Transformational change for forest product value chains in the Lower Mekong Region

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EXECUTIVE SUMMARY

Wood products trade in the Lower Mekong Region

- Wood products trade in the Lower Mekong Region has undergone significant changes over the last decade, the most dramatic being a plunge in exports of primary wood products from natural forests due to resource depletion, harvesting and trade restrictions, marginal economic returns from commercial forests, and changing consumption levels in consumer markets
- There has been a corresponding Increase in production and trade from plantations (particularly in Viet Nam and Thailand). LMR wood processing demand has also been supplied by imports of primary products from other "high risk" regions (Africa, Pacific).
- Exports of primary products from the LMR are overwhelmingly to China.
- More highly processed wood product exports are mainly to extra-regional destinations – United States, EU, and Japan - with high requirements for legality and sustainability.
- The close proximity to the China wood products market presents opportunities in terms of the significant market size but also threats, in terms of the historical illegal cross border trade and less stringent market requirements for sustainability.

Production and consumption of wood products in the Lower Mekong Region

- Natural production forests in the LMR have suffered in the past from large-scale, uncontrolled, and illegal logging which has limited the incentives to improve forest management. However, harvest levels, and the incidence of illegal logging in the LMR, have declined considerably in recent years and measures such as the FLEGT VPAs which are being negotiated are assisting in facilitating standard setting and certification.
- A significant feature of product value chains in the LMR is the relatively low levels of secondary wood processing in Cambodia, Lao PDR and Myanmar, and the high levels of wood processing in Thailand (particularly wood-based panels, paper and paperboard, and pulp) and Viet Nam (particularly wooden furniture), where government interventions have supported value chain development. Primary wood products consumption levels in Thailand and Viet Nam reflect their input to the value-added processing industries and rising domestic consumption in both countries.
- A common theme in all LMR countries is that the micro, small and medium-sized enterprises (mSMEs) lack the capital investment in technologies to meet industry export standards, market intelligence to diversify product and markets, and the business management skills to meet emerging timber legality requirements.
- Viet Nam has successfully transitioned from deforestation to reforestation while demonstrating commitment to forest resource conservation and rapid expansion in its wood processing sector. This has supported rapid growth in exports which have contributed to strong economic growth and alleviation of poverty in rural areas. Expansion of the wood processing industry has been based on lower quality raw material from Viet Nam's plantations and imports of higher quality raw and semi-processed materials from a wide range of sources.
- Viet Nam's wood processing sector has been highly competitive in international markets although there are indications that its ranking has fallen, indicating that industry

transformation and upgrading is required, with a greater focus on higher value-added products, technological innovation, and product quality which meets international standards.

- In all LMR countries, data and information on domestic consumption and consumer markets is minimal and unlikely to account for the informal sector. Accurate assessments of wood consumption in domestic end use markets will be required to determine the effectiveness of policies to control the legality and sustainability of wood supplies to LMR countries' wood processing industries.
- Forest certification and chain of custody certification remains at a low level in the LMR but is significantly higher in Viet Nam and Thailand, reflecting the higher level of wood product exports to countries which require evidence of legality, such as the United States, Japan and EU countries.
- There are a number of challenges to forest certification in the LMR including the high certification process cost, often requiring external funding and technical assistance, insufficient sourcing of certified timber, lack of demand for certified products and lack of a harmonised certification system across the region.

Transformational change in forest product value chains in the Lower Mekong Region

- Transformational change in forest product value chains in the LMR implies a shift in forest product value chains from systems that support deforestation and forest degradation, illegal logging and trade, to systems that support sustainable management of LMR forests and legal and sustainable forest product value chains which benefit all stakeholders.
- There are a number of pathways available to achieve transformational change which include:
    - Transition from production and trade based on unmanaged/poorly managed natural stands to that based on plantations and sustainably managed natural stands.
    - Adopt systems to support the transition to legal and sustainable wood resources.
    - Increase the value of natural stands by developing alternative revenue sources, such as carbon and hydropower.
    - Develop internationally competitive forestry enterprises.
    - Grow domestic/LMR regional markets for legal and sustainable wood products.
    - Grow and diversify export markets for LMR legal and sustainable wood products.
    - Transformative and responsible public and private investments.
- There are numerous challenges to forest governance within the LMR, particularly as the illegal timber supply chain extends beyond LMR country boundaries. Some of the important challenges to achieving transformational change include:
    - Meeting international environmental standards.
    - Limited information on the extent of illegal harvesting and trade.
    - High proportion of mSMEs in wood growing and processing, which are challenged to meet timber legality requirements, technical standards, competitiveness with informal operators, large enterprises and imports.
    - Lack of public and private procurement policies to activate domestic demand for legal and sustainable wood products.

  - Low levels of technology in all aspects of the supply chain, particularly in Myanmar, Cambodia and Lao PDR, and declining industry competitiveness in Viet Nam and Thailand.
  - China is a significant market for LMR wood products but lacks mandatory controls on value chains of unsustainable and illegal wood products.
  - LMR forest products are perceived as illegal and unsustainable in value-added export markets with high legality and sustainability requirements.
  - High levels of corruption, which provides risks for exporters of value-added products from the region and is a major obstacle to foreign investment in the forestry sectors.

- While there are similarities in the challenges faced by different countries in the region, there is unlikely to be a single approach or program that leads to transformational change towards SFM in all of the countries in the region. Ongoing work will be required in all countries, with some countries requiring the focus to start on basic forest management practices and others requiring improvements further down the value chain. There is no doubt, however, that the countries of the LMR and the major importers of their forest products can learn from each other's experiences as they continue the transformation to sustainable forest management and trade.

ACRONYMS

ASEAN	Association of Southeast Asian Nations
CITES	Convention on the International Trade in Endangered Species
CoC	Chain of Custody
CSIL	Centre for Industrial Studies
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
EIA	Environmental Investigation Agency
EU	European Union
EVFTA	EU-Vietnam Free Trade Agreement
FAO	Food and Agriculture Organization of the United Nations
FIE	Foreign Investment Enterprise
FLEGT	Forest Law Enforcement, Governance and Trade
FSC	Forest Stewardship Council
FTA	Free Trade Agreement
GDP	Gross Domestic Product
HS	Harmonised System
Ibid.	“in the same place” (Refer to the previous citation)
ITTO	International Tropical Timber Organization
Lao PDR	Lao People's Democratic Republic
LMR	Lower Mekong Region
MDF	Medium Density Fibreboard
MFCS	Malaysian Forest Certification System
mSME	micro, small and medium-sized enterprises
MTE	Myanma Timber Enterprise
MTLAS	Myanmar Timber Legality Assurance System
NGO	Non-government Organisation
OECD	Organisation for Economic Co-operation and Development
Op. cit.	"the work cited"
PEFC	Programme for the Endorsement of Forest Certification
PES	Payments for Environmental Services
PMO	(Lao PDR) Prime Minister Order
R&D	Research and Development
RCEP	Regional Comprehensive Economic Partnership
REDD	Reducing Emissions from Deforestation and Forest Degradation
Rep. of Korea	Republic of Korea
RFD	Royal Forest Department (Thailand)
SAQSIQ	State Administration of Quality Supervision, Inspection and Quarantine (China)
SFE	State Forest Enterprise
SFM	Sustainable Forest Management
spp.	Several species
SPWP	Secondary Processed Wood Products
STIX	Sustainable Timber Information Exchange
Taiwan P.O.C.	Taiwan Province of China
TEFSO	Thai-EU FLEGT Secretariat Office
THA-TLAS	Thailand Timber Legality Assurance System
UKVFTA	UK-Vietnam Free Trade Agreement

UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
USD	United States Dollars
USDA	United States Department of Agriculture
USTR	Office of the United States Trade Representative
VNTLAS	Viet Nam Timber Legality Assurance System
VPA	Voluntary Partnership Agreement
WTO	World Trade Organisation

1 BACKGROUND

The UN-REDD Programme supports countries to reduce the likelihood of forest crime by strengthening forest and land use governance. In this context, the Government of Norway requested the UN-REDD Programme to implement a regional initiative (within the framework of the current UN-REDD Global Technical Assistance) to address forest crime through improved governance and trade in the Lower Mekong Region (LMR). A reduction of forest crime will improve sustainable management of forests across the LMR and beyond, and ultimately lead to reduced emissions from deforestation and forest degradation.

Regional dynamics of investment and trade play a particularly important role in determining land use change, and thereby act as a significant underlying driver of forest degradation and deforestation in the LMR. There is a clear trend of investments from the expanding economies of China, Thailand and Viet Nam to the lower income, higher forest cover countries of Cambodia, Lao PDR, and Myanmar. Given that the gap between global supply and demand of wood products is predicted to widen significantly by 2050 due to an increase in demand from rapidly growing populations, pressure on forest resources can also be expected to increase. In 2017, Asia had the largest share (46%) of the global forest footprint embodied in demand for timber.

The objective of this study is to provide insights into the transformational change of value chains of a range of forest products in the LMR and provide recommendations to support policy development to achieve sustainable forest management and sustainable value chains. The report is structured as follows:

Section 2 analyses the evolution of intra and extra-regional trade in primary and secondary wood products in/with LMR countries over the last decade, focusing on the LMR countries (Cambodia, Lao PDR, Myanmar, Thailand and Viet Nam) and major importing countries, particularly China. The section also provides a more detailed analysis of the evolution in trade in historically important commercial species - rosewood and teak - from the LMR region and discusses the role of plantation wood in LMR trade.

Section 3 investigates industry and market developments in the LMR. The section provides insights on production of industrial roundwood, primary and secondary processed wood products in each of the LMR countries, the state of the wood processing industries including levels of foreign investment, domestic consumption of wood products, and the state of certified wood products production and trade in the region.

Section 4 discusses how transformational change has, and can, occur in LMR value chains with the objective of achieving both sustainable management of LMR forests and sustainable forest product value chains which benefit all stakeholders.

2 WOOD PRODUCTS TRADE IN THE LOWER MEKONG REGION

2.1 Data sources and limitations

Data limitations and inconsistencies in reported trade volumes between LMR trading partners provide challenges to analyses of the wood products trade from the LMR.

Inconsistencies in reporting by LMR countries and variations in reported trade flows by respective trading partners mean that analysis of the timber trade from the LMR is challenging. Analysis is mainly limited to data reported by importing countries, as reporting by most countries in the region is inadequate and exports (particularly of primary wood products) are frequently under-reported (see Appendix 2 and Section 2.2). Trade data used in this report has been derived from a number of sources. The primary sources of data are the International Tropical Timber Organization (ITTO) Statistics Database (for primary wood products and secondary processed wood products)[1] and FAOStat (for pulp and paper, panels and reconstituted wood products). Where other data sources have been used, these have been referenced in the report. Appendix 1 shows the levels of trade from LMR countries in 2010, 2015 and 2020 for a range of primary and secondary processed wood products. Appendix 2 indicates the directions and magnitude of trade within the LMR in 2019 for a range of primary and secondary processed forest products, showing some differences in reported trade between trading partners.

2.2 Primary wood products trade

This section provides insights on the evolution of trade in primary wood products (industrial roundwood, sawnwood, plywood and veneer) from LMR countries.

Significant changes have occurred in primary wood products trade from LMR countries over the last decade.

Exports of primary wood products from the LMR have declined significantly in recent years in response to a number of developments. These include a general decline in availability of industrial roundwood from natural forests due to historical overexploitation, various government measures to limit harvesting levels in natural forests, restrictions on exports of primary wood products by LMR governments, and national and international measures to control illegal logging and cross-border trade. The trade has historically been associated with a suspected high incidence of illegal cross-border trade with China and Viet Nam, the major importers, and there have been significant discrepancies in the trade in primary wood products reported by respective trading partners in the region (see Appendix 2).

2.2.1 Industrial roundwood

2.2.1.1 Regional Overview of LMR roundwood trade

Tropical log exports from LMR countries have plunged over the last decade.

Exports of industrial roundwood (logs) from LMR countries have plunged in recent years and are now at minimal levels (in volume and value terms) for most supplier countries (Figure 1). Log exports from the LMR totalled 6.3 million m^3 in 2014, the peak year, and were valued at USD 2.439 billion. By 2020, they had plunged to 80,000 m^3 valued at USD 50 million.

[1] ITTO data are based on imputation methodology and consider a range of variables including reported wood product imports (all products) by a country's trading partners, some of which may be the result of illegal cross-border trade. The primary sources of data are the Joint Forest Sector Questionnaire a collaboration between ITTO, FAO, UNECE and Eurostat), COMTRADE (the UN Commodity Trade Database) in addition to STIX (the Sustainable Timber Information Exchange).

Figure 1: Exports of tropical[2] logs from the LMR by volume and value, 2010-2020

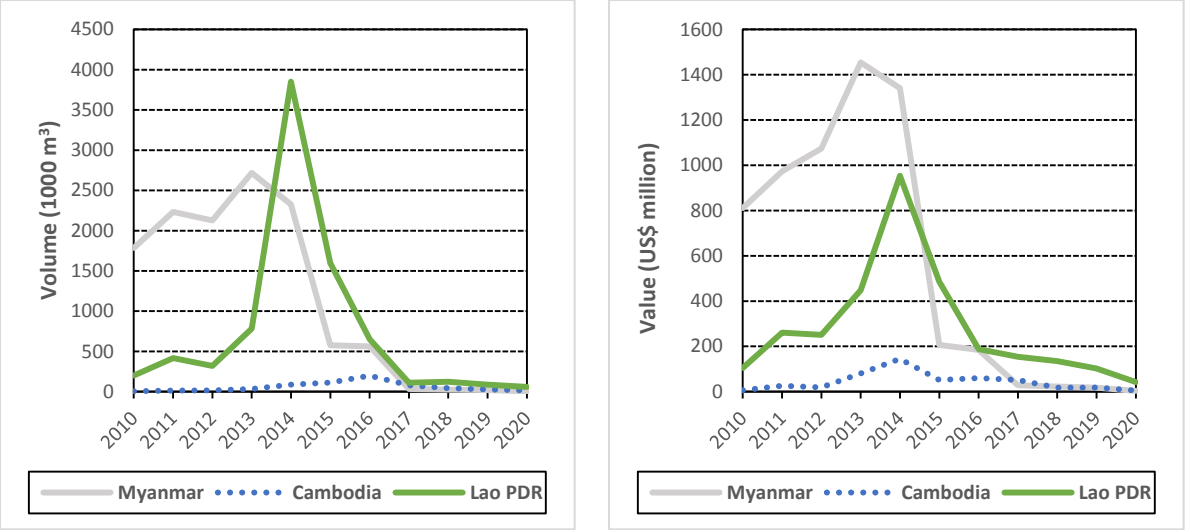
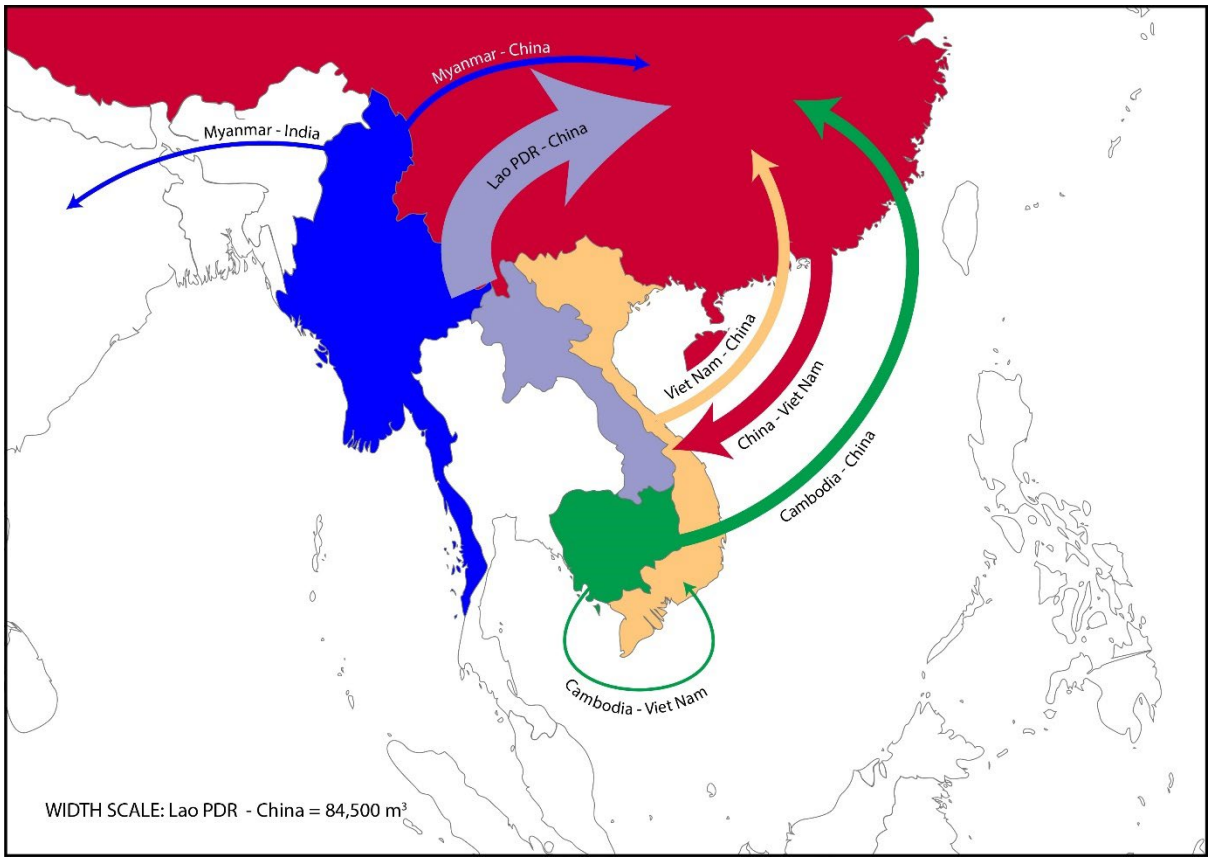


Figure 2: Major trade flows for tropical logs from LMR countries, 2019, by volume



Source: COMTRADE
Note: Major trade flows include annual trade greater than 5,000 m³

[2] This report assumes the ITTO definition of "tropical" timber, which includes all timber grown or produced in the countries situated between the Tropic of Cancer and the Tropic of Capricorn and includes both timber from natural stands and plantations, including both hardwoods and softwoods grown in the tropical zone.

Most of the tropical log trade from LMR countries has been within the LMR and border countries.
The directions and magnitude of the log trade in the LMR Mekong Region and border countries in 2019 (the latest year for which comparative data is available) are shown in Figure 2. Lao PDR was the major log exporter from the region and China, and to a lesser extent Viet Nam were the major importers.

2.2.1.2 Myanmar roundwood exports

Myanmar's tropical log exports peaked in 2013 but plunged after 2014 following government interventions to curb deforestation and facilitate domestic processing.
Exports of tropical logs from Myanmar peaked in 2013 at 2.7 million m^3 and were valued at USD 1.454 billion representing about 16% of global tropical log exports[3] (Figure 3). Exports had surged prior to an impending log export ban which was announced in October 2012 but imposed in April 2014. Its purpose was to increase domestic processors' access to raw material. A ban was also imposed in 2013 on other timber exports except through the port of Yangon, to increase the efficiency of enforcement by preventing cross-border trade. Import demand escalated in the ensuing period, with stockpiling of Myanmar logs being reported in India and Viet Nam prior to introduction of the ban[4]. A one-year moratorium on logging across the country (and extended to 10 years in the Bago Yoma Region) was implemented in May 2016, and a ban on non-competitive sales of timber by the Myanma Timber Enterprise (MTE) has also been imposed since 2016[5], restricting the availability of roundwood for export.

Log export restrictions and other interventions were effective in reducing illegal cross border trade.
Until 2014, India had been the major export destination for Myanmar's log exports, accounting for about half of the trade, with a large proportion of natural teak (*Tectona grandis*) in the export mix. Myanmar's exports to India declined from 1.3 million m^3 in 2013 to 0.9 million m^3 in 2014, and 9,000 m^3 in 2015. Myanmar's exports to China, the other major market, had peaked in 2014 at 1.2 million m^3, and although exports declined in 2015, they remained at relatively high levels in 2015 and 2016 (at 535,000 m^3 and 551,000 m^3 respectively) despite the log export ban. Almost all of these exports had been reported by China to be transported overland through Kunming rather than the port of Yangon. Prior to the log export ban, the cross-border export trade with China had been characterised by widespread illegal activities which have been well documented by NGOs and other agencies[6]. Exports then plummeted in 2017 and have remained at insignificant levels to 2020, with no cross-border exports through Kunming reported by China Customs in that period.

Overexploitation has been the primary driver of the decline in Myanmar log exports.
The primary driver of the plunge in log exports from Myanmar (as well as Lao PDR and Cambodia) has been the exploitation and depletion of the resource base, particularly of commercially valuable species such as rosewood and natural teak. Much of the commercially valuable natural forest timber may have already been extracted. Whether or not this can be corroborated with data collected from national forest inventories may be worth review.

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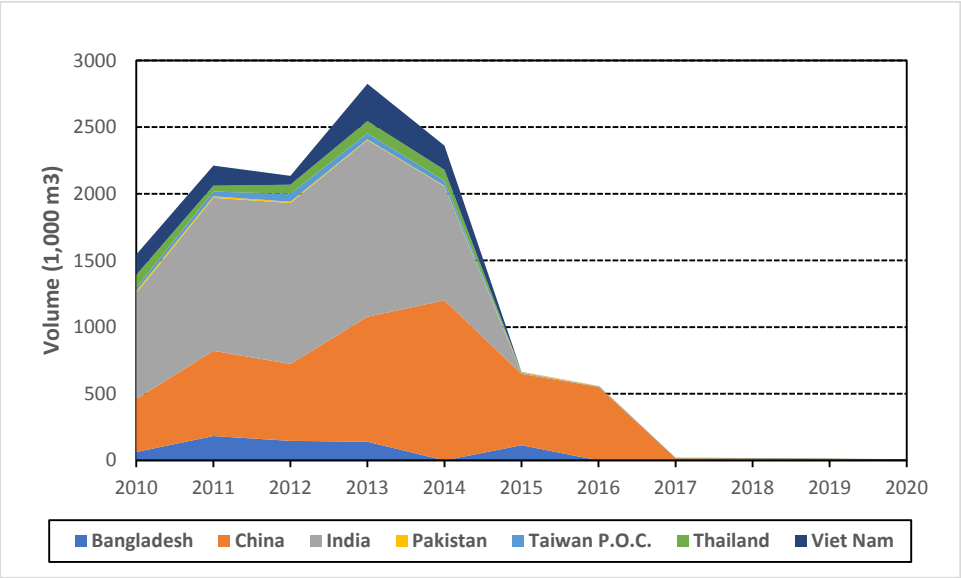
[3] Export data for Myanmar are estimated from import data from Myanmar's trading partners.
[4] ITTO *Tropical Timber Market Report*, 1-15 September 2014.
[5] Forest Trends 2021. *Illegal logging and associated trade in Myanmar: Impacts of government measures to address illegal logging.* Forest Trends. Forest Policy Trade and Finance Initiative. Brief. January 2021. Available at: https://www.forest-trends.org/publications/illegal-logging-and-associated-trade-in-myanmar/
[6] EIA 2015. *Organised Chaos. The illicit overland timber trade between Myanmar and China*. Environmental Investigation Agency, London. Available at: https://eia-international.org/wp-content/uploads/EIA-Organised-Chaos-FINAL-lr1.pdf

Recent political turmoil is affecting governance of the log trade.
In addition to the impact of COVID-19 on the Myanmar timber sector in 2020, Myanmar's trade has also been seriously affected by political turmoil in the country, with the United States, Canada, the United Kingdom, and the European Union (EU) imposing sanctions on trade with the MTE in 2021 following the stockpiling and attempted auctions of illegal timber by the MTE[7,8,9].

