008 - 2012 (USD million) (Binh, 2013).



The sources of these imports of wood products in 2012 were dominated by logs from neighbouring Lao PDR (US$285 million) and China (US$200 million) (Binh, 2013) (Figure 19). Although Vietnam imported US$1.5 billion of logs, sawn timber and panel products in 2012 to meet needs of the furniture industry, very little of this was teak (an estimated US$12 million in 2012).

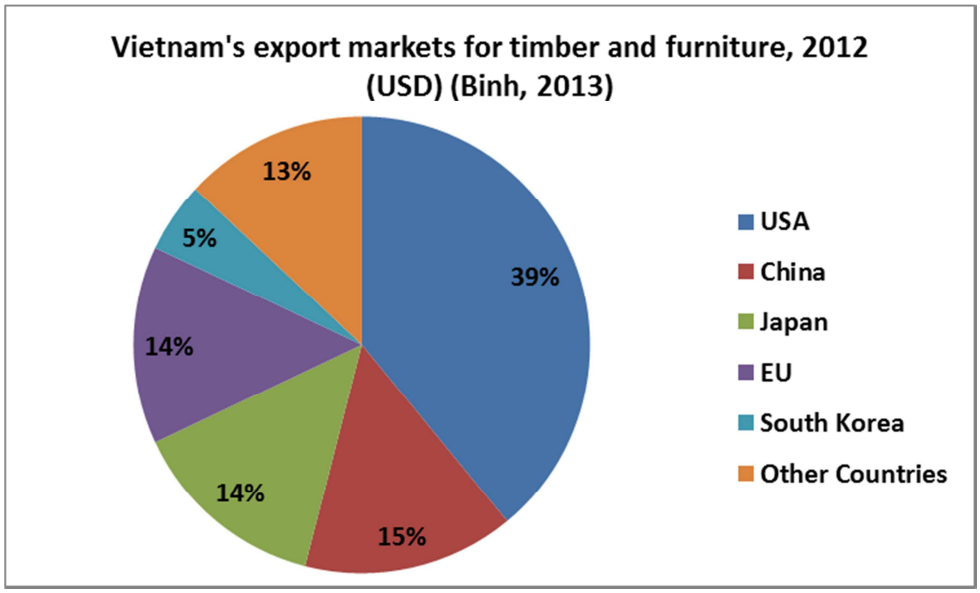
Figure 19. Sources and value (USD million) of Vietnam's wood imports (Binh, 2013).



Vietnam's exports to China (15%) are both sold in China and re-exported. Several large Chinese furniture producers re-located to Vietnam to take advantage of Vietnam's favourable trade access to the US markets and to counter increasing labour and other costs at Chinese manufacturing hubs. Vietnam's largest markets are the USA, China, Japan and the European Union. The US and EU markets, totalling 53% of Vietnam's export markets of US$4.67 billion for timber and furniture in 2012 (Figure 20), are becoming increasingly sensitive to the needs of legality and certification in wood trade. Binh (2013) has identified the importance which the Vietnamese industry is now placing

upon wood from legal and certified sources to meet the needs of the Lacey Act, the EUTR and the requirements of the forthcoming Vietnamese TLAS.

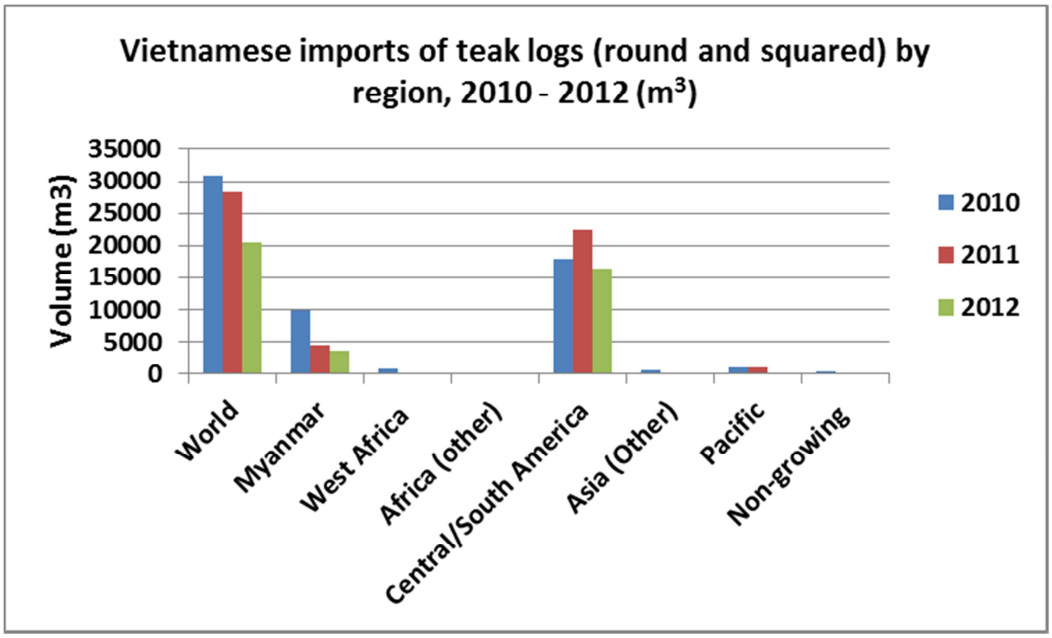
Figure 20. Vietnam's export markets for timber products and furniture, 2012 (US$4.67 bill) (Binh, 2013).



Vietnam's imports of teak round logs and squared logs

Vietnam's imports of teak round logs and squared logs appear to be decreasing (Figure 21). Pressure for legal timber and a preference for certified timber on the part of Vietnam's export industries may explain the significant reduction in imports from Myanmar and other sources which lack processes to demonstrate legality. Many of the plantations in Central and South America have gained FSC status and this may explain their dominant place in the Vietnamese market.

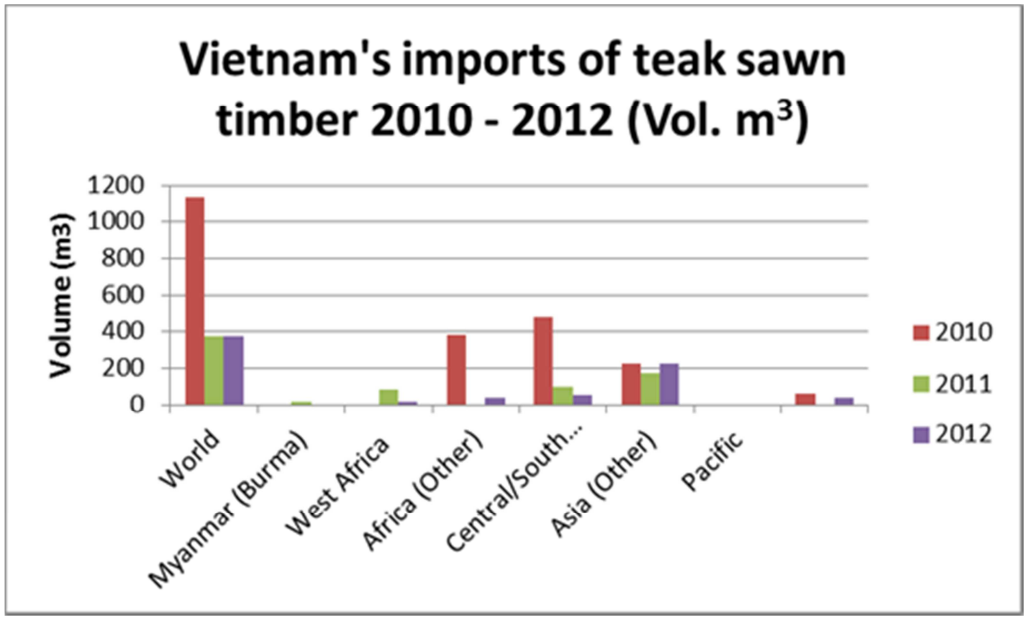
Figure 21. Vietnam's import of teak round logs and squared logs by region 2010 - 2012 (Volume m^3)



Vietnam's imports of teak sawn timber

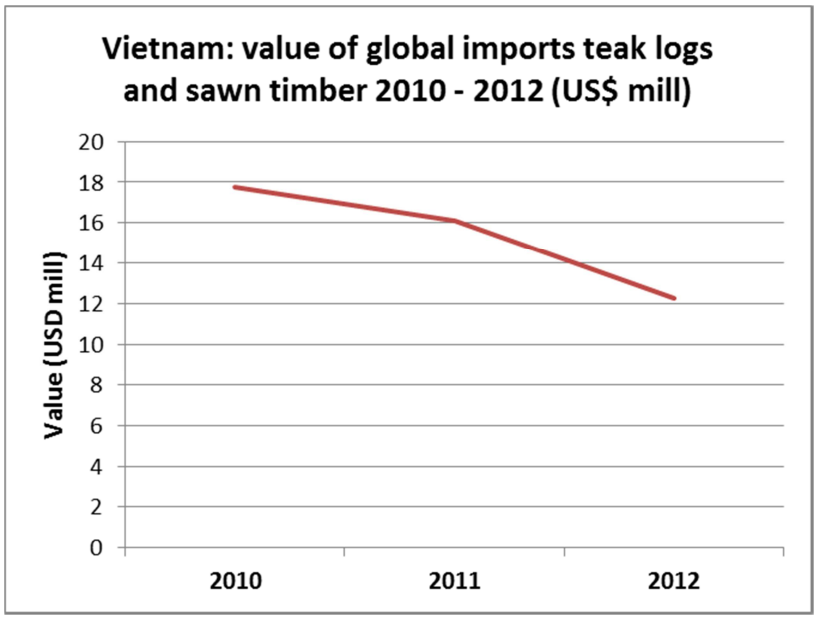
Imports from Asia (apart from Myanmar) have remained constant but imports from Central America and Africa have declined markedly (Figure 22). Industry informants suggest that Vietnam's client countries are driving a preference for certified wood. It appears that there is very little certified teak in the world and furniture manufacturers are moving towards alternative sources of wood (rubberwood and acacia) which may have better legal and certified credentials.

Figure 22. Vietnam's imports of teak sawnwood 2010 - 2012 (m^3)



Analysis of Vietnam's total teak imports (logs and sawn timber) indicates a steady and parallel decline in values of teak imports over the past 3 years (Figure 23).

Figure 23. Vietnam's imports of all teak 2010 – 2012 (USD million)



Vietnam's use and manufacture of teak products: the impacts of certification.

Ninety per cent of Vietnam's wood furniture production is exported. Of this, more than 67% is exported to Japan, USA and the EU (Figure 20), all markets which are demanding of legality and, increasingly, certification. The demand for legal and certified wood may cause processors to offer premium prices for logs and sawn timber which meet these international standards. Discussions with Vietnamese members of WWF's Global Forest Trade Network (GFTN) suggested that they would offer around 20% more for FSC certified logs and 10% more for 'Controlled wood' for particular products.

Chapter 9 Thailand

Thailand is unusual among the clients for teak from the Lao PDR in that it is a grower of native and plantation teak and both an importer of teak logs and sawnwood and an exporter of finished and semi-finished teak products. It is also the most longstanding client for teak from Lao PDR and strong business linkages exist.

Traditionally, the forest sector has been an important component of the Thai economy. However, logging and conversion to agriculture have resulted in substantial land-use changes over the past 50 years. Presently, the forest area of Thailand covers approximately 33% of the total land area (16.8 million hectares), of which about 96% is natural forest. The current area of forest cover is considered below the Government's target level of 40 % forest cover (25% for conservation and 15% for economic forest) and several policy initiatives and incentive programs have been initiated which encourage tree planting. Following the Commercial Forest Plantation Act 1992, several projects were initiated; one of which provided subsidies between 1994 – 2002 of $780 over a 5 year establishment period to encourage landowners and local farmers to establish plantations on their own land and; the Farmer Debt Swap for Forest Plantation Project (2005 – 2007) implemented by the Ministry of Natural Resources and Environment (MNRE). This project has reportedly helped approximately 300,000 farmers reforest about 3,200 km^2 in exchange for reducing their debts by about US$236 million (Eastin, 2011). Much of this tree planting activity used teak

In response to policy changes (including a logging ban in 1989) and market opportunities, Thailand now has substantial areas of planted trees with some 2.9 million ha of rubber (USDA, 2013), 826 000 ha of teak (RFD, 2009) and 500 000 ha of eucalypt (GIT Forestry Consulting, 2009).

Teak in Thailand

The native "teak region" or "teak bearing area" of Thailand (in the north and west of the country) was estimated by Mahaphol (1954) to be 2.3 million ha, some of which is now found in protected areas. Thailand first teak plantations were established in 1906 (Pianhanuruk, 2008) and the country now has a planted teak resource of an estimated 836 000 ha (RFD, 2009); 100 000 ha of which is controlled and managed by the government owned enterprises, the Forestry Industry Organisation (FIO) and the Thai Plywood Company, over 100 000 ha by concessionaires and private landholders and the remainder owned and managed by the Royal Forest Department. Estimates of the land managed and actual area of plantations vary between data sources and many plantations are smallholder owned or informal line plantings and are not included in formal forest inventory data. Plantations of teak, especially those managed by FIO, are primarily in the north of the country.

Teak plantations and harvesting are regulated in a number of ways in an effort to segregate plantation grown teak from the native resource. Teak plantations should be registered with the local office of the RFD or its equivalent in the Provincial Ministry office. Permits are required from the RFD to fell and transport plantation timber (Heuch, *et al*., 2012).

Pianhanuruk (2008) observes that it is highly unlikely that Thailand will be able to expand wood production from domestic sources in the short to medium term. The existing resource of mature plantations is fully committed and the bulk of the teak plantings are immature. Government policies designed to expand forest cover in Thailand mean that the plantation resources of teak controlled by the Government are unlikely to be harvested.

Thailand's trade in forest products

Thailand has a large and diverse trade in forest products. Imports amounted to almost US$3.3 billion in 2010 (2% of total imports, by value) whilst exports in 2011 totalled over US$5.5 billion; 2.7% of total exports, by value (Heuch, *et al*., 2012). Discrepancies in volumes and values make detailed analysis and reconciliation difficult.

In 2010, rough and round wood was imported from 23 countries, categorised in 16 Harmonised System (HS) customs codes, whilst sawn wood was imported from 52 countries, categorised using 59 HS codes and totalled 3.3 million m^3. The prime sources of Thailand's imports of sawn wood are Malaysia and Lao PDR. This great diversity in Thailand's forest industries is demonstrated through some 17 724 factories licenced to process and/or sell wood (Heuch, *et al*., 2012) of which 828 were classified as sawmills.

The largest source of domestic hardwood in Thailand is rubberwood of which 5 – 6 million cubic metres are harvested annually (USDA, 2013). Sawn timber exports of 2.8 million m^3 for 2010 were dominated by rubberwood to China.

Thailand's wood furniture sector

The Thai furniture sector is export-oriented with wood furniture exports accounting for around 45% of the total sector output. The Centre for Industrial Studies (CSIL) ranks Thailand as the 27th furniture exporter at a world level (Tracogna *et al*., 2012) with an estimated export value of US$550 million in 2011 (Heuch, *et al*., 2012). Although from 2008-2010, Thailand's wood furniture exports were valued between US$566 – 600M annually, the total value of the domestic Thai furniture market increased to about US$2 billion in 2012 (USDA, 2013).