Figure 3: Myanmar tropical log exports, by volume, 2010-2020, by country of destination



2.2.1.3 Lao PDR roundwood exports

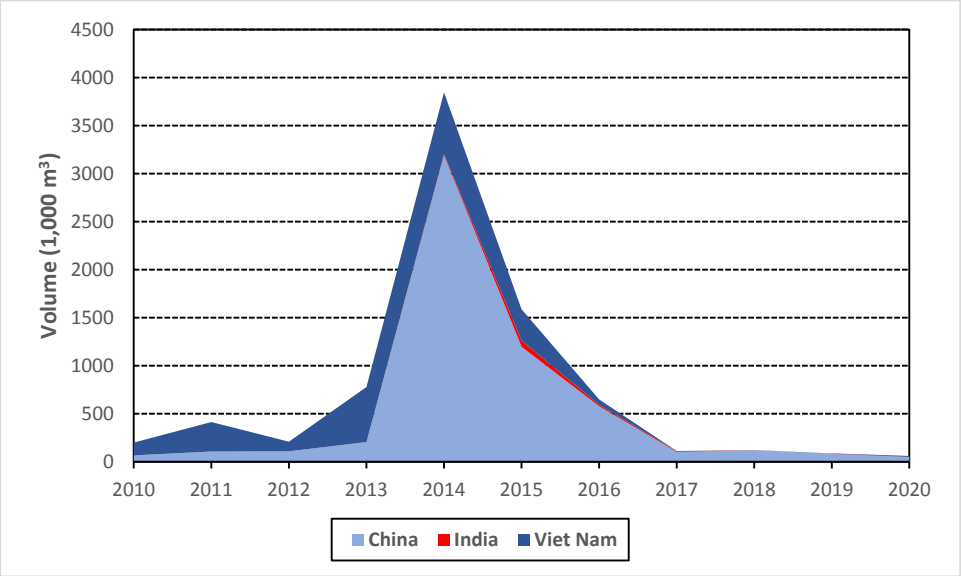
Log exports peaked in 2014 in response to a surge in China's tropical log demand but have declined to minimal levels in response to government interventions.
Tropical log exports from Lao PDR have followed a similar trend with exports peaking in 2014 at 3.9 million m^3 (valued at USD 954 million) dropping by half in 2015 to 1.6 million m^3 and to negligible levels from 2017 to 2020 (Figure 4). Policy instruments had been introduced prior to 2013 which were aimed at curbing unsustainable and illegal practices in natural forests, and capturing more revenue from timber production. These instruments were intended to reduce deforestation and redirect the export of unprocessed wood products to support the development of the domestic wood processing industry. In May 2016 the government issued Prime Minister Order 15 (PMO 15) that, among other directives, prohibited the export of unprocessed timber from natural forests and restricted domestic trade in wood products, including from plantations (although this was lifted in

[7] Mongobay 2021. *Myanmar's troubled forestry sector seeks global endorsement after coup.* 8 February 2021. Available at: https://news.mongabay.com/2021/02/myanmars-troubled-forestry-sector-seeks-global-endorsement-after-coup/
[8] EIA 2021. *New EU sanctions target Myanmar timber and natural resources sector to choke off funds for the junta*. 21 June 2021. Available at: https://eia-international.org/news/new-eu-sanctions-target-myanmar-timber-and-natural-resources-sector-to-choke-off-funds-for-the-junta/
[9] The Irawaddy 2021. *Myanmar Junta to Auction Over 12,000 Tons of Illegal Timber*. 10 September 2021. Available at: https://www.irrawaddy.com/news/burma/myanmar-junta-to-auction-over-12000-tons-of-illegal-timber.html

2018)[10]. Roundwood is now only available for export from logging in conversion areas, timber plantations and from confiscated logs[11].

China and Viet Nam have been the major markets for Lao PDR's log exports. China's log imports from Lao PDR increased significantly during the period 2012 to 2014, mainly in response to exponential growth in China's demand for "rosewood" species, particularly high-value rosewood species from Lao PDR, namely Siamese rosewood (*Dalbergia cochinchinensis*) and to a lesser extent, Burma padauk (*Pterocarpus macrocarpus*) (see Section 2.4.1). Log exports to Viet Nam reached 645,000 m^3 in 2014 and have contracted year-on-year, dropping to negligible levels from 2016 to 2020. The major species exported to Viet Nam in 2015 (before PMO 15) were keruing (*Dipterocarpus* spp.), white meranti (*Shorea roxburgii*), and magnolia (*Magnolia champaca*)[12]. In 2019, plantation acacia was the dominant species exported (73% by volume), albeit at very small volumes[13]. However, cross-border illegal trade continues to be reported, although at significantly lower levels than in previous years[14].

Figure 4: Lao PDR tropical log exports, by volume, 2010-2020, by country of destination



[10] Smith H.; Kanowski P.; Keenan R.J. and Phimmavong S. 2021. *Lao Plantation Policy: Prospects for Change*. Forests 2021.12, 1132. Available at: https://www.mdpi.com/1999-4907/12/8/1132

[11] Flint C. 2019. *Country Report Laos.* Available at: https://www.rinya.maff.go.jp/j/riyou/goho/jouhou/pdf/h30/H30report_nettaib_10.pdf

[12] Ibid.

[13] Phuc Xuan To, Cao Thi Cam, and Tran Le Huy 2020. *Vietnam's Import of Tropical Timber and the Implementation of the Vietnam Timber Legality Assurance System*: Africa, Cambodia, Laos and Papua New Guinea. Forest Trends. Available at: https://www.forest-trends.org/wp-content/uploads/2020/11/Vietnam-import-tropical-timber-FINAL.pdf

[14] Radio Free Asia 2020. *Seven Truckloads of Timber Seized at Lao/Vietnam Border For Failure to Pay Bribe.* 30 January 2020. Available at: https://www.rfa.org/english/news/laos/gtimber-01302020154654.html

2.2.1.4 Cambodia roundwood exports

Cambodia's log exports are smaller scale although illegal cross border trade with Viet Nam has been an historical concern.

Log exports from Cambodia's natural forests have been prohibited since 1996. However, log exports have occurred, albeit on a relatively small scale in official reporting, with Viet Nam being the predominant market. Cambodia's exports to Viet Nam peaked in 2016 at 156 000 m^3, but have declined considerably to negligible levels in 2019 and 2020, as reported by Viet Nam (Figure 6). The cross-border trade with Viet Nam has been associated with an alleged illegal trade in high value rosewood logs (*Dalbergia cochinchinensis*), with historical concerns that large volumes of illegally harvested timber have been smuggled from Cambodia into Viet Nam[15,16]. Viet Nam signed a memorandum of understanding on illegal logging and cross-border transport with Cambodia in 2012. More recently, the Forest Law Enforcement Governance and Trade (FLEGT) Voluntary Partnership Agreement (VPA) between the European Union and Viet Nam entered into force in June 2019. Among other provisions, the agreement seeks to institute a timber legality assurance system that will apply to Viet Nam's domestic and export markets. However, concerns about illegal harvesting and cross-border timber smuggling are continuing[17].

2.2.1.5 China roundwood imports from the LMR

China's tropical log imports from LMR countries has declined since 2014 while imports from other tropical regions (Asia, Africa, Latin America) have increased.

Figure 5 shows China's reported tropical log imports from LMR countries for 2010 to 2020. As discussed, China's imports from Myanmar and Lao PDR peaked in 2014, and have declined to relatively small levels. Imports from Pacific (Papua New Guinea and the Solomon Islands), African (mainly Equatorial Guinea, Rep. of Congo, Cameroon, and Mozambique) and South American (mainly Brazil and Suriname) country supply sources have replacing imports from LMR countries. Viet Nam has also been a source of tropical logs, although China's imports from Viet Nam have fluctuated and the trade has declined to relatively low levels since 2017. There have been discrepancies in the trade reported by the respective countries, with China reporting imports from Viet Nam of 19,000 m^3 in 2019, while Viet Nam's reported exports to China were minimal (Appendix 2).

Although China's reported imports of tropical logs (and sawnwood) from Thailand, sourced from natural forests, have been minimal, illegal logging continues to be reported, particularly of high-value species such as *Dalbergia cochinchinensis* and other rosewood species, and agarwood (*Aquilaria spp.).* However, increased monitoring and control both in Thailand and neighbouring countries has reduced the reports of cross-border timber smuggling and timber laundering schemes, whereby illegally harvested timber is transported across borders and legally imported back into Thailand for domestic utilisation[18].

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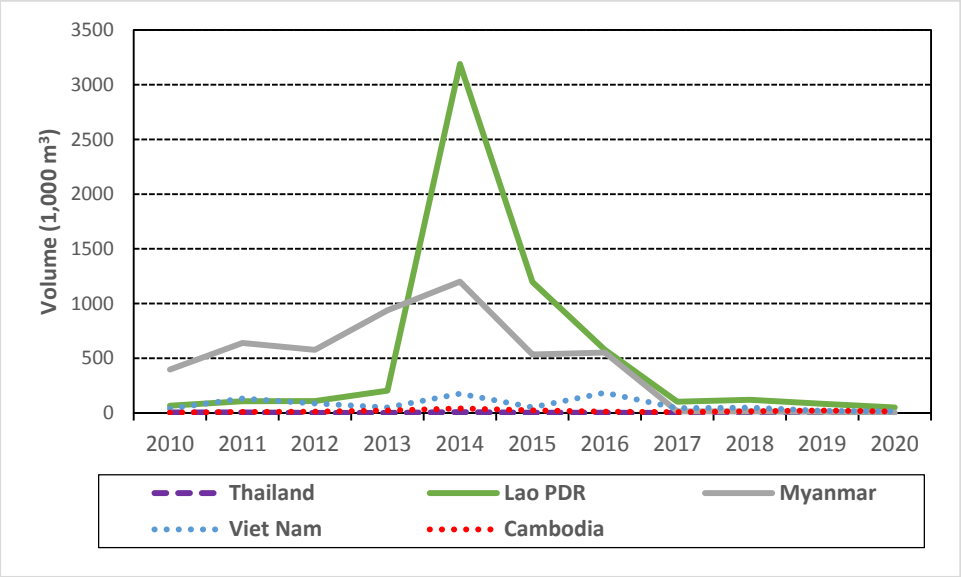
[15] Reuters 2017. *Illegal log exports from Cambodia surge – report*. May 8 2107. Available at: https://www.reuters.com/article/cambodia-logging-idUSL4N1I9097

[16] FLEGT 2018. *EIA details illegal timber operations between Cambodia and Vietnam***.** Available at: http://www.flegt.org/news/content/viewItem/eia-details-illegal-timber-operations-between-cambodia-and-vietnam/04-06-2018/200

[17] EC 2020. *Forest encroachments and logging activities within the Prey Lang Wildlife Sanctuary, Cambodia.* JRC Technical Report. Available at: https://forobs.jrc.ec.europa.eu/iforce/docs/JRC-Technical-Report_Assessment-Cambodia-Prey-Lang-Sanctuary.pdf

[18] Durst P. 2019. *Thailand. Country report on forest product legality requirements and risks*. Available at: https://www.rinya.maff.go.jp/j/riyou/goho/jouhou/pdf/h30/H30report_nettaib_6.pdf.

Figure 5: China imports of tropical logs from LMR countries, by volume, 2010-2020, by country of origin



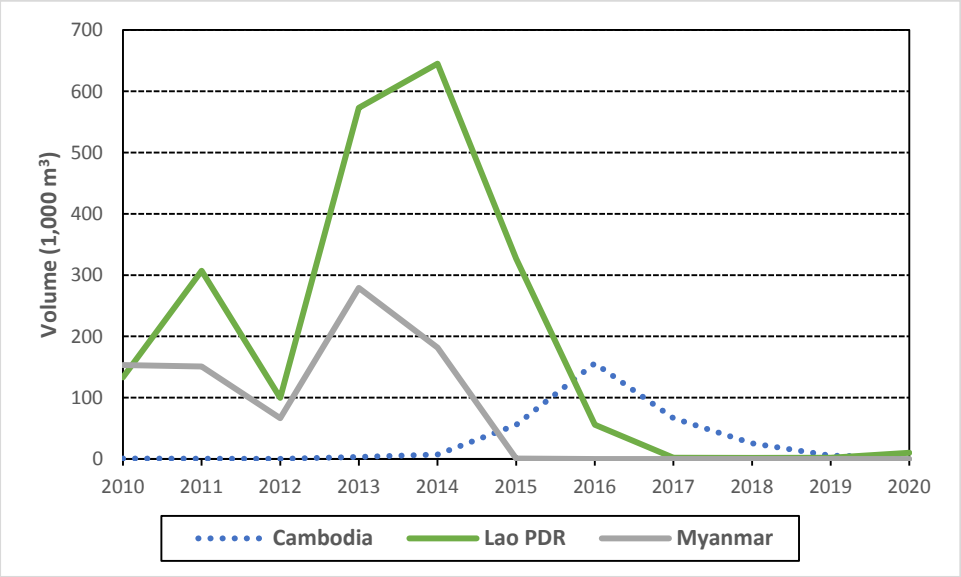
2.2.1.6 Viet Nam roundwood imports from the LMR

Viet Nam's imports of primary wood products from the LMR have declined to minimal levels and have been replaced by imports primarily from the African region.

Viet Nam's log imports from LMR countries Lao PDR, Myanmar and Cambodia) have also declined to minimal levels in recent years (Table 6) and the region accounted for less than 1% of Viet Nam's total tropical log imports by volume in 2019 (Appendix 2). Viet Nam's replacement of supply sources from predominantly the LMR to the African region has been rapid, with the African region (Cameroon, Rep. of Congo, and Central African Republic), supplying 76% of Viet Nam's tropical log imports in 2019 compared with 22% in 2013, when Myanmar and Lao PDR were the major suppliers. China has also been a supply source, although Viet Nam had reported negligible imports of tropical logs from China in 2019 while China had reported exports to Viet Nam totalling 35,462 m^3. The original supply source of China's (re-exported) tropical log supply to Viet Nam is unknown, given that China imports tropical logs from multiple tropical log exporting countries. Viet Nam's imports in 2019 from Lao PDR, although minimal, were reported by Lao PDR as predominantly from plantation sources, comprising acacia (78% by volume) and teak (20% by volume)[19].

[19] ITTO TTM Report, 16 – 30 November 2020

Figure 6: Viet Nam imports of tropical logs from LMR countries, by volume, 2010-2020, by country of origin



2.2.2 Sawnwood

2.2.2.1 Regional overview of LMR sawnwood trade

Exports of sawnwood from the LMR, excluding Thailand, are shown in Figure 7 and the major trade flows from the region, including Thailand, in Figure 8.

Figure 7: Exports of tropical sawnwood from the LMR, by volume and value, 2010-2020

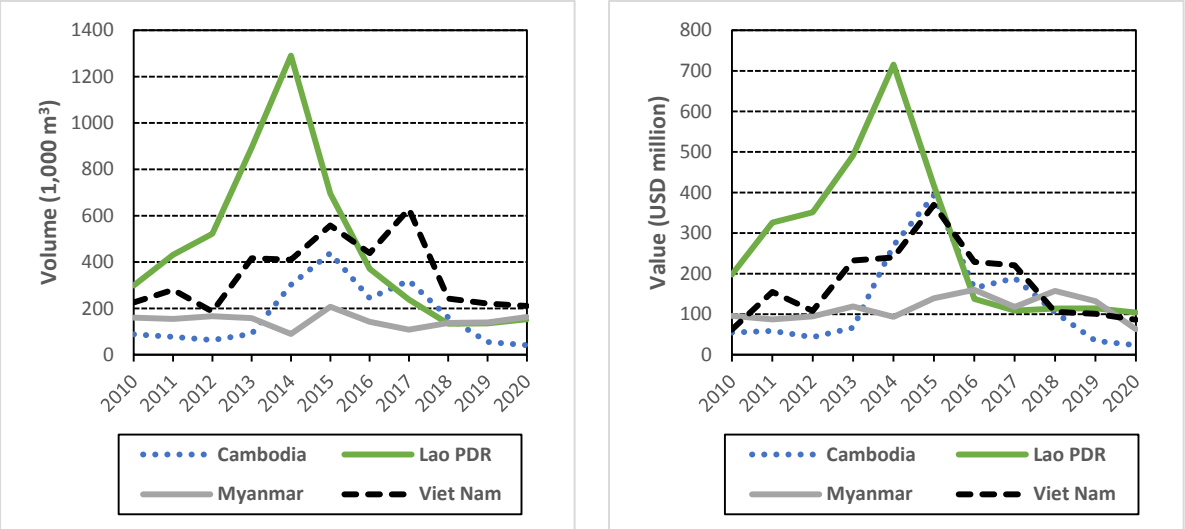
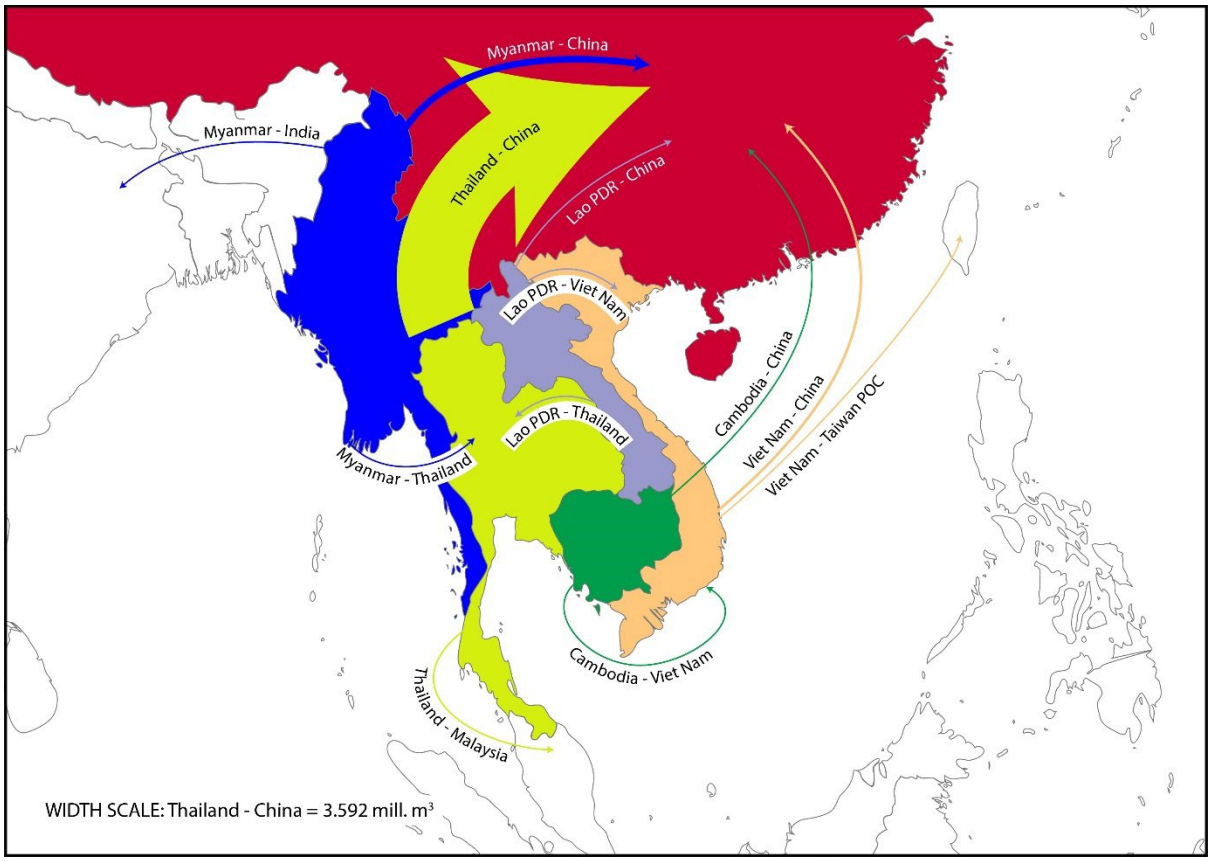


Figure 8: Major trade flows for tropical sawnwood from LMR countries, 2019, by volume



Source: COMTRADE
Note: Major trade flows include annual trade greater than 5,000 m^3

2.2.2.2 Thailand tropical sawnwood exports

Thailand dominates LMR and global exports of tropical sawnwood, most of which is plantation grown rubberwood and almost all of which is exported to China.

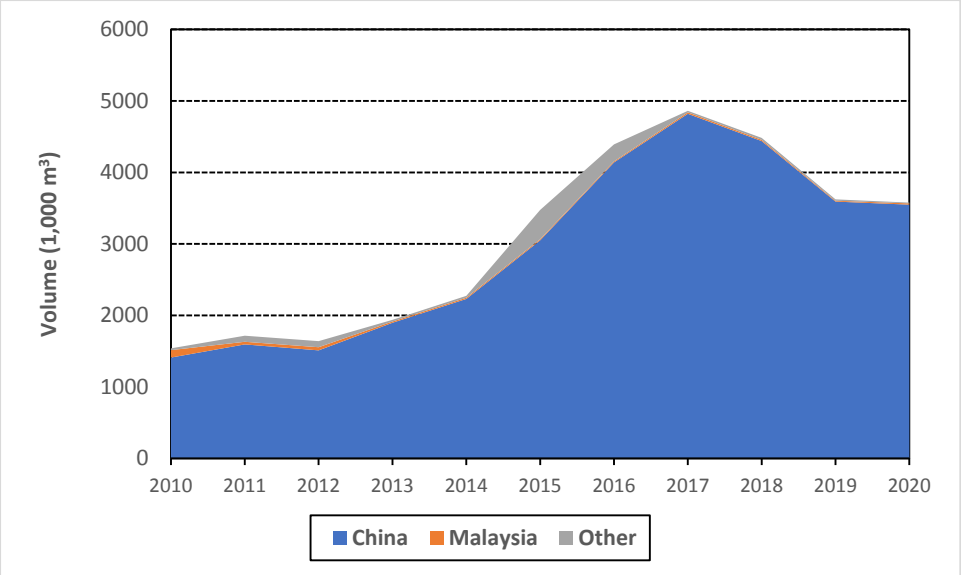
Figure 9 shows the dominance of China as Thailand's major export market for tropical sawnwood, almost all of which is rubberwood destined for China's wooden furniture industry.