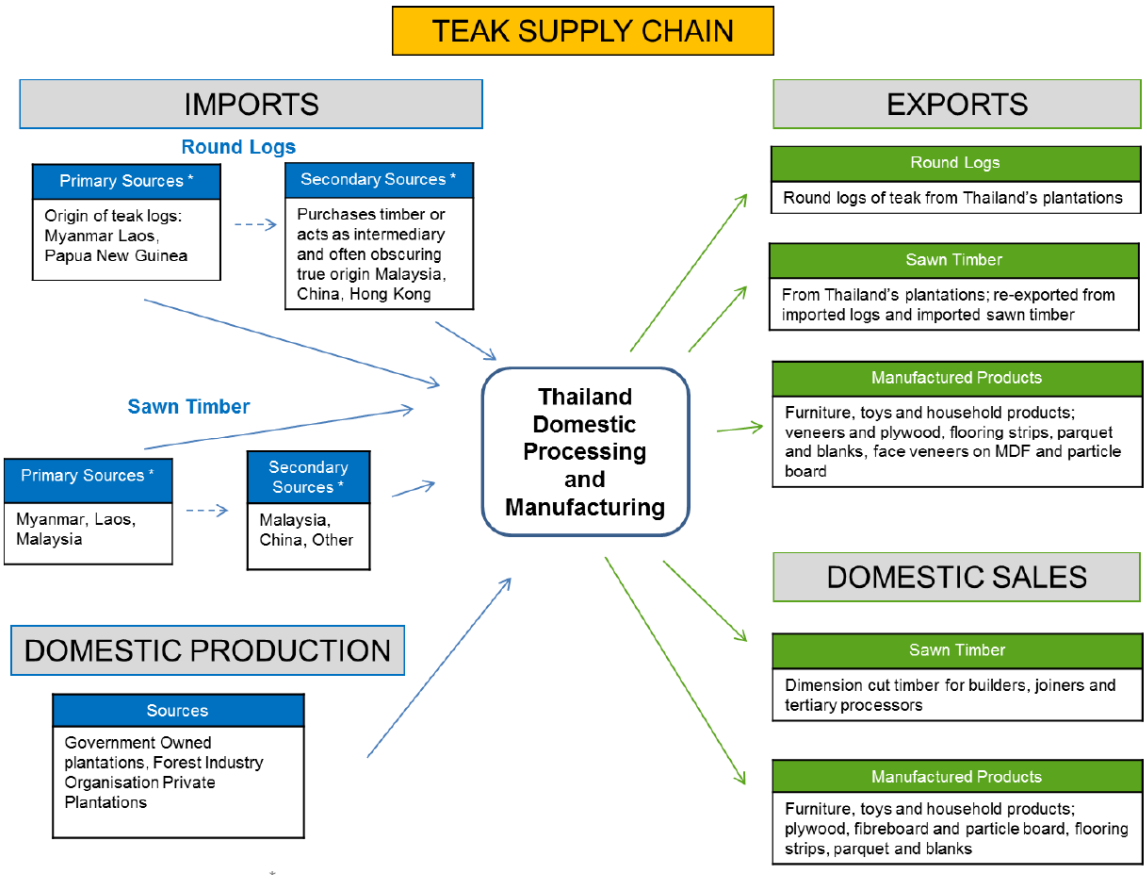
Thailand's trade in teak

In 2012, Thai imports of round and squared teak logs and sawn teak wood products exceeded 67 000 m^3 and were valued at over US$31 million (this study). Exports of high quality logs and large cants and sawn wood (excluding furniture) exceeded 5000 m^3 and were valued at over US$12 million for the same year (Figure 29)

Heuch, *et al*. (2012) found that primary sources of Thai teak imports were Myanmar, Lao PDR, Malaysia and China. Since there are limited plantation resources of planted teak in both China and Malaysia, it is likely that timber imported from these countries originated elsewhere, probably Myanmar or Indonesia. Imported teak may be imported as round logs, squared logs, sawn timber and semi-processed or semi-finished boards. Heuch *et al.* (2012) developed a model supply chain to demonstrate the dynamics of teak wood supply in Thailand (Figure 24).

Generally, teak in Thailand is used for high value end use. Imported teak is usually larger dimensions and of higher quality than domestic-grown plantation teak and so used for high-value products and products involving solid wood construction such as furniture, flooring strips and parquet blocks. Teak logs are also veneered and teak veneers used to face plywood, chipboard, particle boards, MDF and blockboard.

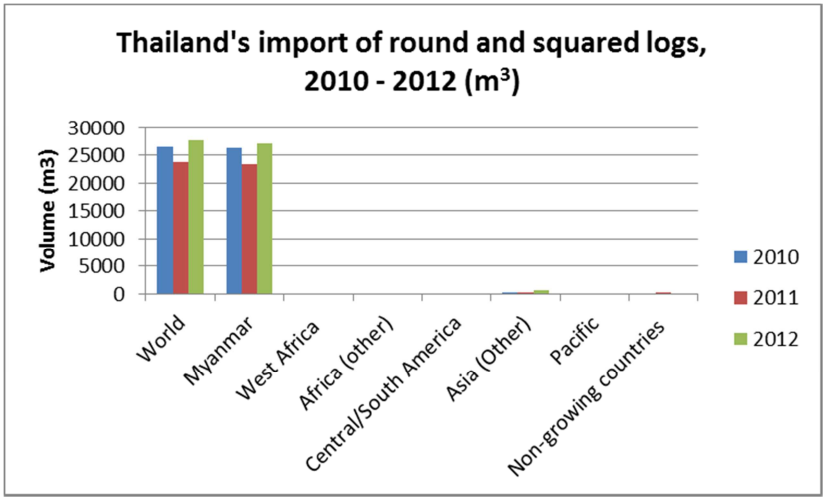
Figure 24. The dynamics of Thai teak wood supply (Heuch, *et al*. 2012)



Thailand's imports of teak round logs and squared logs

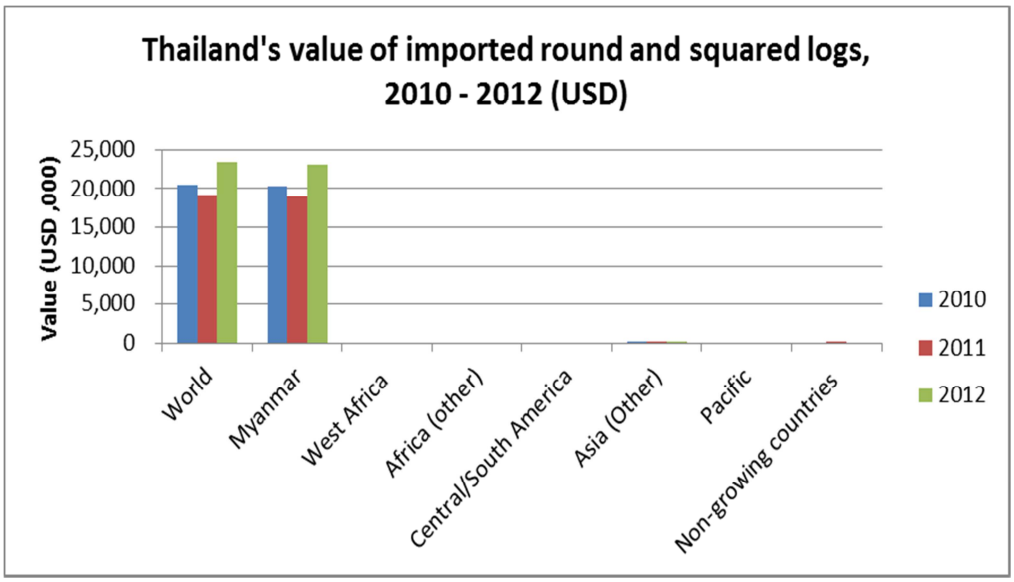
Thailand's imports of teak round and squared logs are dominated by supply from neighbouring Myanmar (Figure 25, Table 15, Table 16) which supplied over 97% (27 162 m^3) in 2012. Although Lao PDR and Malaysia supply Thailand, these amounts are relatively small (2% or 595 m^3) although some significant discrepancies in volumes and values can make detailed analysis and reconciliation challenging. Informal information from traders in Lao PDR, for example, suggests that the current figures are serious underestimates.