Export trends largely reflect market conditions in China.

Export volumes contracted in 2018 in response to U.S. import tariffs on Chinese wooden furniture and the tightening of environmental controls on Chinese furniture manufacturers, which precipitated a decline in demand for rubberwood sawnwood used in furniture manufacture[20]. In the first half of 2020, Thailand's rubberwood sector had been severely affected by declining demand in China and by logistical supply issues from China's imposed measures to control COVID-19. In May 2020, 60 per cent of Thailand's sawmills had ceased production and 40 per cent were working at a minimum level[21]. Further analysis of Thailand's rubberwood plantations and the rubberwood industry are provided in Sections 2.5 and 3.6.

[20] Durst P. 2019. Op cit.
[21] ITTO TTM Report 16-31 May 2020.

Figure 9: Thailand exports of tropical sawnwood, 2010-2020, by volume, by country of destination



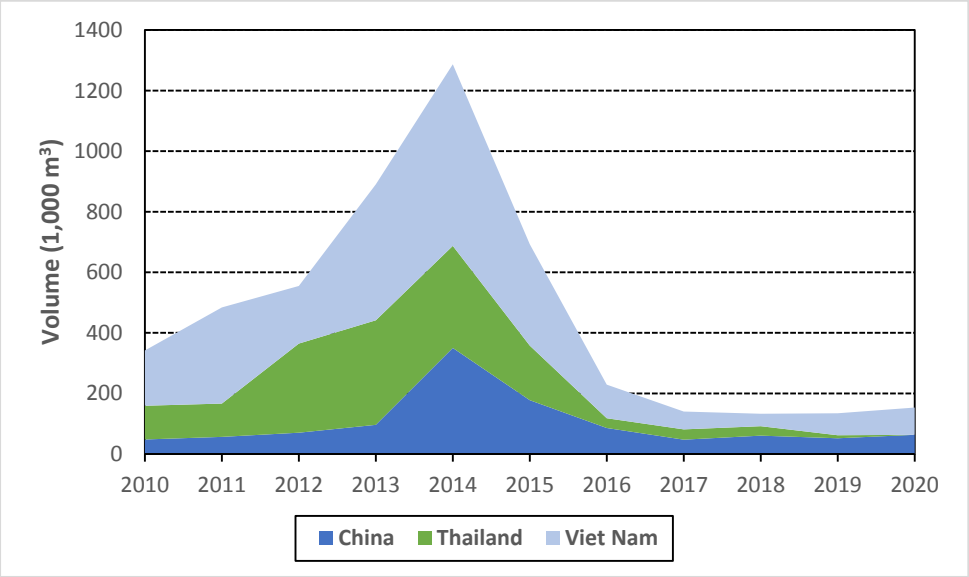
2.2.2.3 Lao PDR tropical sawnwood exports

Tropical sawnwood exports from Lao PDR have been from natural forests and have plunged in recent years, with Viet Nam now the major market.

Exports of tropical sawnwood from Lao PDR reached nearly 1.3 million m^3 in 2014, valued at USD 715 million, before plummeting year-on-year to 210,000 m^3 in 2020. Sawnwood exports from natural forests had been banned from 2016 but have continued, with Viet Nam now the major importer, followed by China and Thailand (Figure 10). The major species exported to Viet Nam (as reported by Viet Nam) in 2019 (proportion by volume) were mostly natural wood species and included the following: Burma padauk (*Pterocarpus macrocarpus*) 28%, *Sindora tonkinensis* 28%, *Xylia dolabriformis* 6%, ironwood (*Erythrophloeum fordii*) 6%, teak (*Tectona grandis*) 7%, *Dipterocarpus* spp. 5%, *Talauma gioi* 4%, *Pterocarpus pedatus* 3%, and crape myrtle (*Lagerstroemia flos-reginae*) 3%. The remainder included a number of other non-plantation species[22]. There have been significant discrepancies between the reported trade by Lao PDR and all its trading partners in the region, with Lao PDR reporting minimal trade compared with significantly larger volumes reported by China, Viet Nam, and Thailand (see Appendix 1).

[22] ITTO *Tropical Timber Market Report*, 16-30 November 2020.

Figure 10: Lao PDR exports of tropical sawnwood, 2010-2020, by volume, by major country of destination

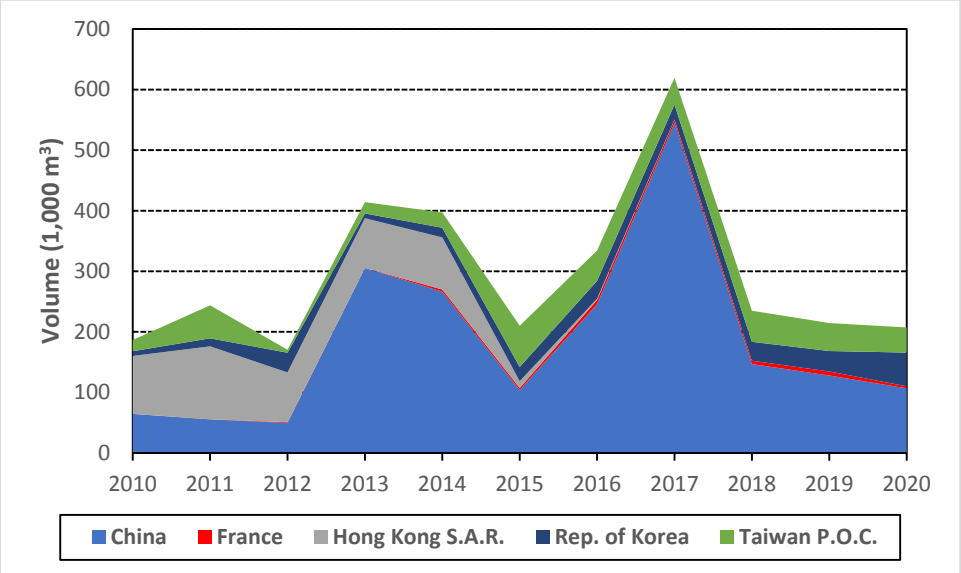


2.2.2.4 Viet Nam tropical sawnwood exports

Viet Nam exports tropical sawnwood to a more diverse range of destinations than other LMR countries.

Viet Nam has been a major exporter of tropical sawnwood within the LMR region but has a more diverse range of export destinations than other LMR countries, mostly within the Asian region (Figure 11). Exports have fluctuated over the last decade but have contracted sharply since 2017, with China, the Republic of Korea and Taiwan P.O.C. the major markets. The species exported are unknown but as well as native species, could include sawnwood produced in Viet Nam from imported logs from other regions, or re-exports from LMR sources and other imports, although this is unable to be verified.

Figure 11: Viet Nam exports of tropical sawnwood, 2010-2020, by volume, by major country of destination

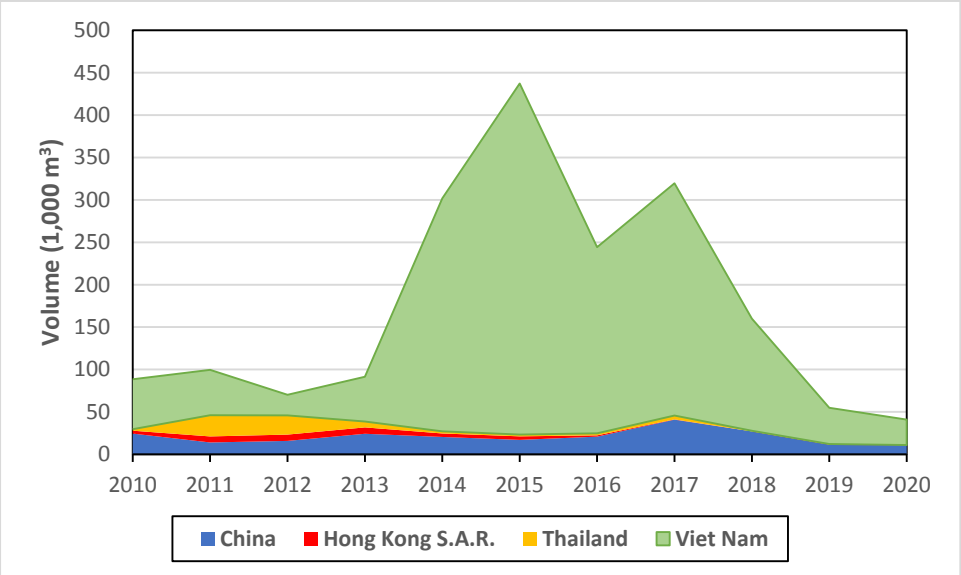


2.2.2.5 Cambodia tropical sawnwood exports

Tropical sawnwood exports from Cambodia have plunged since 2017 but have been associated with illegal timber smuggling.

Cambodia's sawnwood exports increased significantly in 2014, reaching a peak in 2015 of 438,000 m^3. Although imports have fluctuated they remained at a relatively high level to 2016, with large-scale smuggling of illegal timber from Cambodia into Viet Nam documented by NGOs at the peak of the trade[23]. Exports then plummeted year-on-year to 41,000 m^3 in 2020 (Figure 12). In 2019, the major species exported to Viet Nam (the major importer) by volume were: *Terminalia chebula* 25%, pyinkado (*Xylia dolabriformis) 21%,* crape myrtle (Lagerstroemia flos-reginae) 13%, cashew tree (*Anarcadium occientale*) (10%), *Erythrophleum fordii* (7%), sepetir (*Sindora cochinchinensis*) (6%), *Homalium caryopyllaceum* (6%), with the remainder being a number of other non-plantation species[24].

Figure 12: Cambodia tropical sawnwood exports, 2010-2020, by volume, by major country of destination



2.2.2.6 Myanmar tropical sawnwood exports

China is now the major destination for Myanmar's tropical sawnwood exports.

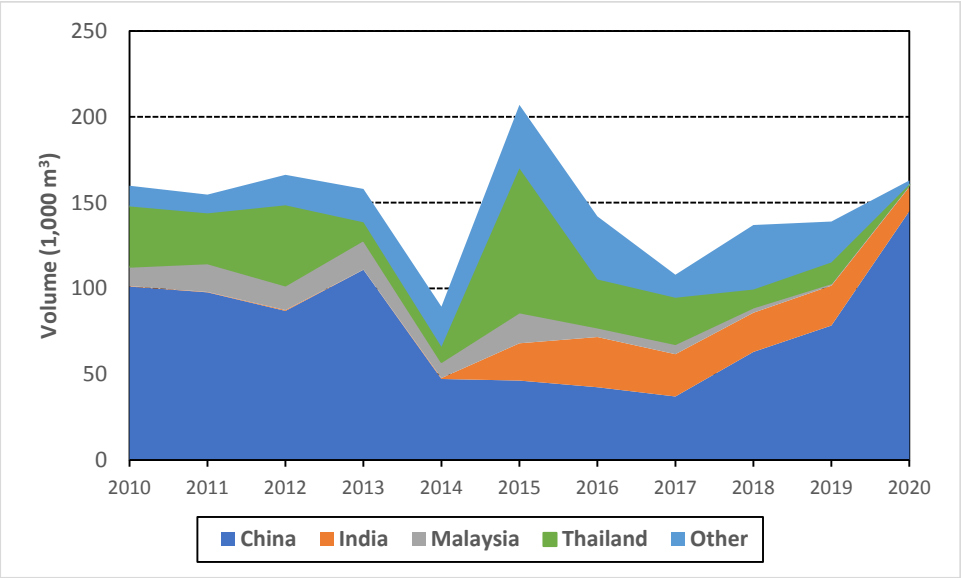
Myanmar's sawnwood exports have fluctuated over the last decade, with China's share of the volume of Myanmar's exports increasing from 34% in 2017 to 89% in 2020 (Figure 13). The unit values of Myanmar's exports have declined considerably over the last 3 years, from an average USD 1147/m^3 in 2018 to USD 387/m^3 in 2020, indicating a change in species mix from teak *(Tectona*

[23] Global Initiative 2021. *Forest crimes in Cambodia. Rings of illegality in Prey Lang Wildlife Sanctuary.* Global Initiative against Transnational Organised Crime. March 2021. Available at: https://globalinitiative.net/wp-content/uploads/2021/03/Forest-crimes-in-Cambodia-Rings-of-illegality-in-Prey-Lang-Wildlife-Sanctuary-GITOC-2021.pdf

[24] Phuc Xuan To, Cao Thi Cam, and Tran Le Huy 2020. *Vietnam's Import of Tropical Timber and the Implementation of the Vietnam Timber Legality Assurance System: Africa, Cambodia, Laos and Papua New Guinea. Forest Trends.* Available at: https://www.forest-trends.org/wp-content/uploads/2020/11/Vietnam-import-tropical-timber-FINAL.pdf

grandis) and other high value species such as pyinkado (*Xylia dolabriformis, X. kerri*), padauk (*Pterocarpus macrocarpus*), and Htauk kyant (*Terminalia tomentosa*), to an increasing proportion of lower value species, including plantation grown rubberwood (*Hevea brasiliensis*) and gmelina (*Gmelina arborea*).

Figure 13: Myanmar tropical sawnwood exports, by volume, 2010-2020, by major country of destination

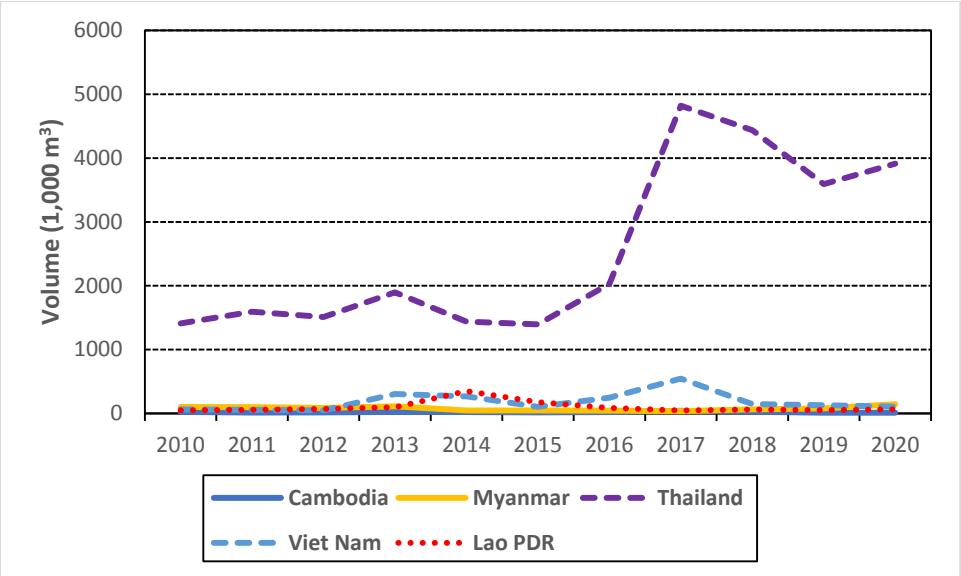


2.2.2.7 China and Vietnam tropical sawnwood imports from LMR countries

China's tropical sawnwood imports are dominated by imports from Thailand while Viet Nam's imports from the region have been replaced by other suppliers.

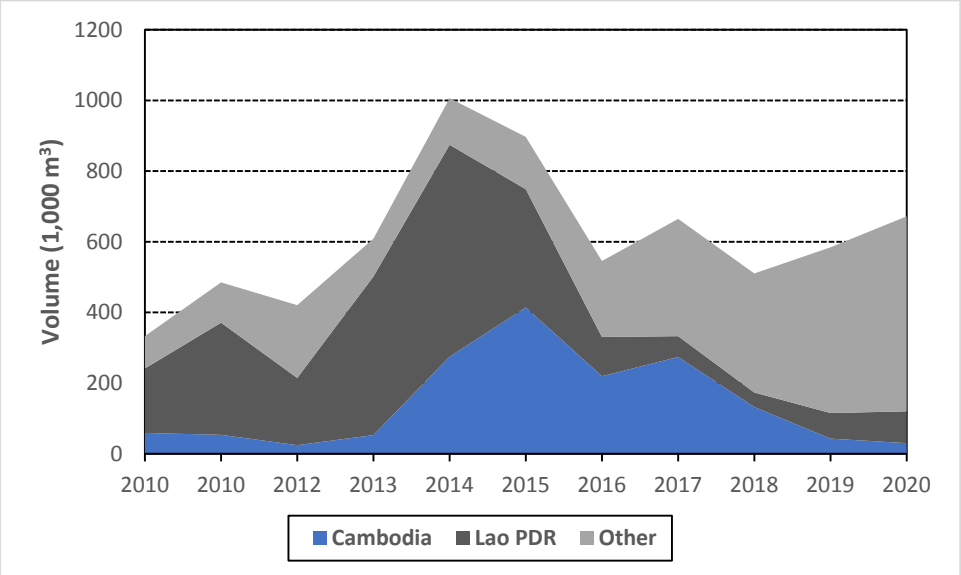
China's imports of tropical sawnwood from LMR countries are dominated by significant volumes of rubberwood from Thailand and very small volumes from other LMR countries (Figure 14). Imports from Thailand comprised 64% of China's total tropical sawnwood imports in 2019 and have been mainly used to supply the production of lower cost furniture (see Appendix 2).

Figure 14: China imports of tropical sawnwood from LMR countries, by volume, 2010-2020



Viet Nam's imports of tropical sawnwood from the LMR have dropped significantly in recent years (Figure 15), as discussed previously, with import demand being replaced by imports from other regions.

Figure 15: Viet Nam imports of tropical sawnwood, 2010-2020, by volume



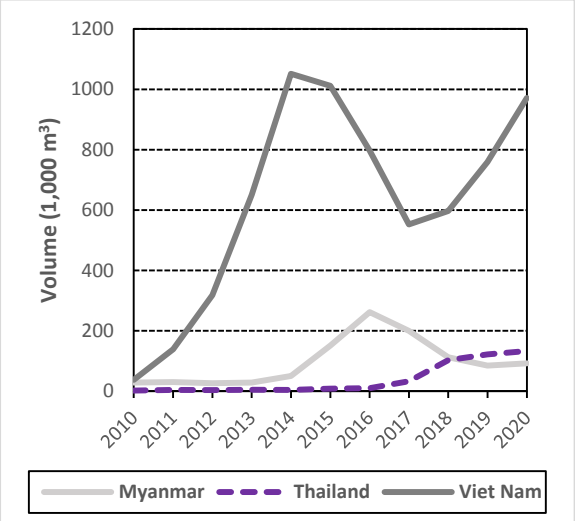
2.2.3 Veneer

2.2.3.1 Regional overview of tropical veneer exports from the LMR

Tropical veneer exports from the LMR region are dominated by Viet Nam, and to a lesser extent, Myanmar, and Thailand.

Figure 16 indicates the volume and value of tropical veneer exports from LMR countries for the period 2010 to 2020. The directions and magnitude of trade from LMR countries in 2019 are shown in Figure 17.

Figure 16: Exports of tropical veneer from the LMR, by volume and value, 2010-2020.