Figure 25. Thailand's import of round and squared logs 2010 - 2012 (m^3)



The annual value of Thailand's imports of round and squared logs has varied from US$19 – 23 million over the past 3 years (Figure 26). The high imports from Myanmar are expected to be threatened by the proposed changes to timber export policies in that country.

Figure 26. Value of Thailand's imports of round and squared logs, 2010 - 2012 (US$)



Thailand's log imports of teak are dominated by those from its neighbours (Table 15). The higher unit value from Myanmar reflects the large size and higher quality of logs from the natural forests typical of that source.

Table 15. Thai imports of teak round logs and squared logs 2010 - 2012 (Volume, USD and USD/m^3)

Supplying country	2010			2011			2012		
	Volume (m^3)	Value (US$)	Av value (US$/$m^3$)	Volume (m^3)	Value (US$)	Av value (US$/$m^3$)	Volume (m^3)	Value (US$)	Av value (US$/$m^3$)
World	26541	20499834	772	23798	19098381	803	27757	23302376	840
Myanmar	26309	20347604	773	23414	19036585	813	27162	23128478	852
West Africa	0	0	0	0	0	0	0	0	0
Africa (other)	0	0	0	0	0	0	0	0	0
Central/South America	0	0	0	0	0	0	0	0	0
Asia (Other)	232	152230	656	78	21207	272	595	173898	292
Pacific	0	0	0	0	0	0	0	0	0
Non-growing countries	0	0	0	306	40588	133	0	0	0

Thailand's imports of teak sawn timber

Analysis of Thailand's teak imports indicates a significant increase in volumes from Myanmar over the past 3 years (Figure 27) and they reached US$8 million in 2012 (Figure 28). Thailand's neighbours, Lao PDR and Malaysia remain small suppliers. Data from Lao PDR is problematic as much of the trade in plantation teak logs (both round and squared) crosses the border informally and often squared logs are classified as "sawn timber".

Figure 27. Volume of Thailand's imports of teak sawn wood, scantlings and boards 2010 - 2012 (m^3)

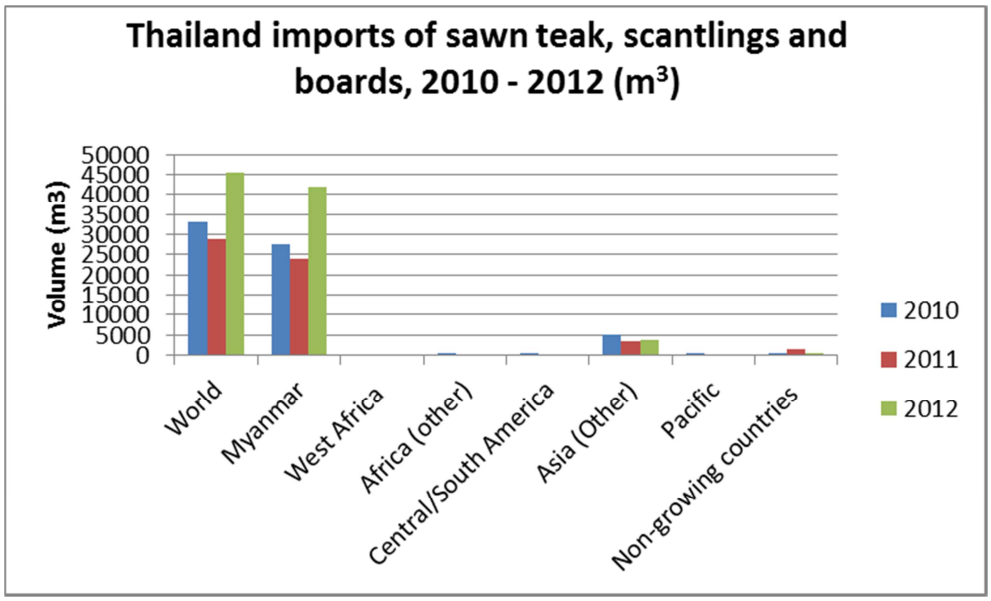
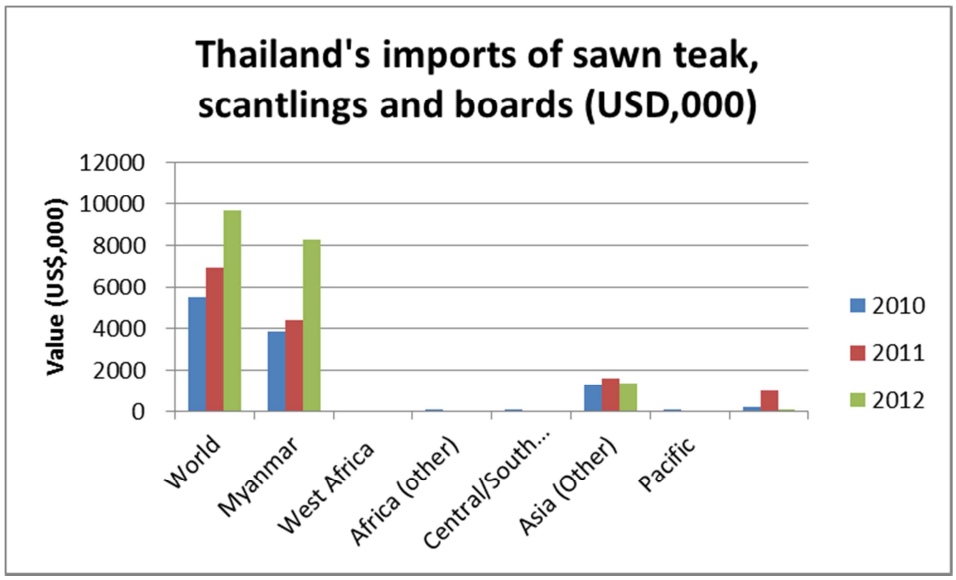


Figure 28. Value of Thai imports of sawn wood, scantlings and boards (US$, 000)



Although teak sawn wood imports have increased over recent years, almost all of this has been sourced in Myanmar and will be affected by the changes to teak marketing which have been foreshadowed for that country. Industry sources in Thailand have expressed a preference for rough-sawn, kiln dried sawn timber. Green sawn timber can become mouldy and stained during transport, causing quality degrade. Kiln dried lumber at 8 – 10% moisture content is preferred. Thai processors also have a preference for rough sawn lumber as this avoids the 5% import tariff on S4S (finished 4 sides) timber.