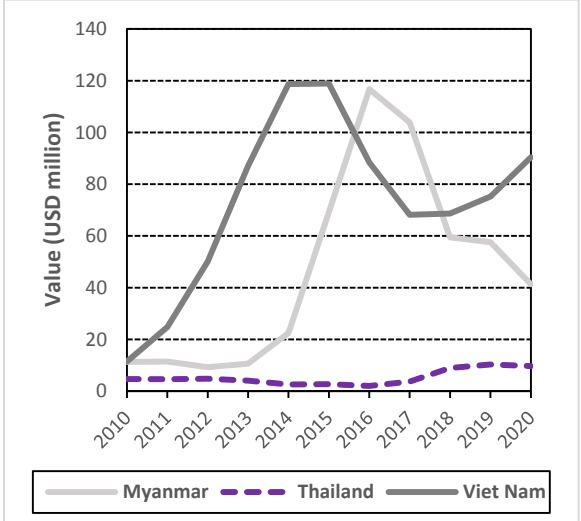
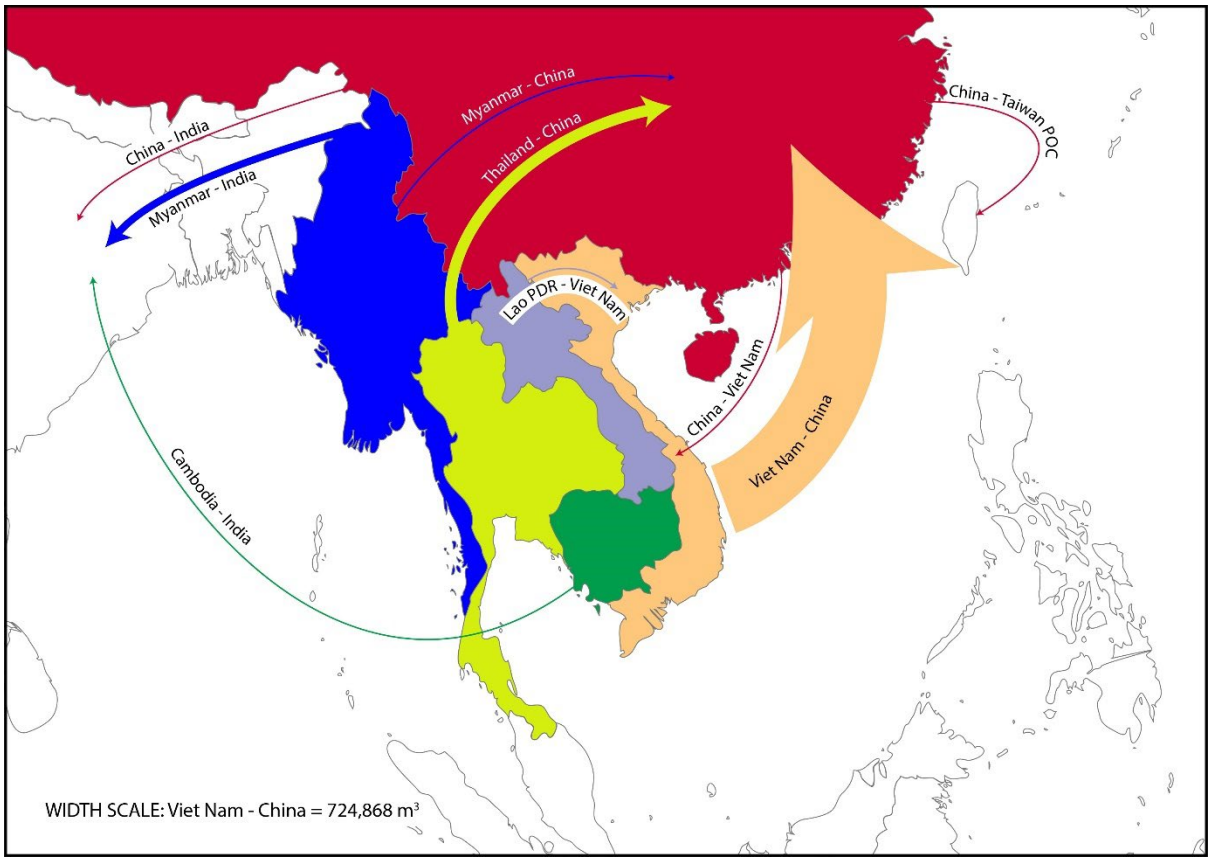


Figure 17: Major trade flows for tropical veneer from LMR countries, 2019, by volume



Source: COMTRADE
Note: Major trade flows include annual trade greater than 3,000 m^3

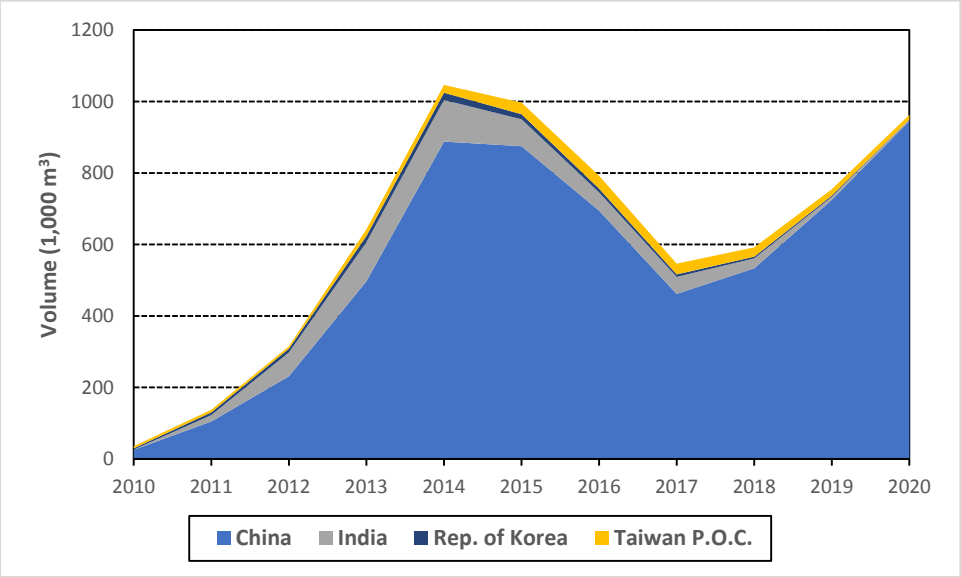
2.2.3.2 Vietnam tropical veneer exports

Viet Nam's tropical veneer exports have grown and are predominantly to China.

Viet Nam's exports have grown rapidly over the last decade, from a minimal level in 2010, to over 1 million m^3 in 2014, although a sharp decline occurred in 2016 and 2017 in response to reduced supplies of high-quality veneer logs, increased consumption of veneer in Viet Nam's furniture industry and declining demand in the major market, China. The surge in exports since 2017 reflects the surge in demand for tropical veneer in China, the major market. In 2020, most of the volume was destined for China (96 percent) with the remainder exported predominantly to Asian destinations (Figure 18). There are, however, significant differences in the trade volumes reported between reporting countries (see Appendix 1). For example, in 2019, China reported tropical veneer imports from Viet Nam at 724,868 m^3, while Viet Nam reported exports to China of 14,442 m^3. There is limited information on Viet Nam's veneer processing industry with which to verify Viet Nam's export data and the species are undifferentiated in Harmonised System (HS) codes[25] for veneer.

[25] The Harmonized System of tariff nomenclature is an internationally standardised system of names and numbers to classify traded products.

Figure 18: Viet Nam exports of tropical veneer, by volume, 2010-2020, by major country of destination

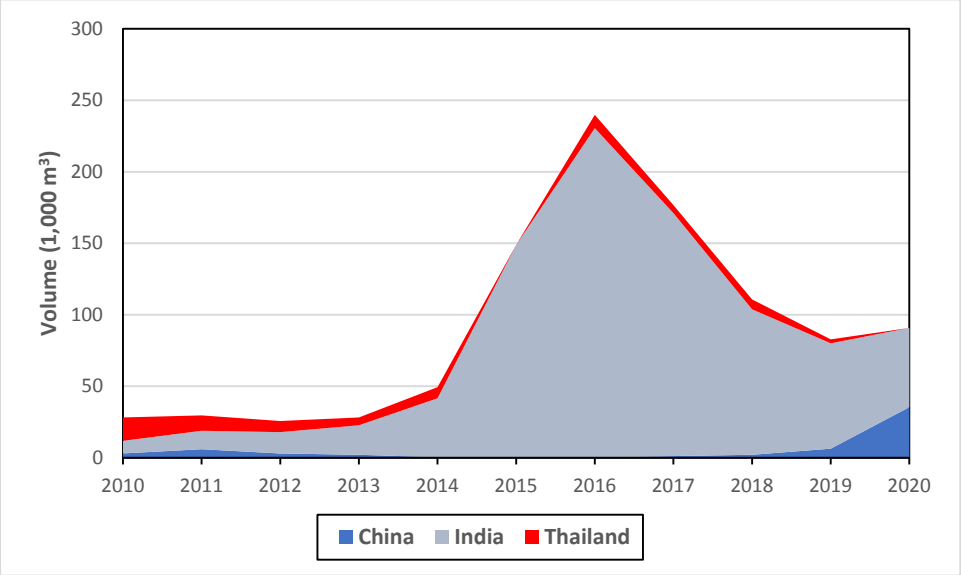


2.2.3.3 Myanmar tropical veneer exports

Myanmar's veneer exports are mainly of high value teak to India, although the market has contracted sharply since 2016 while exports to China have grown.

Myanmar's veneer exports, which are predominantly to India, have been relatively high value compared with exports from Viet Nam and Thailand (Figures 16 and 19), indicating that the predominant species is likely to be of higher-value Burmese teak.

Figure 19: Myanmar exports of tropical veneer, 2010-2020, by major country of destination



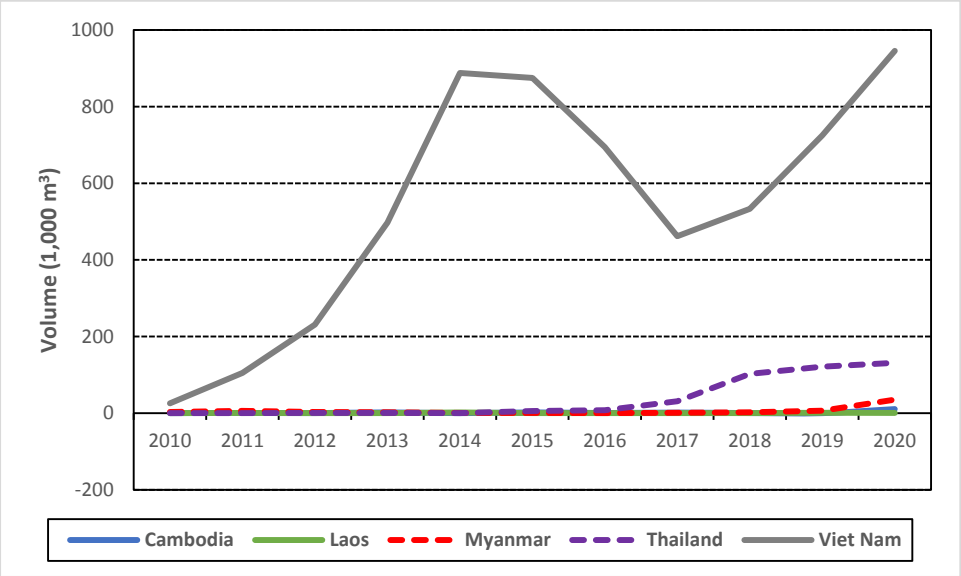
2.2.3.4 China tropical veneer imports from LMR countries

China's tropical veneer imports are predominantly from LMR countries.

China is the dominant market for tropical veneer exports from the LMR. China's imports of tropical veneer from LMR countries have grown considerably since 2017, reflecting a recovery in imports from Viet Nam, which had plunged in 2017, and growth in imports from Thailand and Myanmar

(Figure 20). China's imports from LMR countries accounted for the bulk (88%) of China's imports of tropical veneer in 2019.

Figure 20: China: Imports of tropical veneer from LMR countries, 2010-2020, by volume



2.2.4 Plywood

2.2.4.1 Regional overview of tropical plywood exports from the LMR

Tropical plywood exports from the LMR, mainly from Viet Nam and China, are predominantly to countries outside the LMR.

Viet Nam and China[26] are the major tropical plywood exporters from the LMR (Figure 21), although the proportion of plywood manufactured from LMR raw material input is unable to be determined, specifically due to the significant volume of China and Viet Nam's raw material input from other regions. In contrast to the trade in logs, sawnwood and veneer, there are considerable exports to countries outside the LMR region, with some (e.g., EU and the USA) having high requirements for legality and sustainability (Figure 22).

[26] Although not within the LMR, China has been included in the analysis of tropical plywood exports from the LMR because plywood is manufactured in China from imported LMR (and other) raw material, although the volume of plywood manufactured which uses LMR veneer, and the proportions consumed domestically and exported, is unknown.

Figure 21: Exports of tropical plywood from the LMR, by volume and value, 2010-2020

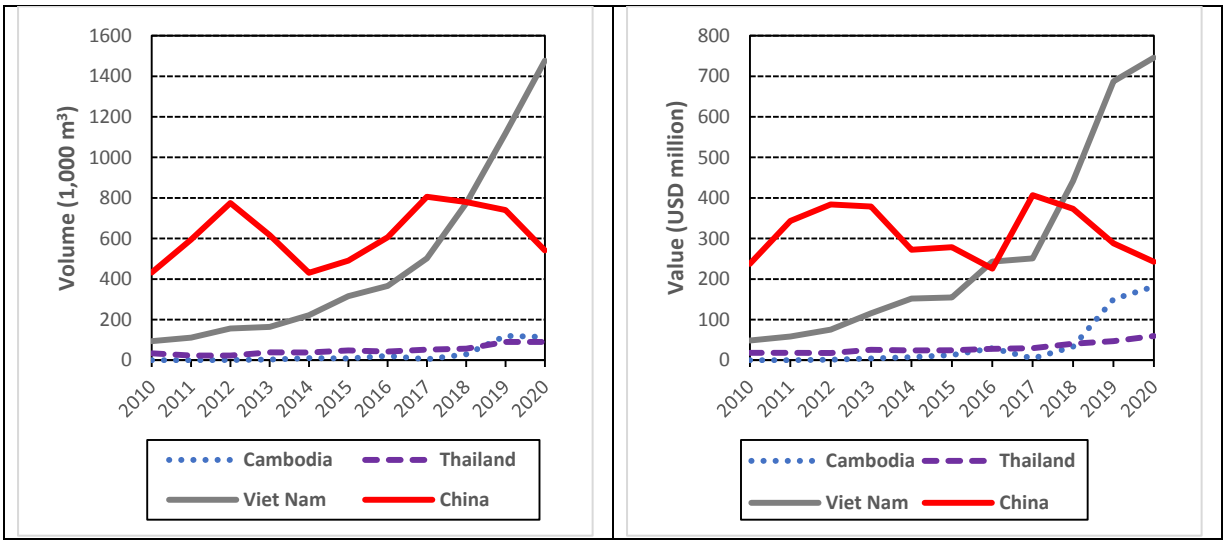
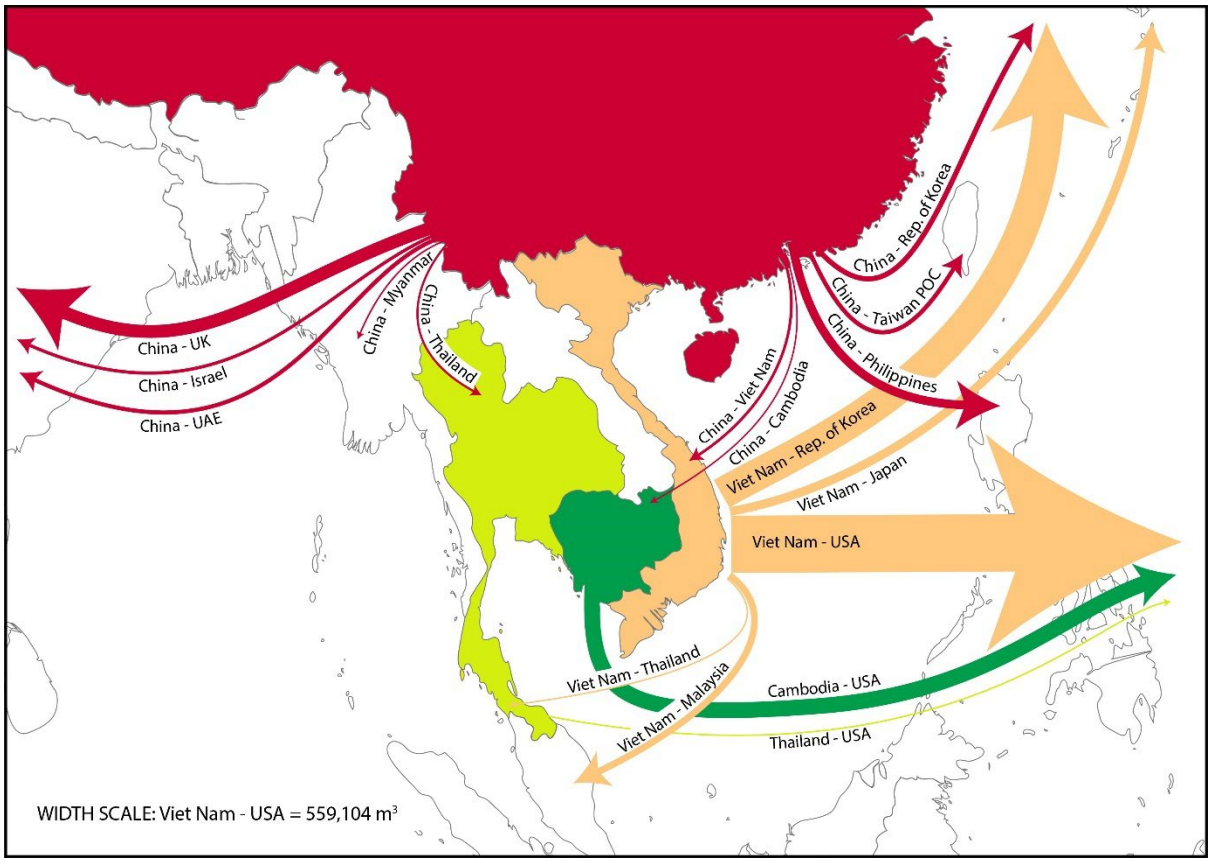


Figure 22: Major trade flows for tropical plywood from LMR countries and China, 2019, by volume



Source: COMTRADE

Note: Major trade flows include annual trade greater than 8,000 m^3

2.2.4.2 Viet Nam tropical plywood exports

Tropical plywood exports from Viet Nam grew exponentially over the last decade and bucked the global trend in 2020 following government interventions to support industry.

Viet Nam's exports of tropical plywood have grown exponentially over the last decade (Figure 23). Despite the onset of the COVID-19 pandemic in 2020, exports grew 32% by volume to 1.5 million m^3. The growth in 2020 reflects the country's early control of the pandemic and the quick and sustained resumption of production and exports, aided by government stimulus. In 2019, half of Viet Nam's exports were destined for the United States, although there were significant discrepancies between their respective reported trade volumes. Viet Nam had benefitted from trade measures imposed in 2018 by the United States on imports from China. The Rep. of Korea was also an important destination, absorbing 28% of Viet Nam's exports, with the remainder mostly exported to other Asian destinations.

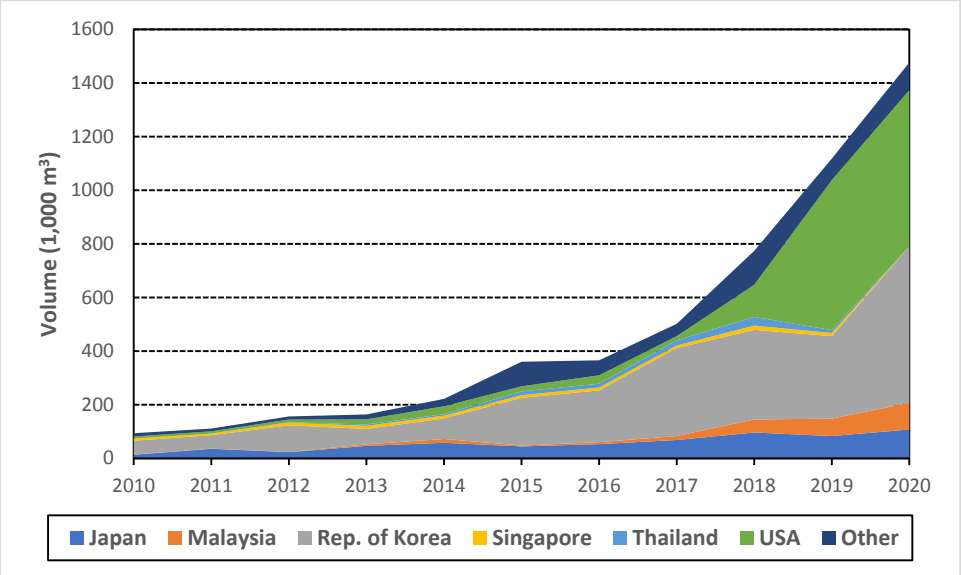
Viet Nam's trade with the United States and the Rep. of Korea has been subject to investigations of dumping and the origins of raw material inputs. In September 2020, the Rep. of Korea imposed anti-dumping duties of 9.18% to 10.65% on plywood imported from Viet Nam for a period of 5 years, for causing commercial harm to South Korean manufacturers[27]. In June 2020, the US Department of Commerce initiated a trade defence investigation for hardwood plywood originating from Viet Nam, in response to observations that Viet Nam's exports to the United States had escalated in 2019, while China's exports had dropped significantly following the imposition of anti-dumping and anti-subsidy duties[28]. In October 2020, the US Trade Representative (USTR) also launched an investigation on the import and use of illegally harvested timber in Viet Nam's timber exports under Section 301 of the 1974 Trade Act. The investigation was resolved in October 2021, when the United States and Viet Nam reached an agreement that establishes commitments to keep illegally harvested or trafficked timber out of the supply chain, as well as to safeguard the environment and natural resources. The agreement refers to a number of robust requirements for Viet Nam that were not included in the FLEGT VPA with the EU, including restrictions on the use of confiscated timber. The agreement is expected to avoid significant tariffs being imposed on US imports of plywood and other wood products from Viet Nam[29].

[27] Aju Business Daily 2020. *S. Korea makes final anti-dumping ruling against Vietnamese plywood.* September 18, 2020. Available at: https://www.ajudaily.com/view/20200918101529870

[28] Vietnam News 2020. *Twelve products face risk of being investigated for trade defence measures*. Available at: https://vietnamnews.vn/economy/715370/twelve-products-face-risk-of-being-investigated-for-trade-defence-measures.htm

[29] USTR 2021. *Agreement Between the Government of The Socialist Republic of Viet Nam and the Government of the United States of America on Illegal Logging and Timber Trade*. Available at: https://ustr.gov/sites/default/files/files/Vietnam%20Timber/VN%20Timber%20Agreement%20Text%20(9-30-21).pdf

Figure 23: Viet Nam: Exports of tropical plywood, by volume, 2010-2020, by country of destination



2.2.4.3 Cambodia tropical plywood exports

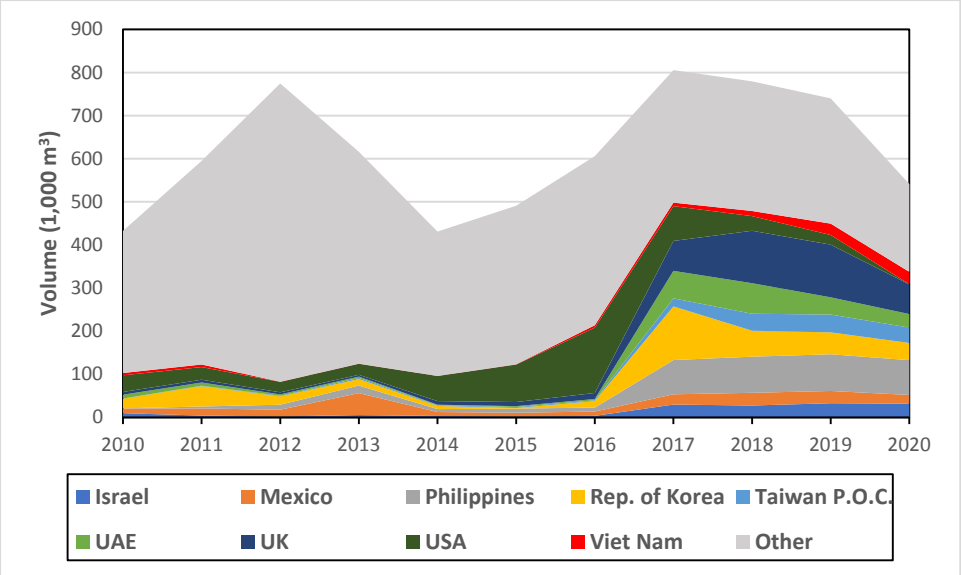
Cambodia's plywood exports are at a relatively low level but they have increased considerably in volume and value over the last 2 years, with the United States the major market destination.

2.2.4.4 China exports of tropical plywood

Tropical plywood export from China have trended downwards since 2017 and have been subject to anti-dumping duties in several jurisdictions.

China's exports of tropical plywood (Figure 24) had peaked in 2017 at 806 000m^3 but declined year-on-year to 2020. This was mainly in response to the imposition of countervailing measures and prohibitive tariffs by the United States on plywood imports from China, a reduction in production levels in 2018 as the plywood industry adjusted to new environmental regulations, and a surge in domestic demand as the economy bounced back quickly from the effects of the pandemic in the second half of 2020. China's export markets are diverse, although there are large discrepancies in the reported trade flows between China and all importing countries. China's exports are subject to anti-dumping duties in several jurisdictions, including the EU, Republic of Korea, Morocco, Turkey, and the United States.

Figure 24: China: Exports of tropical plywood, by volume, 2010-2020, by country of destination



2.3 Secondary processed wood products trade

This section provides detailed insights on trade in selected secondary processed wood products (SPWPs) from LMR countries, focusing on wooden furniture and other secondary processed wood products (builders' woodwork and joinery, wooden mouldings and "other SPWPs"). Data on trade in paper and paperboard, woodchips, pulp and wood panels are shown in Appendix 1.

2.3.1 Wooden furniture

2.3.1.1 Regional overview of wooden furniture exports from the LMR

Tracking exports of wooden furniture manufactured from LMR wood sources is problematic.

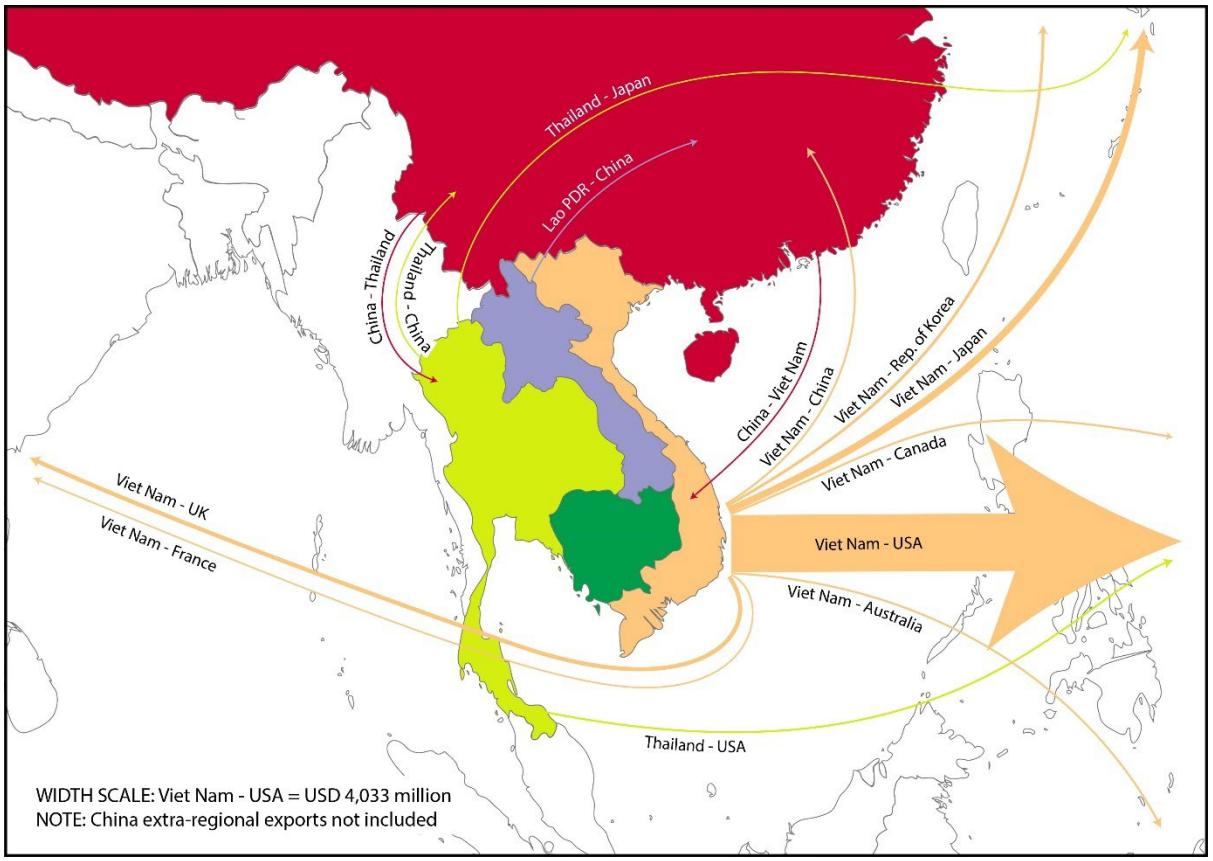
This section presents trade by value, as the volumes of wooden furniture exported are not reported in trade statistics. The species used in wooden furniture trade are also not identified in HS codes so that furniture produced specifically from LMR wood raw material is unable to be identified for exports from China[30] and Viet Nam, which are now importers of primary wood products from many sources outside the region.

Production and exports of the more highly processed wood products are concentrated in China, Viet Nam and Thailand and the export destinations are mainly extra-regional.

A notable feature of the wood products trade within the region is that production and exports of the more highly processed wood products are concentrated in China, Viet Nam and Thailand and the export destinations are mainly extra-regional, particularly the United States, EU member countries and Japan, where demand levels are significant and sustainability requirements are high . Appendix 1 shows the directions of intra-regional trade in wooden furniture by value, which is minimal compared with total exports from the region. The major trade flows of wooden furniture from the LMR and China (within the LMR region) are shown in Figure 25.

[30] Although not within the LMR, China has been included in the analysis of wooden furniture exports by LMR countries because wooden furniture is manufactured in China from imported LMR (and other) raw material, although the volume of wooden furniture manufactured in China which uses LMR-sourced raw material, and the proportions consumed domestically and exported, is unknown.

Figure 25: Major trade flows of wooden furniture from LMR countries, 2019, by value



Source: COMTRADE
Note: Major trade flows include annual trade greater than USD 30 million

2.3.1.2 Viet Nam wooden furniture exports

Over the last decade the growth in production and exports of Viet Nam's wooden furniture has been rapid.

Viet Nam is the world's second largest exporter of wooden furniture and parts, valued at USD 10.2 billion in 2020. Although domestic consumption has been increasing in response to rapid urbanisation and income levels, the bulk (about 90%) of production is exported. Over the last decade the growth in production and exports of Viet Nam's wooden furniture has been rapid (Figure 26). This has been due to increasing global demand for lower cost furniture, the global sourcing policy of large-scale retailers (e.g., IKEA), World Trade Organisation (WTO) membership, the country's political and macroeconomic stability, relatively low labour and production costs, quality craftsmanship, easy access to global shipping, and a relatively good export-oriented infrastructure and business environment[31]. In 2020, Viet Nam's successful response to the pandemic had enabled a quick and sustained resumption in production, with export levels able to respond to the surge in demand in the United States, the major market, which accounted for over 77% of the total export value in 2020, followed by Japan (5%) and Canada (3%).

[31] Castellina G. 2017. *Vietnam, The new Asia Furniture Dragon*. Available at: https://www.linkedin.com/pulse/vietnam-new-asian-furniture-dragon-giovanna-castellina

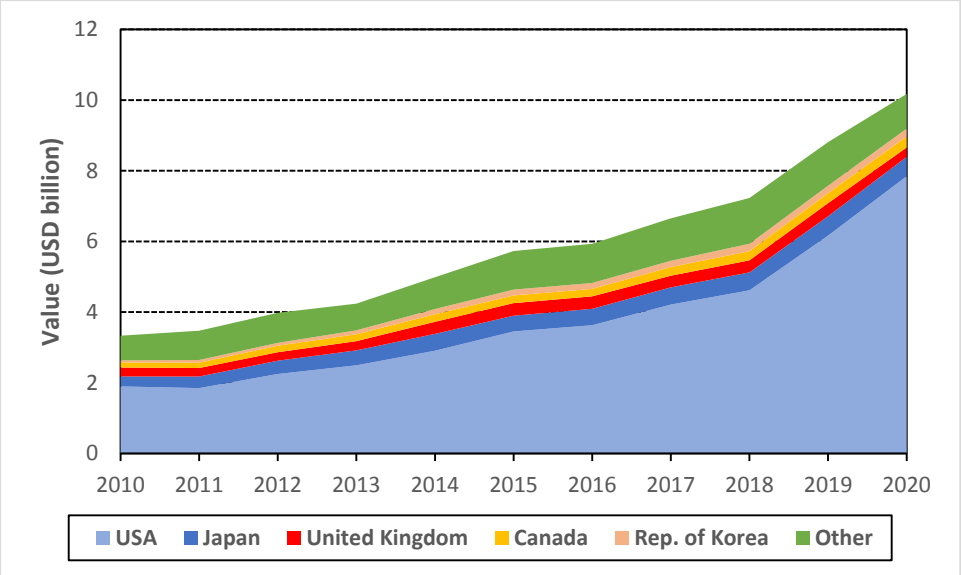
The share of plantation material in wooden furniture has grown, with domestically grown acacia estimated to provide about 14% of the wood used in furniture for export[32].

Export growth to the United States, the major market, has been assisted by US-imposed trade restrictions on China's imports.
Growth in exports to the US market has been assisted by the anti-dumping measures imposed on imports from China of some wooden furniture items since 2005, which had resulted in the relocation of many foreign-owned furniture enterprises to Viet Nam. About half of Viet Nam's exports are reported to be from foreign enterprises and this trend is likely to continue with further tariffs imposed since 2019 on China's wooden furniture exports to the United States. As discussed, in 2020 the US Department of Commerce initiated a review of Viet Nam's importation of timber that may have been illegally harvested or traded and used as inputs for its manufacturing of timber products (including wooden furniture), and subsequently exported to the United States[33]. The recently signed agreement between the United States and Viet Nam implies that it will now be difficult for illegally harvested timber in the region to enter the wooden furniture value chain[34].

A proliferation of new free trade agreements (FTAs) is expected to further assist wood furniture (and other wood products) export potential outside the region.
In addition to Viet Nam's obligations to enable implementation of a FLEGT-licensing scheme, Viet Nam has been active in pursuing free trade agreements to assist in export development. In addition to the Association of Southeast Asian Nations (ASEAN) Free Trade Agreement (FTA), Viet Nam has signed a proliferation of FTAs outside ASEAN aimed at improving the investment climate and reducing complexities in doing business in Viet Nam, and which are expected to result in more foreign investment in Viet Nam's furniture sector. These include recent trade agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP), EU-Vietnam FTA (EVFTA), UK-Vietnam FTA (UKVFTA), and the Regional Comprehensive Economic Partnership (RCEP).

[32] Tran C.T. and Huynh N.T. 2020. Analysis of export market structure for Acacia wooden furniture in Vietnam. J. Sci. Ho Chi Minh Open Univ. 10 (4), 27-41.
[33] Congressional Research Service 2020. *Section 301 Investigations: Vietnam's Timber Trade and Currency Practices*. Available at: https://crsreports.congress.gov/product/pdf/IF/IF11683
[34] USTR 2021. *Agreement Between the Government of The Socialist Republic of Viet Nam and the Government of the United States of America on Illegal Logging and Timber Trade*. Available at: https://ustr.gov/sites/default/files/files/Vietnam%20Timber/VN%20Timber%20Agreement%20Text%20(9-30-21).pdf

Figure 26: Viet Nam: Exports of wooden furniture, by value, 2010-2020, by country of destination

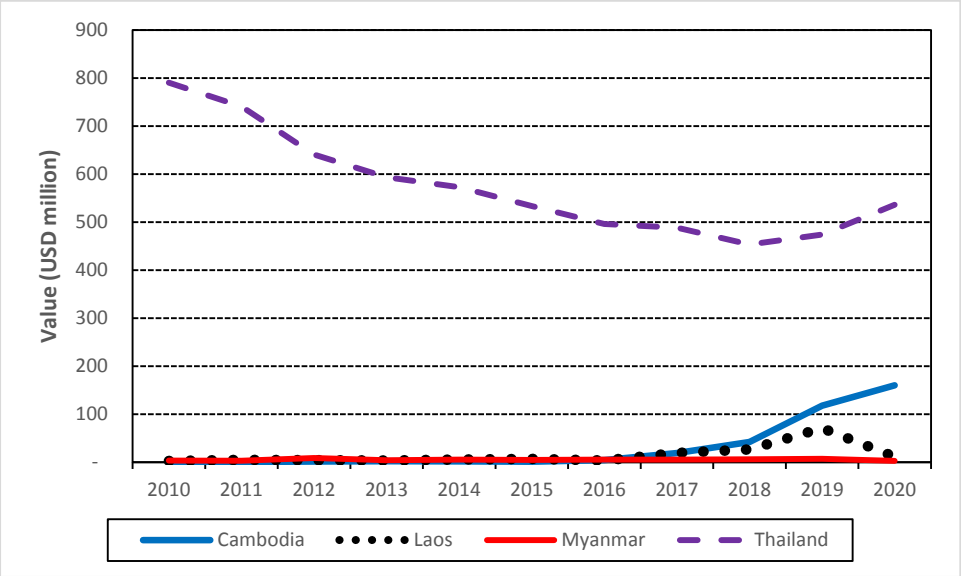


2.3.1.3 Other LMR countries' wood furniture exports

Other LMR countries' wood furniture exports have not followed the growth in Viet Nam, although Cambodia's exports have increased rapidly since 2016 from a very small base.

Thailand's wooden furniture exports were valued at USD 536 million in 2020, and were mainly to the United States (32%), Japan (24%), and the remainder to China, Australia, and EU destinations. Exports of wooden furniture from Lao PDR, and Myanmar have been minimal, and there have been significant differences in the trade values reported by respective countries (Appendix 2). Cambodia's exports have risen from a small base over the last 5 years and amounted to USD 160 million in 2020, with the bulk exported to the United States.

Figure 27: Exports of wooden furniture from the LMR (excluding Viet Nam), by value, 2010-2020



2.3.1.4 China wood furniture exports

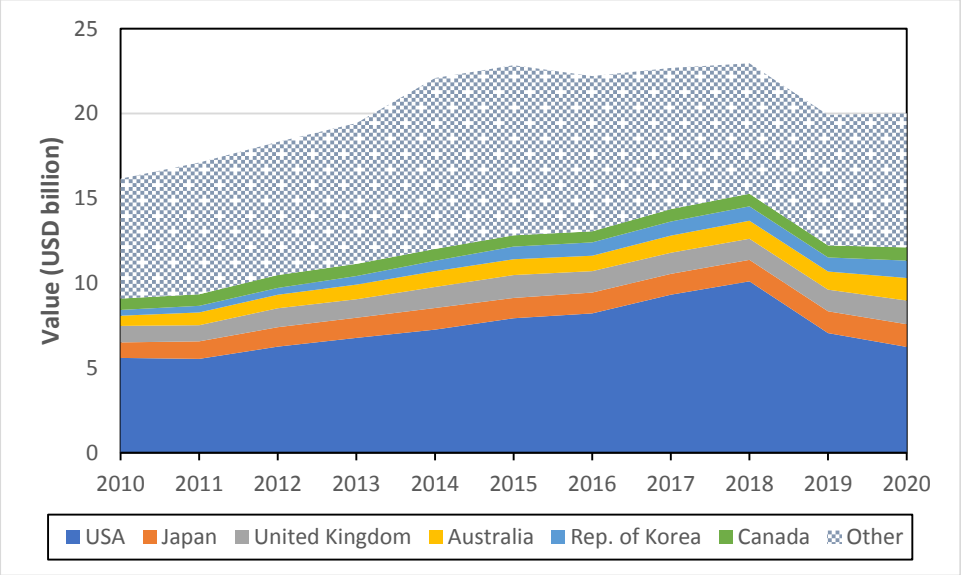
China is the largest global producer and exporter of wooden furniture but exports have slowed since 2018.

China is the world's largest producer of wooden furniture, with 41% of world production, and it continues to dominate global exports of wooden furniture and parts, valued at about double that of the second largest exporter Viet Nam. Growth in China's exports to 2014 was rapid, although exports slowed between 2014 and 2018, declining by 13% in 2019 to USD 19.9 billion, and recovering slightly in 2020 to USD 20.0 billion. Wooden furniture, particularly wooden bedroom furniture, which is China's largest wood product export item, accounts for over three-quarters of China's SPWP exports by value. China's tropical wooden furniture exports have been strongly competitive in price sensitive markets even though the value of China's exports has been continuing to grow at a faster rate than the quantity of exports, indicating an expanding proportion of higher value items in the product mix.

Chinese furniture manufacturers have been relocating to Viet Nam and other locations following retaliatory tariffs imposed by the United States.

The United States has been China's dominant market but exports to the United States have plunged since 2018, down 30% in 2019 to USD 7.1 billion and dropping further (by 11%) to USD 6.2 billion in 2020 (Figure 28). In 2019 and 2020, exports had been affected by retaliatory tariffs on Chinese furniture imports (among other products) imposed by the United States. The duties have resulted in a continuing trend of relocation of some manufacturers, particularly foreign-owned enterprises operating in China, to Viet Nam. In 2020, the United States accounted for 31% of export value, followed by the United Kingdom (7%), Japan (7%), Australia (7%) and the Rep. of Korea (5%). China's export destinations have been widespread. Exports to ASEAN countries (assisted by the China-ASEAN Free Trade Agreement) and the Middle East (especially Saudi Arabia and United Arab Emirates) have risen considerably. The decline in China's wooden furniture exports has also been associated with a reported rise in domestic consumption of furniture, in response to an increase in real estate development and household incomes in 2020[35].

Figure 28: China: Exports of wooden furniture, by value, 2010-2020



[35] ITTO Tropical Timber Market Report, 16-31 January 2021.

2.3.1.5 EU-28 wood furniture imports from LMR countries

EU-28 imports of wooden furniture from LMR countries have been relatively static over the last decade.

The value of EU-28 country imports of wood furniture from LMR countries has remained static over the last decade (Figure 29). In 2020, imports from China, by far the largest supplier, fell 11% to USD 3.5 billion after rising 7% the previous year. Viet Nam, the second largest LMR country supplier of furniture products to EU-28 countries in 2020, experienced a 16% downturn in sales to EU-28 countries to USD 762 million. Imports also fell from Thailand, Myanmar, and Cambodia, although the level of imports have been insignificant. In contrast, EU-28 intra-regional imports increased during the year. Although the pandemic had significantly disrupted EU-28 imports of wooden furniture in 2020, overall production and exports from Viet Nam were more resilient than expected early in the pandemic, but exports to EU-28 countries were particularly affected by lack of containers destined for Europe and the sharp rise in freight rates, starting in the second half of 2020. Exporters prioritised shipments to alternative markets, particularly the United States which recovered more quickly than EU-28 markets during the year[36].

EU imports of wooden furniture (and other wood products) from Viet Nam will be facilitated by progress in Voluntary Partnership Agreement (VPA) implementation and a recently signed FTA.

Viet Nam has recorded considerable progress in VPA implementation, and in September 2020, the country promulgated Government Decree No. 102 to implement a Timber Legality Assurance System (VNTLAS Decree). However, a FLEGT-licensing scheme is not yet operational as it does not yet meet all of the VPA requirements[37].

The European Union and Viet Nam have also signed a Trade Agreement and an Investment Protection Agreement on 30 June 2019 which came into force on 1 August 2020. The EU-Viet Nam agreement is the most comprehensive trade agreement the EU has concluded with a developing country and includes commitments to "encourage the promotion of trade in forest products from sustainably managed forests and harvested in accordance with the domestic legislation of the country of harvest". The agreement aims to supply opportunities to increase trade and support jobs and growth on both sides, through: eliminating 99% of all tariffs; reducing regulatory barriers and overlapping red tape; ensuring protection of geographical indications; opening up services and public procurement markets; and making sure the agreed rules are enforceable[38].

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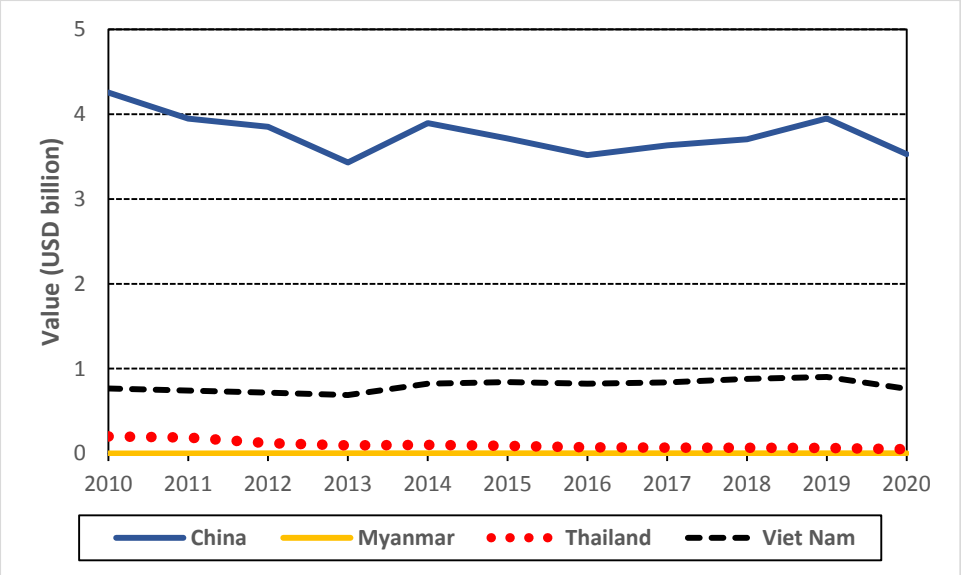
[36] International Tropical Timber Organization / FLEGT Independent Market Monitor. 2021. *FLEGT licensed and VPA partner timber products trade 2020. Main Report.* Document to be posted on IMM/ITTO websites in December 2021.

[37] https://eeas.europa.eu/delegations/Viet Nam/85283/voluntary-partnership-agreement-forest-law-enforcement-governance-and-trade-eu-welcomes_en

[38] https://ec.europa.eu/commission/presscorner/detail/en/IP_20_1412
https://trade.ec.europa.eu/doclib/press/index.cfm?id=1437

Figure 29: EU-28 imports of wooden furniture from the LMR, by value, 2010-2020



2.3.2 Other secondary processed wood products.

Exports of other secondary processed wood products from LMR countries have grown over the last decade and continued growth in exports will have benefits for SME producers.

Exports of other secondary wood products (which includes builder's woodwork and joinery, mouldings, and "other SPWPs" – small manufactured wooden articles) from China have been substantial over the last decade, although exports of "other SPWPs", the major export item, contracted significantly in 2020. The proportion of LMR raw material used in China's production of China's SPWPs is unable to be quantified but is unlikely to be significant.