Thailand's exports of teak logs and sawn wood (excluding furniture)

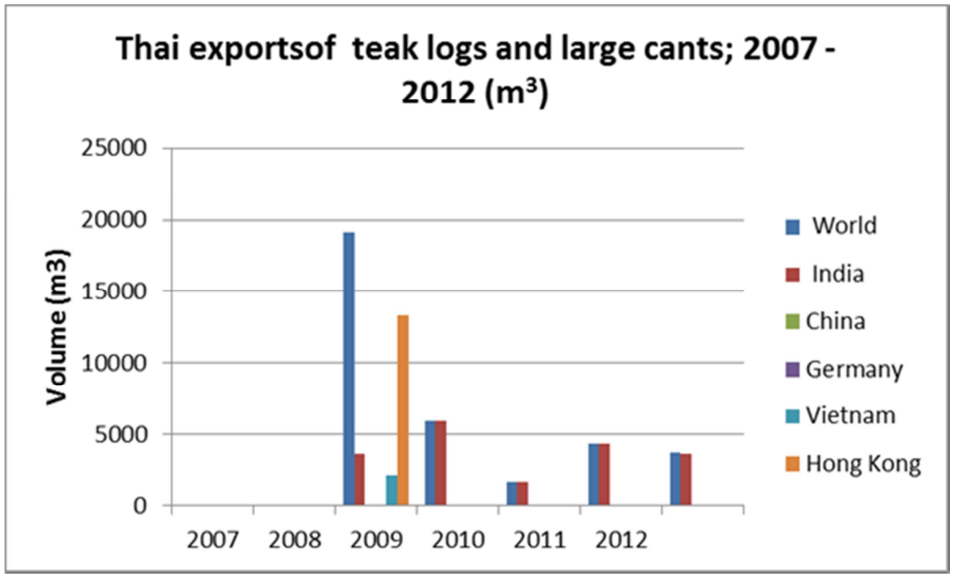
In 1991, export of teak logs and lumber was initially prohibited and then subsequently restricted to exports by FIO. The only exceptions being export in the form of processed products or veneers (Pianhanuruk, 2008). Thailand exports a wide range of teak products including joinery, furniture,

flooring and manufactured items. Board products and plywood faced with teak are popular products. Larger dimension products and high quality (marine ply, boat decking, solid wood furniture) tend to be from imported timber. Domestic timber (with smaller dimensions) provides flooring, and other manufactured products.

Almost all of Thailand's export of teak logs and sawn wood products (excluding furniture) are of the highest quality destined for wealthy markets.

India appears to be the dominant market for high grade logs and wood slabs for high quality sliced veneers and other high quality products (Figure 29). The only organisation authorised to make such exports is the FIO and this is a strictly controlled market.

Figure 29. Thai exports of high quality logs and large cants: 2007 - 2012 (m^3)



Thai exports of sawn wood vary from small cheap boards to marine decking of the highest quality, commanding prices of over \$8000/m^3. Europe and the USA are dominant in these markets (Table 16)

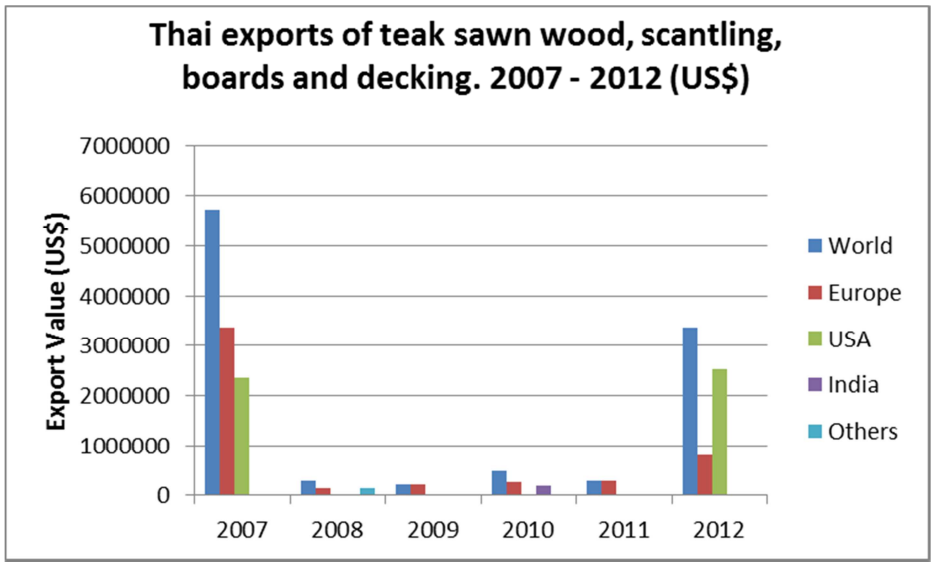
Table 16. Thai exports of teak sawn wood, scantlings, boards and decking, 2007 - 2012. (Source: Thai Customs, 2013)

Client Country/Region	2007			2008			2009			2010			2011			2012		
	Value (USD)	Volume (m^3)	Unit Value (US\$/m^3)	Value (USD)	Volume (m^3)	Unit Value (US\$/m^3)	Value (USD)	Volume (m^3)	Unit Value (US\$/m^3)	Value (USD)	Volume (m^3)	Unit Value (US\$/m^3)	Value (USD)	Volume (m^3)	Unit Value (US\$/m^3)	Value (USD)	Volume (m^3)	Unit Value (US\$/m^3)
World	5721525	181735	31	288159	101	2853	227905	86	2650	480891	37208	13	292095	93	3141	3351647	612	5477
Europe	3366020	125769	27	144286	36	4008	227905	86	2650	277801	90	3087	292074	91	3210	799214	94	8502
USA	2355505	55966	42	0	0	0	0	0	0	0	0	0	0	0	0	2537303	489	5189
India	0	0	0	0	0	0	0	0	0	203091	37118	5	0	0	0	0	0	0
Others	0	0	0	143873	65	2213	0	0	0	0	0	0	20	2	10	15129	29	522

Source of Data: Thai Customs Department

The Global Financial Crisis of 2007–2009, had a significant impact upon Thai exports of high quality teak (Figure 30). Luxury markets for products such as marine decking for luxury yachts in Europe and the USA collapsed and it has taken several years for business confidence to be re-established.

Figure 30. Thai exports of teak sawn wood, scantling, boards and decking: 2007 - 2010 (US$) (Source: GTA)



Some caution needs to be exercised in interpreting data from the Thai Customs databases, particularly with regard to exports. High value logs and products can appear to have very low unit values and data from neighbouring countries do not tally with industry reports.

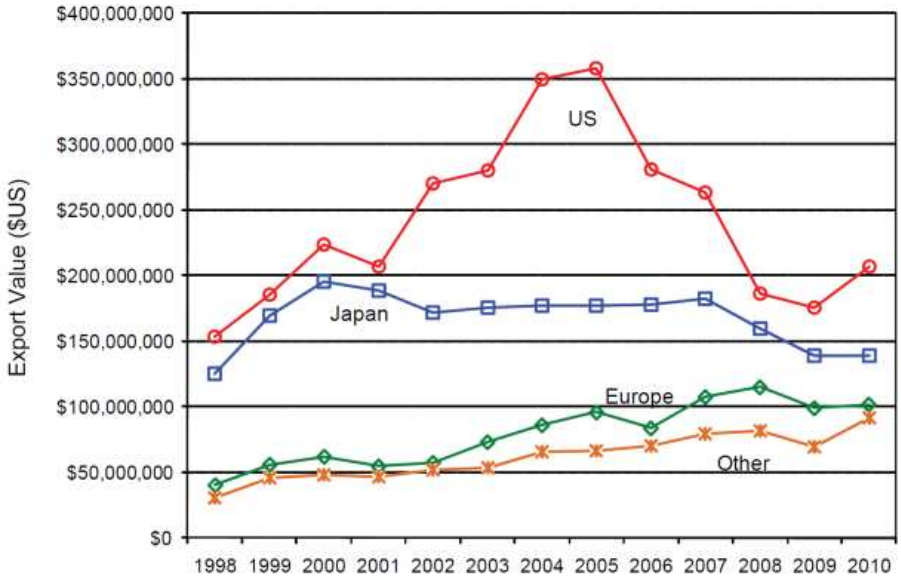
The impacts of legality legislation on Thai wood product exports

As part of the processes to demonstrate legality, Thailand relies upon a Certificate of Origin (CoO) issued by an organisation in the country from which the wood has been dispatched. Although the document certifies that the wood making up a particular shipment has come from a particular country, it does not guarantee that this reflects where the wood was harvested. Certificates of Origin do not specify, or make reference to, the past chain of custody and it is widely acknowledged that timber may have been routed through a number of different locations before it physically leaves the country and acquires a CoO (Heuch, *et al*., 2012).