Table 1: Exports of Secondary Processed Wood Products from LMR countries and China, 2020-2020, by value (USD 1,000)

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
CAMBODIA											
Builder's woodwork	1,593	6	11	92	343	214	1,558	748	696	1,277	6,269
Mouldings	81	7	159	300	68	7,766	28,428	36,904	42,317	16,321	7,820
Other SPWPs	239	307	314	1,577	2,099	1,318	905	582	1,549	1,995	7,093
CHINA											
Builder's woodwork	1,724,867	1,768,633	1,905,025	2,046,514	2,117,267	2,037,087	1,946,942	1,944,859	1,976,677	1,745,398	1,154,498
Mouldings	921,207	887,814	827,513	801,619	798,194	714,604	676,640	745,785	832,639	707,159	445,849
Other SPWPs	4,287,405	4,611,342	4,724,092	4,804,420	5,083,772	5,134,317	5,013,287	5,229,385	5,618,860	5,339,183	3,994,186
LAO PDR											
Builder's woodwork	4,234	7,357	9,838	23,001	12,408	10,164	4,165	2,647	6,888	4,709	374
Mouldings	9,710	13,019	18,211	16,150	9,957	10,255	4,106	12,202	22,536	21,986	21,986
Other SPWPs	1,103	2,255	2,407	2,206	2,758	2,704	2,984	5,874	4,917	4,982	1,698
MYANMAR											
Builder's woodwork	3,459	3,619	4,137	7,179	5,858	10,733	22,032	29,560	58,344	68,549	68,549
Mouldings	7,155	10,007	13,295	13,060	14,143	13,301	14,308	14,119	14,187	12,886	4,061
Other SPWPs	1,871	2,185	1,903	3,295	6,685	1,498	1,567	999	15,589	1,150	334
THAILAND											
Builder's woodwork	40,851	32,191	29,900	32,740	34,999	41,393	47,666	41,715	43,430	40,889	29,111
Mouldings	34,485	32,410	16,952	14,835	11,280	8,650	9,269	10,658	9,825	38,435	4,396
Other SPWPs	213,796	221,879	211,195	191,082	188,936	163,286	169,628	164,981	151,704	154,198	97,386
VIET NAM											
Builder's woodwork	31,401	33,778	44,772	58,801	102,736	133,997	209,762	243,070	237,745	277,266	277,266
Mouldings	36,056	42,507	46,511	47,545	43,722	46,937	45,911	52,005	58,114	47,212	39,565
Other SPWPs	155,027	166,884	197,617	223,690	250,429	257,249	275,879	284,713	299,242	298,919	264,937

Viet Nam and Thailand's exports are also important in value terms, although Thailand's exports have contracted over the last decade while Viet Nam's have increased. Exports from Lao PDR, Myanmar and Cambodia are relatively small. Lao PDR's exports of mouldings have fluctuated over the last decade but have grown year-on-year since 2016, while Cambodia's exports have dropped sharply from a peak in 2018. Myanmar's exports of mouldings are comparatively small, although builders' woodwork and joinery has grown year-on-year over the last decade, and was valued at USD 68.5 million in 2020.

2.4 Major species exported from the LMR

Although a number of tropical hardwood species have been exported from LMR countries, rosewood and teak have traditionally been the most important commercial species. This section provides a more detailed analysis of the evolution of trade in these species from LMR countries.

2.4.1 Rosewood

China has been the sole driver of rosewood demand.

Species traded under the term "rosewood" most commonly includes different species within the genera *Dalbergia, Pterocarpus* and in some markets, *Diospyrus, Millettia and Cassia,* and species included in China's national standard (SAQSIQ). The standard, which was introduced in 2000 and revised in 2017, was introduced to help ensure consistent quality and reduce false marketing of rosewood products. China has been the sole driver of rosewood demand, and therefore global demand levels have followed economic developments in this country which is the world's largest producer and consumer of rosewood furniture and handicrafts. Although China is the world's largest exporter of wooden furniture, almost all rosewood furniture produced in China is consumed domestically.

Rosewood species that have been exported from LMR countries include *Dalbergia cochinchinensis*, *Dalbergia oliveri*, *Pterocarpus macrocarpus*, *Pterocarpus marsupium* and *Pterocarpus pedatus*. Since 2016, all *Dalbergia* species have been listed in CITES Appendix II (which allows for commercial trade under certain conditions – i.e., findings of legality and sustainability – and is regulated using CITES permits and certificates) and in November 2018, CITES suspended all commercial trade in specimens of the genus *Dalbergia*, including finished products, such as carvings and furniture, from Lao PDR. The suspension will remain "until Lao PDR makes scientifically based non-detriment findings for trade in the relevant species, including *D. cochinchinensis* and *D. oliveri* in the country to the satisfaction of the [CITES] Secretariat"[39]. A CITES amendment was introduced in 2019 to exempt all finished musical instruments, parts and accessories containing Appendix II *Dalbergia* species from the necessity to obtain an export CITES permit, although the volume used in this end-use is considered to be minimal.[40]

2.4.1.1 Rosewood logs

China's imports of rosewood logs peaked in 2014.

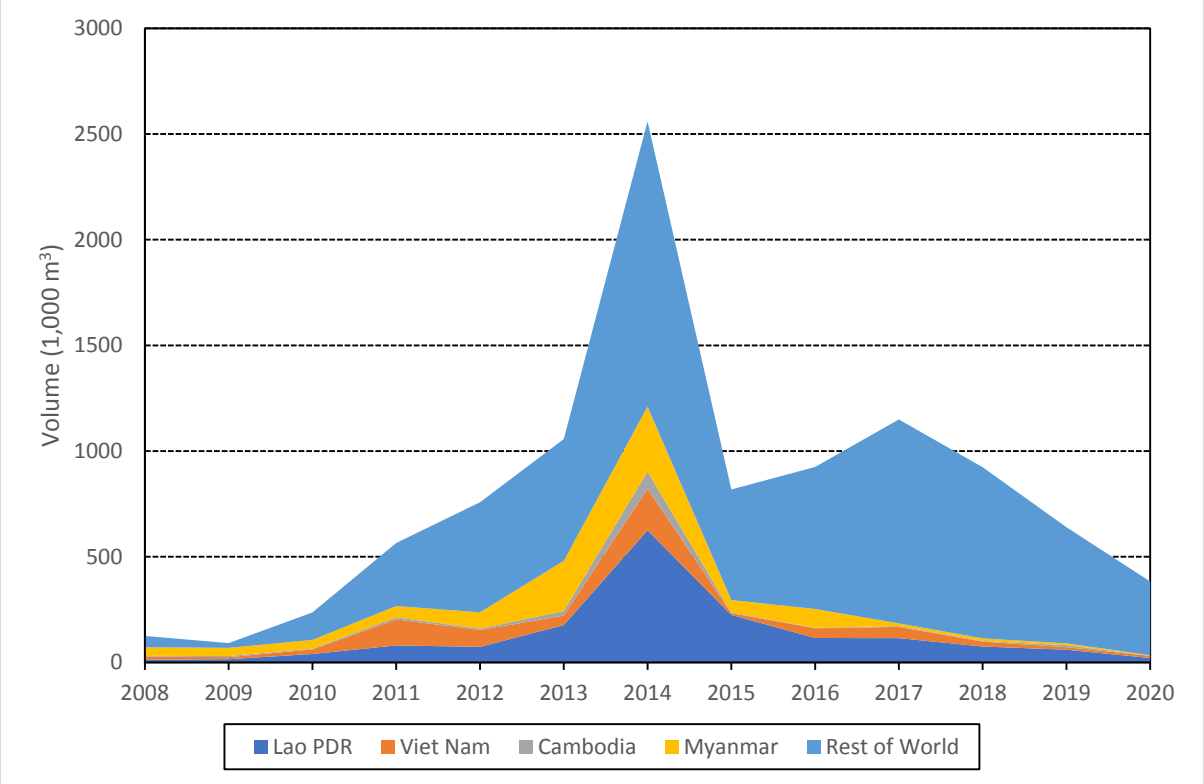
China is the only major importing country to differentiate rosewood species in its Customs classifications. China's imports of logs classified in the "rosewood" category[41] (HS 44039930 and HS 44034980) comprised about 4.5% of all tropical hardwood log imports by volume and 16 percent by value in 2020.

[39] https://www.cites.org/eng/resources/ref/suspend.php
[40] https://checklist.cites.org/#/en
[41] "Rosewood" species in China's HS code classifications include species defined in the revised China Hongmu National Standard 2017.

China's supply of rosewood raw material is mainly in the form of imported logs, with a small proportion in the form of imported sawnwood and veneer (although the volume of imported rosewood veneer is unavailable).

China's imports of logs classified in the "rosewood" category increased dramatically between 2009-2014, reaching a peak of 2.56 million m^3 in 2014 from a negligible volume of 0.09 million m^3 in 2009 (Figure 30). By value, the share of rosewood imports in total log trade had increased even more dramatically during this period, with rosewood log imports valued at USD 2,229 million in 2014, representing 41% of the value of China's total tropical log imports (Figure 31).

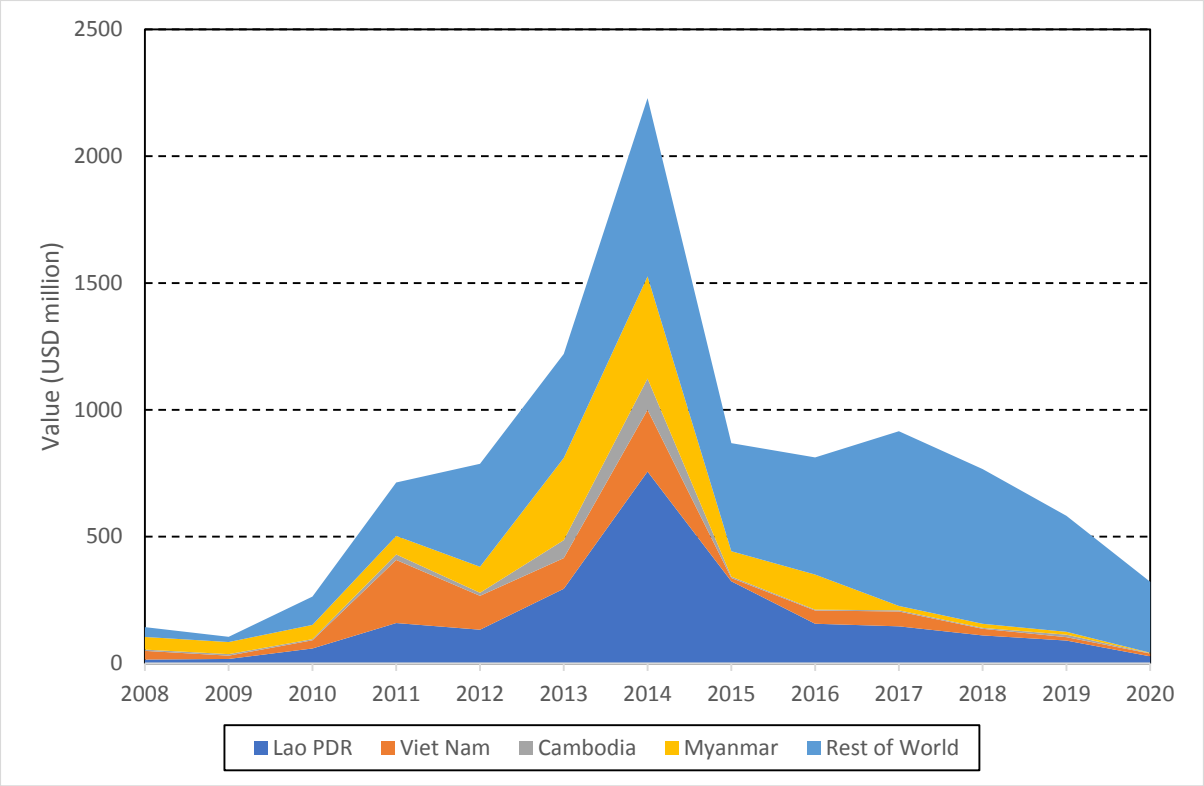
Figure 30: Volume of China imports of "rosewood" logs by LMR country, 2008-2020



Source: Global Trade Atlas, cites China Customs for 2008-2014 data; STIX for 2015-2020 data.
Note: "Rosewood" logs are defined as the following China HS code classifications:
For data from 2008 to 2016: HS 44039930 Padauk in the rough
For data from 2017 to 2020: HS 44034980 Tropical rosewood in the rough, and HS 44039930 Non-tropical rosewood in the rough .
Note: Data for 2014 to 2020 converted from weight to volume using a conversion factor of 0.936m^3/1,000 kg for LMR countries and 0.823m^3/1,000kg for rest of world[42].

[42] Maplesden F. and Pearson H. 2021. *Forest product conversion factors. Tropical logs and sawnwood*. Available at: https://www.itto.int/other_technical_reports/

Figure 31. Value of China imports of "rosewood" logs by major country of origin, 2008-2020



Source: Global Trade Atlas, cites China Customs for 2008-2014 data; STIX for 2015-2020 data.
Note: "Rosewood" logs are defined as the following China HS code classifications:
For data from 2008 to 2016: HS 44039930 Padauk in the rough
For data from 2017 to 2020: HS 44034980 Tropical rosewood in the rough, and HS 44039930 Non-tropical rosewood in the rough .

Chinese consumer demand and speculative industry demand had driven the spike in rosewood log imports.

The exponential growth in China's demand for rosewood logs over the five-year period to 2014 has been attributed to a number of factors, including:

- aggressive Chinese government stimulus measures targeting domestic consumption as a source of economic growth, particularly the real estate sector. Continuing urbanisation and income growth underpinned strong growth in housing and pushed up domestic demand for furniture until the end of 2014, when demand had started to slow;
- a rise in average household incomes and Chinese consumers' ability to pay for higher-priced consumer products, including high quality rosewood furniture;
- an increase in consumers' perceptions of rosewood furniture products as investment items resulting from scarcity of high-quality rosewood raw material, CITES listings of some rosewood species (the listings being extended in 2016 and 2018), and log export restrictions in key supplier countries, particularly Myanmar [43];
- a trend towards cultural identity and cultural enterprises which has driven demand for Chinese-style furniture, particularly rosewood[44];

[43] China Daily 2015. *Rosewood furniture increases in value over time.* 12/01/2015. Available at: http://www.chinadaily.com.cn/business/2015-01/12/content_19293163_2.htm..
[44] China Daily 2015. *Nanaholy offers both furniture and culture.* Available at: http://europe.chinadaily.com.cn/business/2015-01/12/content_19293907.htm..

- the large number of new entrants to the rosewood business, driven by surging demand and price levels, which contributed to speculative demand and a buying frenzy[45,46]; and
- in households with increased disposable income, rosewood being regarded as a safer investment than conventional investments in savings accounts, stocks, shares and real estate[47].

In 2015, the volume and value of China's rosewood log imports dropped sharply in response to both supply and demand factors.

The major drivers of the plunge in imports were the declining availability of rosewood species from the LMR region, the major supply source to 2015, and declining demand for rosewood logs in China. China's rosewood log import volumes increased slightly in 2016 and 2017 but continued to contract between 2018 and 2020. In 2018, China's rosewood log imports dropped 28 percent by volume to 1.1 million^3, valued at USD 562.6 million. The contraction in imports can be attributed to a number of supply and demand factors, some of which are a continuation of previous trends, including:

- significant stockpiles of logs in China resulting from importers anticipating harvesting and export restrictions in a number of supplying countries;
- restructuring and consolidation of the rosewood furniture industry due to overcapacity and rising production costs;
- relocation of some furniture manufacturing enterprises to Viet Nam and other low-cost locations;
- the introduction of stringent regulations for environmental protection and safety which resulted in many furniture manufacturing facilities reducing or ceasing operation to meet the new standards;
- declining overall consumption levels following China's economic slowdown and in 2020 due to COVID-19 related restrictions;
- changes in fashion trends, with younger consumers continuing to prefer less expensive, modern style furniture rather than classical rosewood furniture and décor;
- substitution by rosewood lookalike species which are not listed in the China Hongmu National Standard and are therefore not classified as rosewood in the HS codes;
- manufacturers and consumers becoming more aware about market speculation in the rosewood industry and more discerning in their purchases[48]; and
- government anti-corruption efforts[49].

However, there continues to be an ongoing demand for rosewood furniture and other products as collectable items, with rare and collectible species maintaining their very high price levels to date,

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[45] Wenbin H. and Xiufang S. 2013. *Tropical Hardwood Flows in China: Case Studies of Rosewood and Okoumé. Forest Trends*. Available at: http://www.forest-trends.org/documents/files/doc_4138.pdf.

[46] HKTDC Research 2010. *Rosewood furniture in price heat – report from China (Beijing) International Rosewood Classical Furniture Exhibition 2010.* Available at: http://economists-pick-research.hktdc.com/business-news/article/International-Market-News/Rosewood-furniture-in-price-heat-report-from-China-Beijing-International-Rosewood-Classical-Furniture-Exhibition-2010/imn/en/1/1X000000/1X074E6O.htm. Accessed 16 February 2015.

[47] Basik Treanor N. 2015. *China's Hongmu Consumption Boom. Analysis of the Chinese Rosewood Trade and Links to Illegal Activity in Tropical Forested Countries*. Forest Trends Report Series. December 2015.

[48] ITTO 2018. *Analysis of trade trends for CITES-listed tree species and the impact on Chinese SMEs*. Project Technical Report. Research Institute of Forestry Information and Policy, Chinese Academy of Forestry. (Unpublished report).

[49] China Daily 2016. *Eight Point Austerity Rules*. Available at: http://www.chinadaily.com.cn/china/2016-10/28/content_27199734.htm

although significant differences in price relativities between rosewood species exists reflecting their quality, scarcity, and collectability.

China's Imports from LMR countries dropped sharply after 2014 in response to depleted resources, government interventions and CITES listings of some rosewood species.
Until 2014, LMR countries – Lao PDR, Myanmar, Viet Nam, and Cambodia – had traditionally supplied the bulk of China's recorded rosewood imports, together supplying 47 per cent of the volume and 68 per cent of the value of rosewood imports in 2014. By 2020, the share had dropped to 9% by volume and 13% by value. The decline in LMR's share of China's rosewood imports largely reflects the decline in availability of the resource due to the depletion in stocks, the imposition of harvesting and export restrictions in Myanmar and Lao PDR (despite continued illegalities in the trade), in addition to CITES listings of some rosewood species. China's demand for LMR rosewood had also been dampened by escalating prices for the high-quality rosewood from the region, and the availability of less costly rosewood lookalike substitute species from Africa, in addition to declining overall demand in China.

Lao PDR became the largest supplier of rosewood logs to China by volume and value in 2014, when imports surged in the first half of 2014, surpassing the level of imports from Myanmar which was the dominant supplier until 2013. The trade had occurred despite a log export ban imposed in 2009 and restrictions on the harvesting of all *Dalbergia* species, being effectively enabled by weak governance of environmental laws and the increased financial incentives for loggers to operate illegally[50]. The increase in China's imports from Lao PDR was in anticipation of a reduced log supply from Myanmar, which had announced the imposition of log export restrictions from April 2014. Imports from Lao PDR for the calendar year 2014 nearly tripled the previous year's imports by value, totalling USD 756 million, which was approximately one-third of China's total rosewood log imports by value and 24% by volume (about 625,264 m^3).

In 2015 and 2016, the Lao PDR government imposed severe restrictions on exports of logs and sawnwood, by prohibiting the export of raw logs in 2015, and banning the export of all logs and sawnwood in May 2016. Lao PDR's log exports dropped significantly in 2015, and were negligible in 2020. (Figures 1.30 and 1.31). The downturn from 2014 can be partly attributed to the successive bans and a downturn in Chinese demand, although some trade has continued, albeit at a lower level, despite the existing legal framework. However, the government of Lao PDR has made considerable efforts to control the trade.

China's imports from Myanmar increased during 2013 and surged in early 2014, reaching a peak in March 2014 before the introduction of log export restrictions in April 2014. Imports from Myanmar began to decline from April to December 2014, but overall, import levels for the year ended December 2014 were still significantly higher (29% by volume) compared with the previous year. Imports from Myanmar dropped in 2015 to 58,132 m^3 compared with 306,867 m^3 in 2014, the peak year. In 2016 import levels rose by 53% but have contracted year-on-year to negligible levels in 2020. The Myanmar government had issued a nationwide ban on logging in 2016 following concerns about the extent of illegal cross-border log trade between Myanmar and Yunnan Province in China and record seizures in Myanmar of illegally harvested timber. The decline since 2017 may also be attributed to the CITES Appendix II listing of Burmese rosewood (*Dalbergia oliveri*), although the other major species imported from Myanmar (Burmese padauk, *Pterocarpus macrocarpus/cambodianus*) remains unlisted.

Viet Nam has been a major importer and re-exporter of rosewood logs and rosewood furniture, although data on consumption of rosewood in Viet Nam's domestic rosewood furniture industry, and domestic consumption of rosewood furniture, is unavailable.

[50] Basik Treanor 2015. Op. cit.

Viet Nam has also been a key supplier of rosewood logs to China and was the major source of imports in 2011, although there have been significant discrepancies in the volume and value of the trade flows reported by the respective countries. Viet Nam supplied about 3% of China's total import volume in 2020 compared with 8% in the 2014, the peak year. Viet Nam is a major importer and re-exporter of rosewood logs and rosewood furniture, although the volume of Viet Nam's rosewood log imports is difficult to ascertain because the species is not differentiated in the trade statistics and there is limited data on levels of domestic consumption.

Historically, smuggling of rosewood logs via illicit routes from Cambodia and Lao PDR through Viet Nam to China have been well documented but are now considered to be minimal.
Much of the rosewood declared by China Customs as Vietnamese imports during the height of the trade was alleged to be sourced from elsewhere[51]. The sharp reduction in China's imports of rosewood logs from Viet Nam (the trade in 2020 was negligible) reflects the reduced availability in supplies from LMR countries as well as a likely increase in consumption of rosewood in Viet Nam's domestic rosewood furniture industry, although this is not able to be statistically verified.

Viet Nam has strict controls on logging of natural forests and a total ban on logging of natural forests had been announced in 2016. NGOs reported that illegal imports from Lao PDR to Viet Nam peaked in 2015 at 321,718 m^3 of logs and 400,000 m^3 of sawnwood (of all species)[52]. However, following the measures introduced in Lao PDR to control illegalities in the trade, Viet Nam's imports from Lao PDR (all species) had dropped significantly in 2016 and remain at very low levels (Figures 6 and 15). In response to reduced supply from Lao PDR, a resumption in the illegal border trade between Viet Nam and Cambodia has been previously reported despite a government ban on logging of Siamese rosewood imposed in 2013, a ban on unprocessed roundwood imposed in 2002, and a total closure of the border timber trade with Viet Nam in January 2016[53]. Viet Nam's imports of logs and sawnwood (all species) from Cambodia as reported by Viet Nam totalled 156,040 m^3 and 274,000 m^3 respectively in 2016, indicating the scale of the illegal trade[54,55].

Although the supply of rosewood species from natural stands has diminished due to overexploitation and illegal logging, rosewood plantation development has been occurring in Thailand and Lao PDR, albeit on a relatively small scale.

2.4.1.2 Rosewood sawnwood

China's imports of rosewood sawnwood from the LMR region are shown in Table 2. Lao PDR has been the major LMR supplier of rosewood sawnwood to China. Although Lao PDR exports have contracted over the last 5 years to 33,145 m^3 in 2020, over 80% of Lao PDR's exports of sawnwood to China in 2020 were of rosewood species.

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[51] Basik Treanor 2015 Op cit.
[52] Forest Trends 2017 Op cit.
[53] Environmental Investigation Agency (EIA) 2017. *Repeat Offender. Vietnam's persistent trade in illegal timber*. May 2017. Available at: https://eia-international.org/report/repeat-offender-vietnams-persistent-trade-illegal-timber
[54] Phnom Penh Post 2017. *Despite ban, timber exports to Vietnam nearing 2016 total*. 16 August 2017. Available at: https://www.phnompenhpost.com/national/despite-ban-timber-exports-vietnam-nearing-2016-total
[55] Phnom Penh Post 2017. *Timber trade to Vietnam up – again.* 8 February 2018. Available at: https://www.phnompenhpost.com/national/timber-trade-vietnam-again

Table 2: China imports of rosewood sawnwood from LMR countries, 2015-2020, by volume (m^3)

	2015	2016	2017	2018	2019	2020
Cambodia	1123	393	1093	523	677	132
Lao PDR	94006	36953	49305	58227	41381	33145
Myanmar	1183	390	1430	579	915	675
Thailand	715	578	85	1154	716	2023
Viet Nam	1902	1146	2740	5925	4191	1195
Rest of World	80229	98581	207759	243713	150655	98382

Source: STIX;
Note: Rosewood sawnwood is defined as China HS code classification HS44079910 and HS44072940. Data has been converted from weight to volume using a conversion factor of 1.686m^3/tonne for LMR countries and 1.126m^3/tonne for other countries[56].

2.4.1.3 Rosewood furniture

The proportion of rosewood furniture production which is traded globally is minimal and the bulk of rosewood furniture produced and consumed is in China.

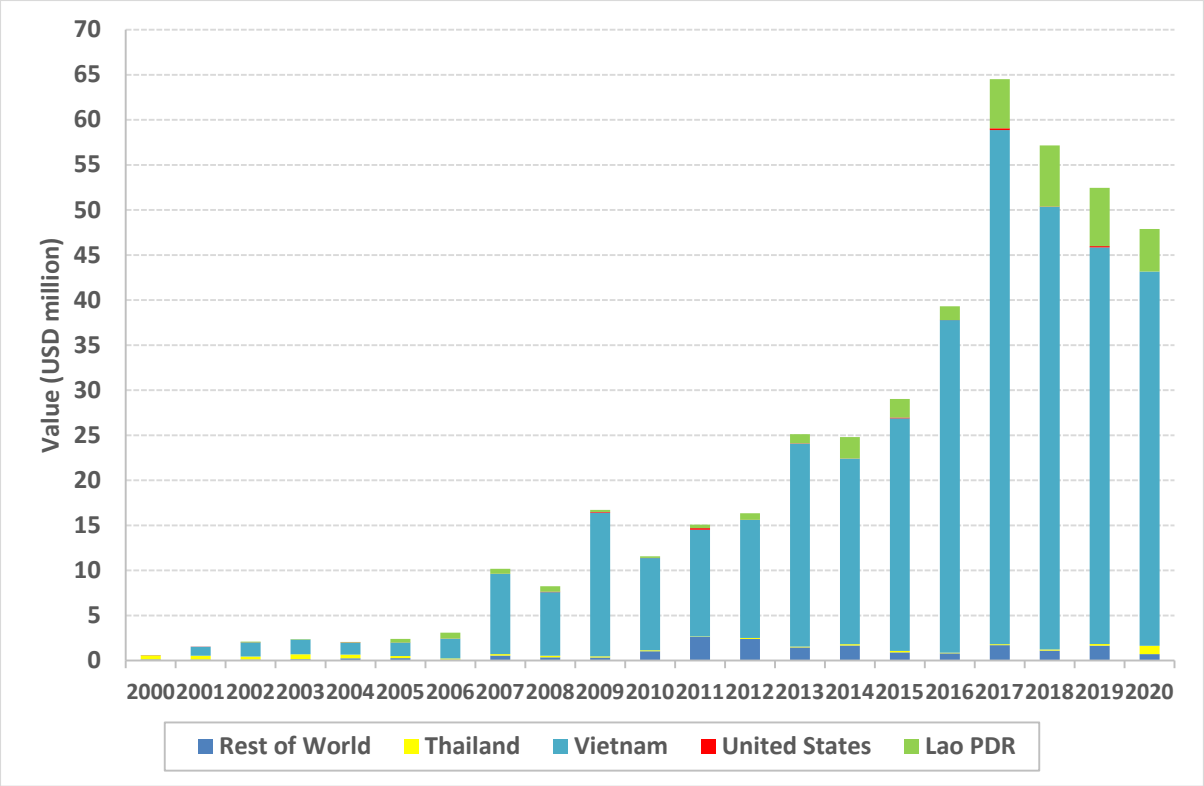
China's exports of rosewood furniture have declined significantly since 2000 and were relatively insignificant in 2020, at about 7,852 units/pieces valued at USD 1.1 million, compared with total wooden furniture exports valued at over USD 20 billion in 2020.

Major export destinations in previous years reflected the other major markets for rosewood furniture, which are the advanced Asian economies – Japan, Taiwan P.O.C., Rep. of Korea, and Singapore – in addition to Hong Kong and the United States. The Asian countries have consumers who have strong cultural associations with rosewood. With insignificant export levels, it can be concluded that almost all of China's rosewood furniture production is consumed domestically, in contrast to the higher proportion of other tropical hardwood furniture produced in China which is exported.

China's imports of rosewood furniture have escalated since 2010 to reach a peak in 2017, growing by nearly two-thirds in value between 2016 and 2017, six times the value in 2010. Although imports declined year-on-year from 2018 to 2020 they have remained at a relatively high level, totalling 336,522 pieces valued at USD 47.0 million in 2020. (Figure 32).

[56] Maplesden F. and Pearson H. 2021. Op. cit.

Figure 32: China imports of rosewood furniture, 2010-2020*



Source: 2010-2018: Global Trade Atlas, cites China Customs. 2019-2020: STIX
** "Rosewood" furniture includes items classified in China Customs code 94036010 (Other furniture of Padauk) and 94035010 (Bedroom furniture of rosewood)*

China's imports of rosewood furniture are mostly from LMR countries, reflecting an emerging trend in the shift in location of the rosewood industry to cost-effective locations.

The LMR supplies the bulk of rosewood furniture imports, with most of the imports in 2020 originating from Viet Nam (88% by value), with Lao PDR supplying 10% by value. The rise in reported imports from Viet Nam reflects the emerging trend in the rosewood industry to shift the location of manufacturing to areas where costs are lower, including the outsourcing of semi-finished furniture manufacturing. Although Viet Nam has rosewood resources, restrictions on logging of natural forests implies that the bulk of rosewood raw material has been imported from neighbouring Lao PDR, Cambodia, and Myanmar. Lao PDR has emerged as a supplier of rosewood furniture to China since 2017, with the value of China's imports of rosewood furniture from Lao PDR totalling USD 4.7 million in 2020.

2.4.2 Teak

Teak (*Tectona grandis*) has been a major commercial species in the LMR although exports from natural stands have declined significantly in recent years. Teak production in Myanmar, the major supplier in the region, has reportedly comprised about 15% of the Myanma Timber Enterprise's

production over the 12 years to 2017, although there have been considerable discrepancies between government reporting agencies[57].

Myanmar has been a principal source of high value natural teak exported mainly to India and China but supplies have diminished and the global trade is now dominated by plantation teak from outside the LMR.

Global teak markets make a fundamental distinction between teak grown in natural compared to planted forests[58]. Logs of native teak are usually considerably larger than those grown in planted forests, with a higher proportion of heartwood. Beyond the size advantage, researchers note that "there are strong market perceptions that native teak is superior to planted teak with respect to several properties, although research shows that these assumptions can be questioned when fitness for specific purposes is taken into account"[59]. Myanmar has been a principal source of native teak (Myanmar teak, Burmese teak) on a commercial level in international markets, which has been used for high-end applications in yacht building, construction applications (in India) and furniture (in China). However, the supply of quality teak logs originating from old-growth stands has declined as a result of Myanmar's log export ban in force since 1 April 2014, as well as the declining harvestable area and the deteriorating quality of naturally grown teak.

Plantation grown teak now constitutes a significant proportion of the international teak trade.

Plantation teak is mainly being used as a general utility timber and for lower value furniture manufacture. As such, it is now competing with other utility hardwoods such as rubberwood and acacias, both of which are produced commercially in the LMR as the basis for competitive furniture industries. Plantation teak in the LMR is now also competing with teak supplies from extensive plantations in other regions, particularly Africa and Latin America.

Imports of teak from LMR countries have declined or remained relatively static compared with significant growth from the rest of the world.

Tables 3-6 show trends in the import volume of teak logs and sawnwood by LMR countries and the rest of the world, where teak has been identified in HS code classifications available in the STIX database. As such it may not represent all teak trade from LMR countries, as export data for teak from the region are not available. China and India are the major markets for LMR teak and, as with the rosewood trade, imports from LMR countries have declined or remained relatively static compared with significant growth from the rest of the world. Myanmar's log export ban was imposed to gain greater control over the international timber trade and promote the export of more semi-finished and finished products. However, overall, the level of teak sawnwood imports from Myanmar by major importers is not as great as would be expected given the objective of this policy.

[57] Forest Trends 2021. *Illegal logging and associated trade in Myanmar: Impacts of government measures to address illegal logging.* Forest Trends. Forest Policy Trade and Finance Initiative. Brief. January 2021. Available at: https://www.forest-trends.org/publications/illegal-logging-and-associated-trade-in-myanmar/

[58] Kollert, W. and Walotek P. 2015. *World teak resources, production and trade*. In Kollert W. and Kleine M. (eds). The Global Teak Study. Analysis, Evaluation, and Future Potential of Teak Resources. IUFRO World Series Vol. 36. Vienna. 108p. Available at: https://www.iufro.org/uploads/media/ws36.pdf

[59] Ibid.

Table 3: China imports of teak logs from the LMR, 2015-2020, by volume (m^3)

	2015	2016	2017	2018	2019	2020
Cambodia	0	0	0	0	0	0
Laos	10613	4835	20	7	57	481
Myanmar	45661	40677	1492	2697	1808	907
Thailand	0	0	101	50	0	0
Viet Nam	58	0	236	507	354	45
Rest of World	14359	17170	20523	15763	7449	9973

Source: STIX; Teak logs are defined as China HS code classification HS44034910. Data has been converted from weight to volume using a conversion factor of 0.905m^3/tonne.[60].

Table 4: China imports of teak sawnwood from the LMR, 2015-2020, by volume (m^3)

	2015	2016	2017	2018	2019	2020
Cambodia	0	0	3	0	0	0
Laos	4412	14878	10045	15774	16277	7240
Myanmar	45607	44452	1567	1312	2044	3652
Thailand	7	34	12	70	130	80
Viet Nam	35	8	10	90	118	123
Rest of World	14046	9354	22942	39580	12943	7637

Source: STIX; Teak sawnwood is defined as China HS code classification HS44072910. Data has been converted from weight to volume using a conversion factor of 1.490m^3/tonne.[61].

Table 5: India imports of teak sawnwood from the LMR, 2015-2020, by volume (m^3)

	2015	2016	2017	2018	2019	2020
Myanmar	9845	10558	11521	13783	17012	6089
Rest of World	59958	61304	111571	116935	178641	179606

Source: STIX; Teak sawnwood is defined as India HS code classification HS44072910. Data has been converted from weight to volume using a conversion factor of 1.490m^3/tonne.[62].

Table 6: USA: Imports of teak sawnwood from the LMR, 2015-2020, by volume (m^3)

	2015	2016	2017	2018	2019	2020
Myanmar	871	1746	2375	2132	5793	2324
Thailand	717	555	203	459	147	70
Viet Nam	0	0	1	0	143	0
Rest of World	7882	3979	2894	2778	2670	1378

Source: STIX; Teak sawnwood is defined as United States HS code classification HS4407290131. Data has been converted from weight to volume using a conversion factor of 1.490m^3/tonne.[63].

[60] Maplesden F. and Pearson H. 2021. Op. cit.
[61] Ibid.
[62] Ibid.
[63] Ibid.

2.5 The role of plantation wood in LMR trade

Production and trade of wood products in the LMR has focused historically on markets for timber (primarily logs) from natural forests rather than plantations. The development of plantations has been uneven throughout the LMR region, with development in Viet Nam and Thailand being rapid, while the expansion of plantations in Lao PDR, Cambodia and Myanmar has been relatively slow, although some gains have been made over the last decade (Table 7). Most plantations in the region are of fast-growing commercial species such as *Acacia mangium*, *Eucalyptus spp*, rubberwood (*Hevea brasiliensis*) and teak (*Tectona grandis*). Some plantation development in the region has been problematic, where establishment has been at the expense of natural forests and the benefit of local communities.

Table 7: Forest area and planted forest area in the LMR.

	Total forest		Planted forest		
	Area in 2020 (1,000 ha)	Net annual change, 2010-2020 (%)	Area in 2020 (1,000)	Net annual change, 2010-2020 (%)	Planted/Total forest area (%)
Cambodia	8,068	-2.68	604	+14.60	7.5
Lao PDR	16,596	-0.21	1,771	+1.05	10.7
Myanmar	28,544	-0.96	427	+3.42	1.5
Thailand	19,873	-0.10	3,537	+0.87	17.8
Viet Nam	14,643	+0.90	4,349	+3.50	29.7

Source FAO 2020[64]

The trade in wood products based on plantation wood is difficult to identify in trade statistics as most plantation species are undifferentiated in HS codes and some species which are specified, such as teak, are grown in both natural forests (in Lao PDR, Myanmar, and Thailand) and in plantations. However, anecdotal information on plantation development and utilisation can provide indications of trade in plantation grown wood products in/from the region.

The use of remote sensing imagery techniques has been used in tropical countries to detect forest logging and forest degradation and, combined with other information such as forest concessions boundaries and protected area status, to distinguish the extent of legal and illegal logging[65]. Similarly, remote sensing techniques has been used extensively for forest inventory and resource mapping in major plantation growing countries and its use could be investigated to monitor forest plantation development in the LMR.

2.5.1 Lao PDR

In Lao PDR, plantation development and value chains for plantation grown wood have emerged relatively recently as a result of both government policies and private sector involvement in development of the sector. The country has potential comparative advantages for plantation investment including its geographic location, rapidly improving regional connectivity and the extent of potentially suitable land[66,67]. The government has aimed to restore forest cover to 70% of the land

[64] FAO. 2020. *Global Forest Resources Assessment 2020: Main report*. Rome. Available at: https://doi.org/10.4060/ca9825en

[65] EC 2020. *Study on Monitoring of Forests through Remote Sensing*. Final Report. ENV.D.1/ETU/2018/0022MV. https://ec.europa.eu/environment/forests/pdf/report_monitoring_forests_through_remote_sensing.pdf

[66] Kennan R. 2021. *Policy analysis for forest plantations in Lao PDR and Viet Nam*. Australian Centre for International Agricultural Research, Canberra, Australia.

area (16.6 million ha), with plantations targeted at 500,000 ha, with one objective (among others) being to promote domestic wood processing for export markets. Specific policies targeting plantation development have included encouraging international investment in plantations and processing industries and improving the ease of doing business in Lao PDR. The policies have resulted in about 500,000 ha of tree plantations, including 270,000 ha of rubber plantations (which expanded rapidly based on investment from China, Viet Nam, and Thailand), 67,000 ha of eucalypt and acacia, about 40,000 ha of teak and 58,000 ha of other species. However, a recent review of Lao PDR plantation policies concluded that "plantation wood value chains are poorly developed due to contradictory and confusing laws and regulations with inconsistent application and high transaction costs. Consequently, there has been limited tree plantation investment, and few investments have realized the anticipated benefits"[68].

Lao PDR Prime Minister's Order No. 15 (PMO 15), which had banned the export of unprocessed wood and native sawnwood from 2016, also tightened the regulation of allowable exports resulting in the closure or suspension of over 1100 wood processors, some of which were based on plantations. Some products from plantation wood were reportedly stopped at borders because they did not meet the new wood export instructions. In 2019, unprocessed wood from plantations was approved for export but restrictions have been retained for plantation-grown native species, including teak[69]. In 2018 and 2019 new policies were introduced to enable commercial plantation development, including PMO No. 9, implemented in July 2018, which lifted the moratorium on approval of new concessions on degraded lands in production forest areas[70].

Teak plantations in Lao PDR are overwhelmingly (over 99%) in smallholder ownership and teak wood is used in low-value domestic and Chinese export markets. Eucalypt and acacia plantations are mainly owned by company concessions (88%) and contract farming (10%)[71]. Acacia was the dominant species exported as logs to Viet Nam in 2019 (See Section 2.2). Lao PDR's rubberwood plantations, while relatively larger in area than other plantation species, are of a relatively young age and have not yet reached maturity for harvest or export[72]. However, some of the earliest rubber plantations are already being harvested, and this will increase as trees mature, with rubberwood becoming available to industry at scale in around 2030-2035, with potential harvest estimated at 500,000 m^3/annum over a 25-year rotation. A detailed analysis of the rubberwood industry in Lao PDR is provided in Smith et al. (2020)[73].

2.5.2 Viet Nam

Viet Nam's forest plantations are more extensive than those in Lao PDR, covering 4.32 million ha, about 32% of forest cover, including a significant proportion in protection forests, in addition to those planted under poverty reduction programmes. In 2014, the government imposed a logging

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[67] Smith, H., Kanowski P., Keenan R. J., Phimmavong S. 2021. *Lao Plantation Policy: Prospects for change.* Forests 2021, 12, 1132. Available at: https://doi.org/10.3390/f12081132
[68] Ibid.
[69] Ibid.
[70] Keenan R. 2021. Op cit.
[71] Smith S. et al. 2021. Op cit.
[72] Smith, H., Lu J., To P. X., Mienmany S., and Soukphaxay K. 2020. *Rubber Plantation Value Chains in Laos: Opportunities and Constraints in Policy, Legality and Wood Processing.* Report produced for ACIAR project FST/2016/151: Advancing enhanced wood manufacturing industries in Laos and Australia and Forest Trends. Available at: https://www.forest-trends.org/wp-content/uploads/2020/07/Rubber-Plantation-Value-Chains-in-Laos.pdf
[73] Ibid.

ban in most natural forest areas, a regulation which was extended nationwide in 2017. Since then, all commercial wood supply has been derived from plantations and imports. Thirty-eight percent of plantations are owned and managed by households and the remainder managed by State Forest Corporations or Forest Management Boards. Commercial plantations comprise mainly fast-growing acacia and eucalypt species, and the logs from these plantations are largely sold for woodchip and pulp. Viet Nam is a significant exporter of (mainly acacia) woodchips, which were valued at USD 1,620 million in 2019[74]. About 80% of plantation supply comprises small diameter wood suitable only for wood chips and MDF, although there are intentions to promote a gradual conversion to longer rotation stands. Most small plantations use a rotation length of around 5-7 years, while the larger State Forest Enterprise (SFEs) may be managed for longer rotations, with the majority of large sawlogs aged 10-12 years. The productivity of these plantations varies both between and within regions, and from private to industrial management regimes[75]. Although most plantations are short rotation, non-native species destined for reconstituted wood products, the government aims to encourage production of higher value logs for domestic manufacturing. However, Viet Nam is heavily dependent on imports for wood supply, particularly of larger diameter logs and higher value and decorative species.

Rubberwood has also become an important raw material for Viet Nam's domestic wood products industry and for exports, mostly as wooden furniture. Production has been estimated at 4.5 million m^3 RWE/annum, with about 70% utilised domestically[76].

2.5.3 Thailand

Thailand has a large area of plantations which totalled 3.537 million ha in 2020, or 18% of the total forest area. The government plans to increase forest cover to 40% (25% protected forest and 15% community forest) by stimulating tree planting by smallholders and revising major regulations of the forestry sector. There have been no timber harvests allowed in natural forests since 1989, so that the focus on domestic timber harvesting has shifted to plantations. A large proportion of planted forests are on private lands, and the major plantation species are rubber, teak, acacia, eucalypts, and pine[77].

Thailand's rubberwood plantations have expanded rapidly and cover more than 3.7 million ha, with 90% of production being exported to China, mainly as sawnwood and to a lesser extent, wooden furniture (See section 2.2.2)[78]. Thailand is also a major exporter of wood-based panels, particularly medium-density fibreboard (MDF) and particleboard (see Appendix 1) which are based on plantation grown wood, including domestic rubberwood. In the long term, rubberwood production is expected to expand by approximately 5% per year, reaching 35 million tonnes (approximately 29 million m^3 RWE) in 2030, as plantings in 2000-2005 mature. In 2020, the rubberwood industry was severely impacted by Covid-19 restrictions in the furniture manufacturing industry in China. The Hevea Wood Association estimated that around 60% of Thai rubberwood entrepreneurs were out of business due to the outbreak of Covid-19 and other market constraints , following a decline in imports by China.

[74] COMTRADE 2021. *Commodity Trade Database*.
[75] Smith H., Barney K., Byron N., Tran D. N., Keenan R., Phuong V. T. and Huynh T. B. 2017. *Tree Plantations in Viet Nam: A Policy Framework.* Available at: https://www.researchgate.net/publication/332012409_Tree_Plantations_in_Viet_Nam_A_Policy_Framework
[76] Smith H. et al. 2020. Op. cit.
[77] Durst P. 2020. Op. cit.
[78] ITTO Statistics Database.

Eucalypt plantations are estimated to cover approximately 480,000 ha with 95% privately owned, comprising 70% of which supply wood to the pulp and paper industry as contract eucalypt tree growers[79]. Thailand's woodchip exports are also based mainly on raw material from eucalypt and rubberwood plantations.

2.5.4 Cambodia

Information on Cambodia's planted forests is limited. Cambodia has experienced rapid deforestation of natural forests over the last 20 years. Between 2006 and 2016, forest cover declined from 60% to 45% of the country's land area, with the rate of loss being most rapid between 2010 and 2014[80]. About 23% of all cleared forest in Cambodia has been converted to rubber plantations, covering 509,000 ha, or nearly 3% of Cambodia's land area.

The total plantation area is expected to increase significantly in the coming years following the involvement of the private sector in tree planting programmes. Both short-term, fast growing tree species and long-term, native species have been planted. However, the fast-growing exotic species have been dominant. Information on Cambodia's exports of plantation wood products is minimal, but it can be expected that rubberwood exports will increase as plantation trees reach maturity.