Pianhanuruk (2008) observed that a complex suite of Thai Government regulations which were designed to differentiate between wood from natural forests, plantations and imports. These had the perverse impact of making the industry less competitive through adding costs and complexity and seeking to control (rather than encourage) industry. Such complexity makes it difficult to demonstrate clear legality.

About 70% of Thailand's wood furniture production is exported (USDA, 2013) and the primary markets for Thai wood furniture exports are USA and Japan (Figure 31), with 9 European countries being among the top 20 markets for Thai furniture (Heuch, *et al*., 2012). An estimated 300 factories are involved in the export of furniture from Thailand and it is likely that they would be sympathetic to the benefits and ongoing market access offered through legality and certification.

Figure 31. Thai furniture exports, by destination (1998 - 2010). (Eastin, 2011).



Chapter 10 Export markets for Lao teak

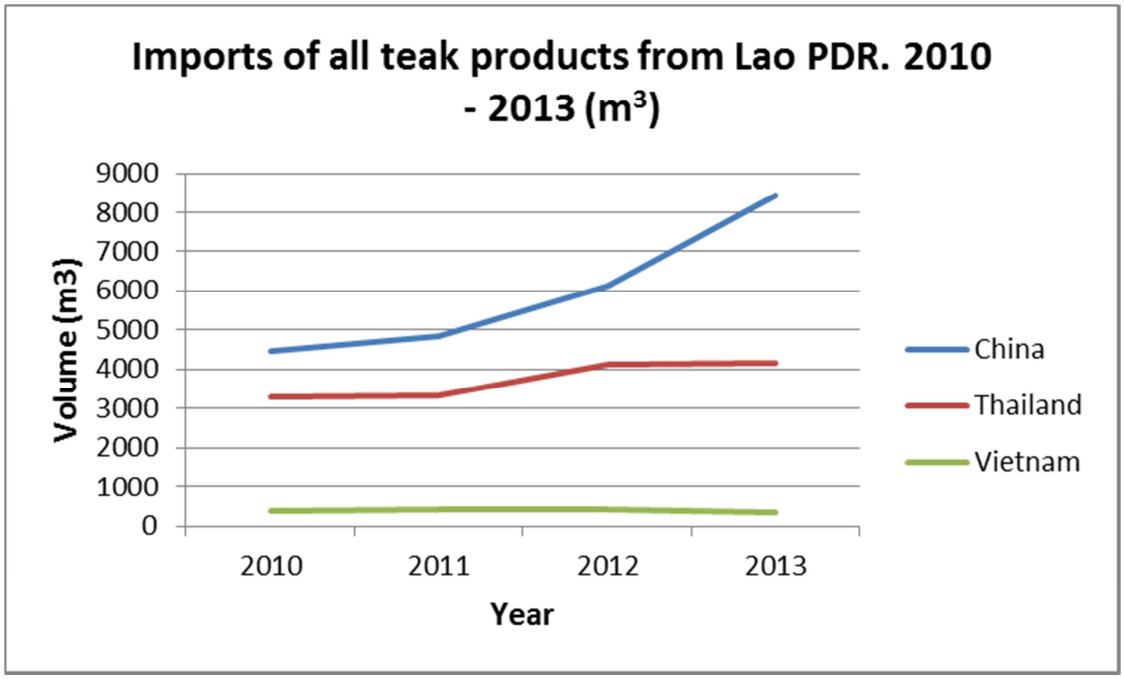
Lao exports of teak round and squared logs and sawn wood are relatively small by global standards, comprising some 8,000 m^3 of the 1.1 million m^3 (<0.1%) imported by the global leaders, India, China, Thailand and Vietnam in 2011. However, export of round and squared logs represent an important source of much-needed income for the growers in northern Lao PDR.

The Lao export markets are dominated by neighbours China, Thailand and Vietnam and this is likely to continue as demand in all three countries is strong. Data extracted from the Global Trade Atlas, for imports of teak round and squared logs from Lao PDR show that these exports have increased over the past 3 years (Table 17, Figure 32). Although India is emerging as a potential market for Lao teak, volumes are low.

Table 17. Imports from Lao PDR; major trade partners (all teak wood), 2010 – 2013 (m3).

Partner Country	2010	2011	2012	2013
China	4467	4842	6117	8430
Thailand	3282	3346	4115	4179
Vietnam	386	414	438	350

Figure 32. China, Thailand, Vietnam imports of all teak products from Lao PDR (m^3).



China

China is the leading importer of Lao teak and the recent increase in imports from Lao PDR has been substantial; GTA data indicating that Chinese imports of teak products from Lao PDR have grown by 89% in volume and over 59% in value since 2010 (Figure 32) and are valued currently at over US$4 million annually (Table 18). China is now the largest client for Lao teak, the reasons for which are

several; teak is widely planted in the provinces bordering China; the emerging maturity of the resource and increased availability of planted teak from Lao PDR; improved infrastructure and road links/highways between Lao PDR and China have made road transport more reliable and efficient.

Table 18. Value and quantity of all Chinese teak imports from Lao PDR, 2010 - 2013

China Import Statistics (China Customs through GTA)									
Value of all teak imports from Lao PDR 2010 - 2013 (Commodities: 44034910 and 44072910)									
Partner Country	Unit	2010		2011		2012		2013 (est)	
		USD	Quantity	USD	Quantity	USD	Quantity	USD	Quantity
World	M3	92,074,672	123,062	105,829,809	141,699	141,294,608	170,033	231,408,242	293,953
Laos	M3	2,403,409	4,467	3,038,053	4,842	3,602,450	6,117	4,313,674	8,430

Lao logs constitute between 4 – 5% of the volume (and value) of China's imports of teak round and squared logs; sawn teakwood from Lao PDR constitutes just 1% of the volume and value of these Chinese imports. There is obvious opportunity for this to expand.

Thailand

Less than 1 % of all Thai imports of teak logs and sawn teak timber come from Lao PDR. Thailand has an extensive plantation resource of teak and presumably has adequate supplies of small sized plantation material and has no commercial need to import from Lao PDR. However, Thailand has been a longstanding partner with the Lao forest industry and there are strong cultural and corporate links between the wood industry sectors in both countries. In addition, field interviews with traders suggest that there are substantial (but not defined) informal shipments of plantation teak wood across the border which suggest that there are discrepancies in the official data.

Although figures for Thai imports of teak logs are small, high trade figures for "teak sawn wood" (Table 19) suggest that the HS code for teak sawn timber is being used for squared logs ("teak in the rough"). Reports from northern Lao PDR suggest that the bulk of teak exports to Thailand are in the form of squared logs (Midgley, *et al.* 2006) and very little is exported as sawn timber. There is ambiguous advice from forestry and export authorities in Lao PDR as to whether plantation logs can be exported in unprocessed form – hence the interest in squared logs which could be classified in a HS "sawn wood" code and exported as "processed" wood.

Table 19. Thai imports of Lao teak logs and sawn wood. 2010 - 2013 (m^3). Extracted from GTA.

Commodity	2010	2011	2012	2013
Sawn wood	3079	3268	3520	3724
Round and squared logs	203	78	595	455

Vietnam

In contrast to other Lao neighbours, trade data suggests that imports of teak may be decreasing (Table 17). This is consistent with the general decrease in all of Vietnam's teak imports identified in Chapter 8 (Figure 23). Vietnam's negotiations with the EU regarding their VPA and the anticipated introduction of the Vietnamese TLAS (Timber Legality Assurance System) suggest that Vietnamese industry may require wood of clear legality. For a variety of reasons (such as land tenure), many teak

producers, and particularly the smallholders in Lao PDR, are unable to clearly demonstrate legality and this might explain why imports of plantation-grown teak are declining as they cannot fit into Vietnam's market niche for furniture from legally-sourced wood.

Discrepancies in export data

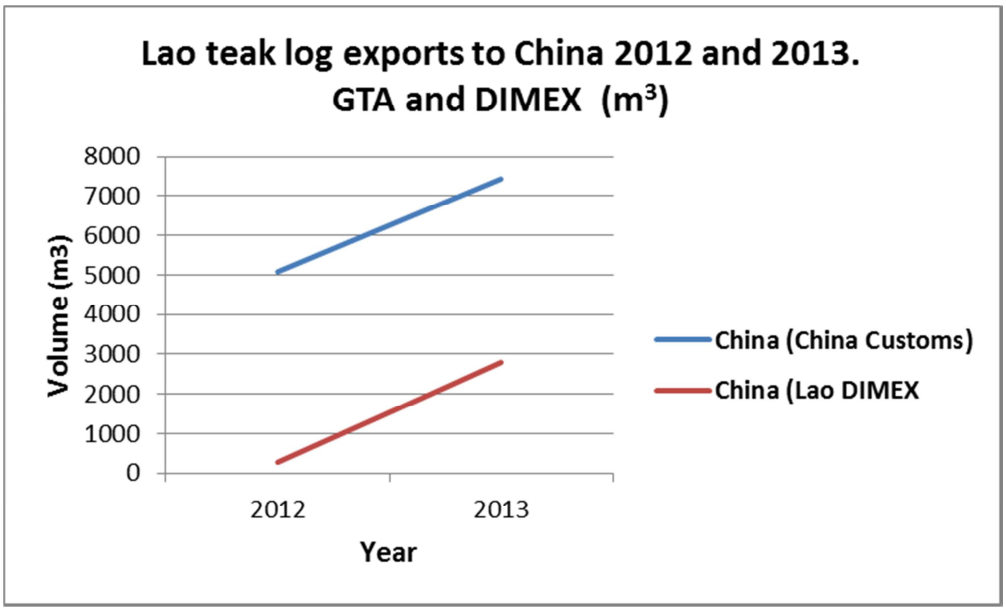
Limited data on Lao trade in teak were available through the Department of Import and Export, Ministry of Finance which maintains records through Lao Customs (Table 20). Only limited records were available for 2012 and 2013.

Table 20. Export of teak logs from Lao PDR, 2012 - 2013 (est). Source: DIMEX, GoL.

Partner Country	2012	2013 (Jan - Aug)	2013 (est)
China	278	1837	2783
Thailand (round logs)	890	659	998
Thailand (squared logs)	789	382	579
Thailand (Total)	1679	1041	1577
Vietnam	0	777	1177
India	0	382	579

These figures, provided in Table 20, were assembled nationally by DIMEX from information provided by Provincial authorities. They are at variance with data obtained via the GTA from the Chinese Customs authorities (Figure 33). There is a discrepancy of about 5000 m^3 annually which suggests that many teak exports from Lao PDR to China are not being recorded or, perhaps, being recorded as other wood commodities.

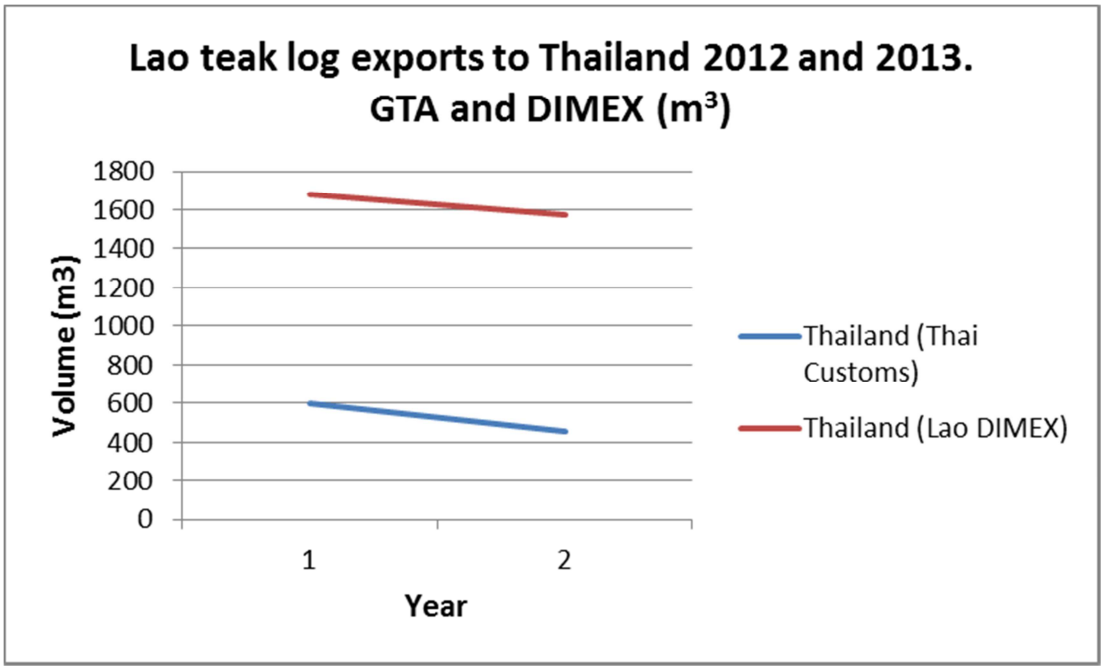
Figure 33. Lao teak log export data sourced from GTA and DIMEX. 2012 and 2013 (est)



Similarly, discrepancies exist between DIMEX and GTA data for teak log exports to Thailand (Figure 34). The Lao figures suggest that there is more teak arriving in Thailand than is being recorded by Thai Customs. A possible explanation of this might lie with the interpretation of what can be

classified as sawn or processed timber. Some Lao border posts will only allow the export of "processed" timber and exercise discretion in classifying squared logs as "processed". Such imports may then be classified as "sawn timber" once received in Thailand.

Figure 34. Lao teak log exports to Thailand sourced from GTA and DIMEX (m3)



Chapter 11 Conclusions

The global resource and trade in teak

The global teak plantation resource of 6.8M ha is geographically spread across the seasonally dry tropics and is mostly less than 20 years of age. As a popular plantation species, new plantations continue to be established and the area planted to teak is expanding. Although the annual wood increment of global plantations is currently about 30M m^3, only 2.0 – 2.5 M m^3 are harvested annually and this can be expected to increase as the resource matures. Industry sources suggest that the mature plantation resources of West Africa are likely to decline as plantations have not been replaced and that the plantations of Central and South America are reaching maturity and supply from this region will continue to expand. In addition, some of India's 2.5 M ha of plantations, previously unavailable for commercial utilisation, may be made available to meet India's domestic demand if Government of India policies change.

An analysis of data available to this study indicates that some 1.3M m^3 teak logs and sawn wood are currently being traded annually; a global trade worth an estimated US$723 million. The data demonstrates the importance of domestic processing which accounts for the remaining 1.2M m^3 of harvested wood which is processed in the country of origin. The data firmly suggest that global trade is expanding and grew by 47% by volume and 58% by value between 2010 – 2012. "Burmese teak" sets international standards for quality and Myanmar is the world's largest supplier of teak logs and sawnwood, with exports growing by 50% between 2010 and 2012 and valued at $409 million in 2012. However, any future analysis of teak availability in global markets must account for a dramatic reduction in teak supply from Myanmar following implementation of its proposed log export bans and forest trade reforms scheduled to commence in April, 2014.

Importers of teak

There are four major importers of teak; India, Thailand, China and Vietnam. Of these, India and Thailand have protected resources of native teak and both are growers of plantation teak and exporters of teak products.

India is the world's largest market for plantation teak, representing some 75% of global trade. India's imports are expanding and have grown by 54% since 2010 with a marked increase in trade with Central/South America accounting for a large part of this increase. The increase in demand has been fuelled domestically by an expansion in the real estate market and a boom in construction of residential housing where teak is the preferred timber, particularly for doors and windows which account for some 40% of teak processed. Indian wooden furniture manufacture for domestic consumption and export is growing steadily with exports reaching $592 million in 2012. This sector is significant user of teak. An Indian policy response to the proposed log export ban from Myanmar may be to allow greater access to Government-managed teak plantations in India. Whilst having an impact upon Indian domestic supply, this is not expected to have a large impact upon trade from countries other than Myanmar.

India's import preference is for round or squared logs (rather than sawnwood) which takes advantage of India's low costs of processing and attractively low tariffs for roundlogs and squared

logs. Whilst India remains the leading global importer of teak roundlogs and squared logs, China shows a strong demand for sawn timber.

Although China is the world's largest importer of wood and exporter of wooden furniture (US$17.5 billion in 2012), imports of teak logs to China are only 10% of those imported by India. Chinese imports of teak logs and sawn timber are expanding. In contrast to India where teak is used for buildings and doors/windows, in China the use of teak is dominated by manufacture of wood furniture for exports. Chinese processors of export furniture are becoming increasingly sensitive to the need to demonstrate use of legally-sourced wood.

Thailand is a grower of native and plantation teak and both an importer of teak logs and sawnwood and an exporter of finished and semi-finished teak products. The country has mature, sophisticated wood processing industries which have a heavy reliance upon Myanmar, particularly for supply of high quality teak from native forests. As in China and India, the proposed log export ban and policy reforms in Myanmar are likely to have a very large impact upon wood supply and industry output. This may result in an increase in illegally sourced high quality timber from neighbouring countries or a shift to utilisation of plantation grown timbers from both domestic and imported sources.

Vietnam has a vibrant, sophisticated and modern, export-oriented wood furniture industry which is dependent upon imported logs and timber. Despite the size of the industry, there has been a reduction in imports of teak logs and sawn timber. A possible explanation shared by processors has been the challenges experienced in obtaining legally certified supplies of teak to service industry demand. In contrast, supplies of competing plantation grown acacia and rubber have been in ready supply.

Influences in the global teak trade

There are a wide range of factors which influence global trade of teak, apart from the normal challenges of international trade such as exchange rates, changing trade policies and regulatory requirements, taxes and tariffs.

The global trade is teak is frustrated by a lack of standards and consistency in establishing prices for teak logs. Despite a considerable international dialogue, the lack of standards, lack of information and misinformation results in widespread uncertainty and confusion around teak investments, particularly in relation to prices. There is a rationale for provision of standard, transparent, up-to-date information on plantation teak prices.

A potential source of misunderstanding in the teak trade is the confusion between methods of calculating log volume. Some producer countries one method for calculating log volumes and dimensions (e.g. Brereton) and a purchasing country (India) may use Hoppus as their standard. The entire industry supply chain in India is based upon Hoppus measurement and growers and suppliers who see engagement with the Indian market must be equipped with reliable standards and conversion factors to move between the two systems.

Global wood markets are becoming increasingly sensitive to timber sourced illegally or unsustainably and the large markets of North America and Europe have responded legislatively through specifying prescriptive compliance measures. Confidential discussions with wood processors and wood product exporters in China, Vietnam, Lao PDR and Thailand indicate that importers have a strong preference

for imported wood which is clearly legal and, in some cases, certified. The ongoing competitiveness of the large Vietnamese wood furniture sector will depend upon compliance with legality requirements. Much of the export furniture market from Thailand and India are based upon teak and are heavily dependent upon the discerning markets of Europe and North America. This is a challenge which growers and processors of teak will need to address as a matter of urgency. Indonesia has completed domestic regulations to comply with a VPA with the EU and Vietnam is to follow suit. Although designed for the EU markets, the conditions of a functioning VPA will meet the requirements for export to the USA.

Opportunities and challenges for Lao teak in global markets

The Lao plantation teak resource of 40 000 ha is located largely in the north, small and highly fragmented and almost entirely aged less than 20 years. As transport infrastructure improves and the resource matures, its proximity to major global markets of Thailand, China and Vietnam (and to a lesser account, India), will make it attractive for these markets. There have been reports (supported by Indian import data) that consignments of Lao teak squared logs to Thailand have been shipped to India. The burgeoning Indian industry offers possibilities to the Lao growers.

The global furniture markets are very competitive and furniture manufacturers are extremely price-sensitive. Small-sized teak from Lao PDR must compete with other tropical hardwoods such as acacia and rubberwood and commonly traded temperate hardwoods. The teak available from Lao PDR is not differentiated from other small-sized plantation teak available from other sources in Asia, Central America and Africa and will have to compete to establish and maintain market share. To compete in the international markets, those trading in Lao teak will need to differentiate Lao teak in a positive way through:

- Price and quality (including efficient logistics)
- Selling in standardised form as round or squared logs and in standard sawn wood dimensions required by the markets
- Efficiency and ease of doing business through a sympathetic legal and regulatory environment
- Clear GoL processes to establish legality to meet EUTR and Lacey Act requirements
- Reliability and capacity of growers to assemble commercial consignments
- Responsiveness to the needs of buyers

The fragmentation of the resource across many thousands of smallholders make it challenging to assemble consignments of commercial size which meet market requirements of legality. Given the poverty which characterises many of the teak growing communities in Lao PDR, it is likely that consignments will continue to be of small sized timbers as growers seek early financial returns through early harvest. Recognising both of these issues, the GoL has encouraged the establishment of growers' groups and adoption of processes to demonstrate legality and an informal dialogue has commenced with EU partners regarding a VPA.

There is an urgent need to complete an inventory of teak plantings in Lao PDR as the basis for planning efficient marketing programs. Once industry has basic information on location and age structure, commercial decisions can be made, consolidation can begin and contact made with reliable markets.

Traders provide a vital link between Lao PDR and the global markets and assume much of the risk entailed in making successful international trades. Locally, they will play a vital role in organising collection from smallholders to offer a consistent supply of quantity and quality to buyers. Those involved in the development of the Lao teak trade may care to moderate an obvious prejudice on the part of some against traders and middlemen; they are a necessary part of the value chain.

If Lao PDR continues to encourage Chain of Custody for its forest industry and Group Certification for its smallholder teak resource , and commits resources to gaining certification for its teak resources and processing facilities, then it is logical that marketing efforts be strengthened in countries which have a need for certified timber. For example, although India represents 75% of global markets, its dominant domestic market is not sensitive to the additional costs of certification. Vietnam, however, has a world class wood furniture industry which is 90% directed towards exports; these exports primarily to the markets of the EU and USA. Similarly, the Chinese and Thai furniture industries are export-oriented and have an obvious interest in both legality and certification. Certification will offer uncertain rewards unless reliable and regular buyers are located in these countries with a commitment to certification and legality. It is important that the costs and benefits of verification and certification programs are assessed fully to ensure that they are cost-effective for the growers.

The Lao resource of planted teak, a high value, smallholder-grown, tropical hardwood, clearly offers attractive investment possibilities for local processing rather than export as low-value 'squared' logs to other countries. Knowledge of international markets will offer Lao growers and processors an opportunity to achieve efficiencies and refinements such as focussed marketing, assured legality and an improved regulatory environment and make appropriate adjustments to the supply chain to successfully compete in markets for planted teak.

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