2.5.5 Myanmar

While Myanmar has a significant proportion of teak in natural stands, plantation establishment of teak (and other species) has taken place over a number of years. In 2006, the establishment of private timber plantations was permitted and by March 2018, private sector plantations totalled 57,983 ha of teak and 42,447 ha of other hardwoods. The total plantation area is estimated at 427,000 ha in 2020 of which 46% was teak [81].

The Myanmar government imposed a log export ban in 2014, including plantation logs, to limit deforestation. In 2016, all logging was temporarily banned for a year. The ban on log exports from public and private plantations was lifted in June 2019, but not for those sourced from natural forests[82].

[79] Ibid.
[80] Ministry of Environment 2018. *Cambodia Forest Cover 2016.* Ministry of Environment. Kingdom of Cambodia. Available at: https://redd.unfccc.int/uploads/54_3_cambodia_forest_cover_resource__2016_english.pdf
[81] FAO. 2020. *Global Forest Resources Assessment 2020: Main report*. Rome. Available at: https://doi.org/10.4060/ca9825en
[82] https://www.irrawaddy.com/news/burma/govt-lifts-ban-plantation-teak-exports.html

3 INDUSTRY AND MARKET DEVELOPMENTS IN THE LMR

This section provides insights on production of industrial roundwood, primary and secondary processed wood products in each of the LMR countries, the state of the wood processing industries including levels of foreign investment, domestic consumption of wood products, and the state of certified wood products production and trade in the region. Data on production and consumption of primary and secondary processed wood products in LMR countries for 2010, 2015 and 2020 are shown in Appendix 1.

3.1 Overview of production and consumption of wood products in the LMR

A significant feature of product value chains in the LMR is the relatively low levels of secondary wood processing in Cambodia, Lao PDR and Myanmar, and the high levels of wood processing in Thailand (particularly wood-based panels, paper and paperboard, and pulp) and Viet Nam (particularly wooden furniture). Primary wood products consumption levels in Thailand and Viet Nam reflect their input to the significant value-added processing industries and rising domestic consumption in both countries.

3.2 Myanmar

There are disparities in reported levels of roundwood production.

Industrial roundwood (log) production in Myanmar was estimated to be about 4.36 million m^3 in 2020, according to ITTO statistics. However, there are significant discrepancies in log production estimates between reporting agencies. ITTO data are based on imputation methodology, rather than measured data, and considers a range of variables. These include reported wood product imports (all products) by Myanmar's trading partners, some of which may be the result of illegal cross-border trade, and variables such as estimates of wood consumption per capita, reported levels of domestic wood processing, and anecdotal reports of production in the informal sector.

The Myanma Timber Enterprise (MTE) is the government agency responsible for harvesting, processing and sales of timber. MTE reported total Myanmar log production of 3.35 million m^3 in the year ended September 2013, the peak year, dropping to 1.34 million m^3 in 2014/15 and 0.54 million m^3 in 2018/2019. The volume of teak logs harvested, as reported by MTE, has declined considerably in recent years, from 0.54 million m^3 in 2012/2013 (comprising 16.1% of total production), to 0.23 million m^3 in 2014/2015 and less than 0.05 million m^3 in 2018/19 (about 9% of total production)[83]. MTE statistics, however, do not take into account production in the informal sector, which includes many small and medium-sized enterprises which are often ignored in production statistics, and the volume of confiscated illegal timber. MTE data is therefore considered to be underreported.

Measures to curb deforestation have resulted in a reported decline in harvest levels since 2014.

MTE's reported production data indicates that roundwood production had well exceeded the annual allowable cut from 2003, as determined by the Myanmar Forest Department. Various measures to curb deforestation were put in place. These included a ban on exports of roundwood, and exports through the port of Yangon, imposed in 2014 (see Section 2.2.1.2), reductions in the annual allowable cut, a one-year moratorium on logging throughout Myanmar imposed in 2016/2017, and

[83] Central Statistical Organization 2020. *Myanmar Agricultural Statistics (2010-2011 to 2018-2019).* The Government of the Republic of the Union of Myanmar Ministry of Planning, Finance and Industry. Available at: www.csostat.gov.mm

various other reforms to improve forest governance and restrict illegal cross-border trade[84]. These measures had resulted in a decline in roundwood production levels, although MTE reported a more significant contraction than that reported by ITTO.

Recent political instability has resulted in a resumption of illegal logging and further sanctions have been imposed on Myanmar imports by major importing countries.

While the government of Myanmar had reduced harvest levels and initiated reform processes, the military coup of the Myanmar government in February 2021 has reportedly resulted in an increase in illegal logging practises because of weak law enforcement. With concerns regarding the legality of auctioning timber from MTE stockpiles of confiscated timber[85], sanctions on imports of Myanmar timber were imposed in April 2021 by the United States, and in June 2021 by the EU. The EU Timber Regulation has restricted the Myanmar trade with the EU, with Myanmar-sourced timber perceived as illegal given the current conflict, poor traceability and corruption.[86] The Programme for the Endorsement of Forest Certification (PEFC) has suspended its assessment, and therefore endorsement, of the Myanmar Forest Certification System MFCS/MTLAS until further notice because the requirement for wide public consultation could not be guaranteed. While these measures are expected to affect production levels, the measured impacts are as yet unknown. The political turmoil has limited the delivery of timely and accurate data on Myanmar roundwood production which is critical to analysis of the sustainability of the Myanmar wood products sector.

Wood processing in Myanmar is mainly of primary products and uses low technology. Information on the wood processing industry is limited.

The wood processing industry in Myanmar is mostly restricted to low technology, primary processing, limited mainly to sawnwood. Although some secondary processing is evident, it is on a small scale relative to the size of the resource. There is limited information on the scale and efficiency of Myanmar's wood processing industry, although MTE indicates that there are 7 state-owned sawmills operated by MTE, while the wood-based industry department of MTE lists 4 plywood mills, 4 furniture factories, 9 veneer mills and 3 moulding factories in operation[87]. MTE lists 3 enterprises with 100% foreign direct investment from Thailand, France and Singapore. It is assumed that these enterprises are larger scale. There is limited information on the size and structure of privately owned SMEs and the informal sector because official data does not capture businesses that operate without registration[88].

Trade restrictions have resulted in a focus on alternative markets and the domestic market, which has impacted raw material quality demand.

Trade restrictions in some importing countries and a resultant change in focus on the domestic market has impacted log quality demand in the wood processing industry. Wood processing for

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[84] Forest Trends 2021. *Illegal logging and associated trade in Myanmar: Impacts of government measures to address illegal logging.* Forest Trends. Forest Policy Trade and Finance Initiative. Brief. January 2021. Available at: https://www.forest-trends.org/publications/illegal-logging-and-associated-trade-in-myanmar/

[85] The Irawaddy 2021. *Myanmar Junta to Auction Over 12,000 Tons of Illegal Timber.* 10 September 2021. Available at: https://www.irrawaddy.com/news/burma/myanmar-junta-to-auction-over-12000-tons-of-illegal-timber.html

[86] ITTO Tropical Timber Market Report, 1-15 January, 2022

[87] Myanma Timber Enterprise 2022. *Sawmills and Factories.* Available at: http://www.mte.com.mm/index.php/en/sawmills-factories/wb-factories

[88] EU FLEGT 2019. *Small and micro-sized entities in the Mekong region's forest sector. A situational analysis in the FLEGT context.* Available at: https://www.euflegt.efi.int/es/publications/small-and-micro-sized-entities-in-the-mekong-region-s-forest-sector

export markets utilises higher grade logs to produce value-added products of export quality. The EU and US trade restrictions have resulted in manufacturers switching to alternative markets, including domestic markets, although these markets do not require higher grade logs. In addition to trade restrictions, the wood processing industry has been impacted by recent civil unrest and disruptions caused by the COVID pandemic, which have affected labour markets and supply chains, disrupting production levels[89].

Comprehensive information on domestic consumption of secondary processed wood products is needed.
Data and other information on domestic consumption of processed wood products in Myanmar consumer markets is not sufficient to provide a comprehensive assessment of wood use. Derived consumption figures indicate sawnwood consumption in 2020 totalled 1.5 million m^3 although wooden furniture consumption (and production) is unknown (Appendix 1). Derived consumption for other processed wood products is relatively low. With a population of 55 million, these data indicate that consumption per capita is very low and/or there is significant consumption in the unrecorded informal sector.

3.3 Lao PDR

Government interventions have had an impact on reducing harvest levels in natural stands.
Roundwood production in Lao PDR has historically focused on harvesting of logs in natural stands rather than plantations. ITTO estimates that log production had surged in 2014 to 7.0 million m^3, the peak year, in response to significant export demand from China and Viet Nam. Production then plunged from 2015, following government interventions to reduce deforestation and support domestic processing, with log production remaining at low levels in 2020. As discussed in section 1.3.1, roundwood production is now restricted to permanent conversion areas for infrastructure development, timber plantations, and from confiscated logs (where illegalities are associated with harvesting, transportation or trade transactions)[90].

Plantations are insufficient to meet wood processing demand.
The current supply of plantation roundwood from smallholders and larger forest growers is considered insufficient to meet the demands of the wood processing industry. It has been estimated that only approximately 17% of household timber-processing entities in Lao PDR are registered, suggesting that official production estimates are underestimated[91]. The proportion of plantation roundwood in total production is unknown but is expected to grow as plantations reach maturity (See Section 2.5.1).

Smallholders are mainly producing lower quality wood for low value markets.
Production from smallholder teak plantations in Northern Lao PDR has reportedly been mainly of roundwood and rough-sawn square logs which are utilised in low-value domestic markets for production of low quality, low-value furniture, and for Chinese export markets. These value chains have low transaction costs and therefore benefit smallholders and micro, small and medium sized enterprises (mSMEs). Larger domestic and foreign-owned plantation investors have developed more

[89] ITTO Tropical Timber Market Report 1-15 January, 2022
[90] Flint C. 2019. *Country Report. Laos*. Available at: https://www.rinya.maff.go.jp/j/riyou/goho/jouhou/pdf/h30/H30report_nettaib_10.pdf
[91] EU FLEGT *Briefing. Small and micro-sized entities in the Mekong region's forest sector*. Available at: https://www.euflegt.efi.int/publications/small-and-micro-sized-entities-in-the-mekong-region-s-forest-sector

integrated value chains and have benefitted more from government interventions targeting value-added processing[92].

The Lao PDR wood processing industry is mainly restricted to primary wood processing and levels of secondary processing are minimal.
Similar to the situation in Myanmar, the Lao PDR wood processing industry has historically been largely restricted to primary processing and exports of logs, sawn timber and semi-finished products to neighbouring countries. Only a limited number of companies have been active in downstream processing, although the government sector has introduced regulatory measures to stimulate value-added processing. PMO 15 stipulates (among other directives):

- Strengthening forest law enforcement against illegal logging and strict monitoring of timber harvesting, especially from conversion areas.
- All timber must be processed by the national wood processing industry and banning of exports of unprocessed timber.
- Banning of illegal roundwood and wood products from transiting through Lao PDR territory to a third country.
- Auctioning of all timber at a specific log landing site (to prevent illegalities in sales).

Government interventions to combat illegal logging and trade have resulted in a contraction of the wood processing industry.
There have been impacts on the wood processing sector since the introduction of PMO 15 in 2016. Illegal logging has declined significantly while the availability of raw material for primary and secondary processing, and exports, has declined. There has been some rationalisation of the industry, as evidenced by a contraction in the number of wood processing facilities, although to date there has been limited improvement in exports of value-added wood products, notably wooden furniture. A subsequent regulation stipulates the wood products which are permitted for export, with the objective of promoting value-added processing and exports. The prescriptive product export list has reportedly had adverse impacts on smallholder teak growers and mSMEs and has impacted on larger plantation companies who are unable to export intermediate unprocessed products resulting in sub-optimal resource utilisation.[93]

The wood processing industry has been dominated by small and medium-sized enterprises.
In 2016, it was estimated that there were 1,325 wood manufacturing plants operating in Lao PDR and most were small (589) or medium-sized (391). Most enterprises were involved in furniture production (678) or wood processing (579) with 139 involved in sawmilling and 2 in veneer production. Some processors were involved in both sawmilling and furniture manufacture. By 2020, however, the number of plants in operation had dropped to 969, of which there were 6 sawmills, 364 wood processing factories, 599 furniture manufacturers, and 121 micro units[94].

The wood processing industry has been affected by the global pandemic.
In 2020 and 2021, nearly all Lao PDR wood manufacturers, particularly small enterprises, were affected by labour shortages from temporary lockdowns of the country due to the COVID-19 pandemic. Key challenges have been a reduction in logistical services and new infrastructure

[92] Smith H.; Kanowski P.; Keenan R.J. and Phimmavong S. 2021. *Lao Plantation Policy: Prospects for Change*. Forests 2021.12, 1132. Available at: https://www.mdpi.com/1999-4907/12/8/1132
[93] Ibid.
[94] Ibid.

challenges, reduced investment and supply chain disruption in both domestic and export markets[95]. The government of Lao PDR has put in place a series of measures to help businesses during the pandemic crisis, by implementing, for example, tax breaks and exemptions, and debt reclassifications. The impact of these measures on production and trade is not yet evident in official statistics.

Public/private sector plans to expand the sector and improve its sustainability face a number of challenges.

The private and public sectors have been involved in the development of the Lao PDR's Wood Processing Sector Export Roadmap 2021-2025, which includes objectives to improve the sector's sustainability through better access to legal timber; to stimulate product diversification, enhance skills and increase processing capacities; to foster technology adoption, and spur investment[96].

However, many challenges for the development of the Lao PDR wood processing industry had been identified before the onset of the pandemic through the Wood Processing Sector Export Roadmap[97], including:

- Limited and intermittent supplies of legal, high quality and competitively priced raw material, which has discouraged investment in wood processing. Moreover, the volumes of roundwood available from conversion forests are unpredictable, of varying quality, and the volume of wood available from plantations is currently limited.
- Increasing volumes of Lesser Used Species could be utilised but their acceptance in traditional markets requires significant market development.
- The predominant focus on primary processing and exports to China, Viet Nam and Thailand has impeded development of the value-added sector. Value-added secondary processing has been impeded by the decreasing supply of raw materials, weak access to finance (particularly for SMEs), weak availability of skilled workers, poor technology and product innovation, and an unconducive business environment. There has been limited adoption of technologies widely used in the global industry. Research on value-added technologies to move Lao PDR plantation wood production up the value chain has focused on improving wood recovery during the manufacturing process, including new veneering technologies to increase value recovery from small logs, and improved drying, machining, gluing, finishing and waste management[98].
- Minimum investment in more advanced wood technologies in SMEs, and a lack of product quality standards, has impacted on the quality of finished wood products.
- A timber legality assurance system and chain of custody and sustainable forest management (SFM) certification standards have not yet been achieved. This has been limited by a number

[95] International Trade Centre 2021a. *Lao People's Democratic Republic Wood Processing Export Roadmap. Assessment Results On Covid-19*. Available at: https://www.intracen.org/uploadedFiles/intracenorg/Content/Redesign/Projects/Arise_plus_Laos/Lao%20wood%20processing%20COVID-19%20assessment_FINAL.pdf

[96] International Trade Centre 2021b. *Lao People's Democratic Republic Wood Processing Sector Export Roadmap (2021-2025).* Available at: https://www.intracen.org/uploadedFiles/intracenorg/Content/Redesign/Projects/Arise_plus_Laos/Lao%20Wood%20processing_final_web.pdf

[97] International Trade Centre 2021a. Op cit.

[98] Ozarska B. 2017. *Enhancing key elements of the value chains for plantation-grown wood in Lao PDR*. Australian Centre for International Agricultural Research. Available at: https://www.aciar.gov.au/sites/default/files/project-page-docs/final_report_fst.2010.012.pdf

of constraints, including institutional regulatory weaknesses, complex and often inconsistent regulations, weak capacity and resources for enforcement, limited sector organisation and slow progress on community level forest management. Some of these issues are being addressed through the VPA with the EU (currently in negotiation) which seeks to identify, monitor and license legally produced timber for export.

- Certification for smallholder plantation investors is challenged by the combined cost of regulatory compliance and meeting the standards, which is not offset by increased income from certified products. A common theme in all LMR countries is that mSMEs lack capital investment in technologies to meet industry export standards, market intelligence to diversify product and markets, and the business management skills to meet emerging timber legality requirements.
- High transport costs and administrative delays for exports, with shipping for export requiring high costs for logistical services through neighbouring countries.
- Limited access to market intelligence to diversify new product and geographic market opportunities due to the dominance of smaller firms and limited private sector organisation.
- Limited share of the domestic market for some value-added wood products, including particleboard, plywood, fibreboard and veneered panels.
- Complex government regulations for exporting.

Wood furniture production in Lao PDR has historically focused on the domestic market although exports are growing.

There is limited information on domestic production and consumption of secondary processed wood products in Lao PDR but anecdotal information suggests the bulk of wooden furniture production is consumed domestically. The growth in exports of Lao PDR wooden furniture to 2019 suggests that production has grown, although the decline in exports in 2020 suggests that production had been severely impacted by the effects of the global pandemic.

3.4 Cambodia

The private sector has been involved in plantation establishment.

Cambodia has banned all logging in natural forests for commercial purposes since 2006 except for customary use by local communities and private forests registered by the government. Public Private Partnerships have been promoted to encourage the private sector to plant trees on degraded forest land and unused state land. Guidelines on private forests were issued in 2017 to encourage the private sector to establish plantations to increase the supply of timber and non-timber forest products for processing and supply to domestic and export markets.

A 2014 EU FLEGT report states that the majority of timber harvest (90%) is derived from land clearing activities in Economic Land Concessions (ELCs) with the remainder from hydropower projects and annual coupes [99]. ITTO estimates Cambodia's roundwood production at 291,000 m^3 in 2010, peaking in 2015 at 1.1 million m^3 and in 2020 totalled 813,000 m^3. The estimates are significantly higher than reported by the Cambodia Forestry Administration (at about 130,000 m^3 in 2011 and 2012[100]. However, it was acknowledged that there are significant inconsistencies in the

[99] EUFLEGT 2014. *Understanding timber flows and control in Cambodia in the context of FLEGT*. Technical Working Group on Forestry Reform. Available at: https://www.euflegt.efi.int/documents/10180/211477/Understanding+timber+flows+and+control+in+Cambodia+in+the+context+of+FLEGTc/03c0c17a-5dd0-43d6-9ccc-b4f661ba7463

[100] Ibid.

availability of data and recording mechanisms and ITTO data is based on imputation methodology, as reported previously.

Wooden furniture production has grown substantially over the last five years.
While up-to-date information on Cambodia's wood processing sector from official sources is unavailable, ITTO estimates production of plywood has increased and totalled 202,000 m^3 in 2020, of which about half was exported. While production data for wooden furniture is unavailable, the value of exports has risen significantly over the last 5 years, from USD 1.2 million in 2015 to USD 160.4 in 2020. Preliminary data for 2021 indicates further exponential growth to USD 307.8 million. Accordingly, production is expected to have grown substantially over that period although the current value of domestic consumption and the volume of wood products consumed in the furniture sector are unknown. An earlier report estimated wooden furniture consumption in Cambodia to be valued at USD 16.7 million in 2015, and was forecast to reach USD 32.2 million in 2020[101]. These figures suggest wooden furniture production was valued at about USD 169.2 million in 2020 (taking export and import data into account).

There has been significant foreign investment in rubber plantations.
The level of foreign investment in Cambodia's wood processing industry is unknown, although FDI has been encouraged by the Cambodian government. The largest share of total FDI invested capital originates from China, which has surged over the last 5 years, followed by South Korea, Viet Nam, Thailand and Singapore. Foreign investment in economic land concessions for rubber plantations has been high, particularly from Vietnamese investors, with investments valued at USD 1.6 billion, and a further USD 0.2 billion in other plantations over the period 1994-2017[102]. These concessions are key sources for rubber exports, but also important sources of raw material for Cambodia and Viet Nam's wood processing industries. The government has offered strong incentives to foreign investors although some investors have been deterred by the country's relatively small market size, corruption, a limited supply of skilled labour, inadequate infrastructure (including high energy costs), and a lack of transparency in some government approval processes[103]. Growth in Cambodia's wooden furniture production possibly reflects China and Viet Nam's investment in the industry, although this cannot be verified.

There is no available data for the volumes of wood products being consumed by the domestic market, although significant growth in GDP/capita over the last decade suggests that domestic consumption of wood products can be expected to rise.

Viet Nam's commitment to eliminating illegal timber from its timber supply chain, as reflected in the VPA/FLEGT Agreement with the EU and the agreement with the United States on illegal logging and timber trade, is impacting Cambodia's requirements for evidence of legality of wood product exports to Viet Nam. Viet Nam is requesting sharing of legal evidence for Cambodian timber exported to Viet Nam which is expected to incentivise Cambodia's commitments to production of sustainable and legal timber products.

[101] Global Research and Data Services 2016. *Furniture Market in Cambodia to 2020 – Market Size, Development, and Forecasts.*
[102] https://cng-cdn.oxfam.org/cambodia.oxfam.org/s3fs-public/file_attachments/Foreign%20Direct%20Investment%20in%20Agriculture.pdf
[103] https://www.state.gov/reports/2020-investment-climate-statements/cambodia/

3.5 Viet Nam

Viet Nam has successfully transitioned from deforestation to reforestation while demonstrating commitment to forest resource conservation and rapid expansion in its wood processing sector. This has supported rapid growth in exports which have contributed to strong economic growth and alleviation of poverty in rural areas. Expansion of the wood processing industry has been based on lower quality raw material from Viet Nam's plantations and imports of higher quality raw and semi-processed materials from a wider range of sources. Roundwood demand in 2020 was 39.6 million m^3 with domestic production supplying about 95% of overall roundwood demand (Appendix 1). Sawnwood demand is more dependent on imports, providing about one-third of Viet Nam's sawnwood consumption by volume in 2020.

Small forest growers make a significant contribution to plantation harvest.
In contrast to many other large tropical wood producing countries such as Brazil and Indonesia, Viet Nam does not have vertically integrated forest companies and most plantations are in private ownership. Importantly, a significant production volume is obtained from small forest growers (households, farmers and communities) who have been supported by government incentives including secure and legal access to land, access to credits (with some support from the World Bank and the United Nations Development Programme (UNDP)), and supported export development for wood-based products, particularly wood chips and wooden furniture[104]. Small growers have been estimated to contribute approximately 60% of Viet Nam's industrial wood supply, primarily with acacia species followed by eucalypts and pines.

The supply of trees outside forests is large and unaccounted for in official statistics.
There are considerable quantities of small areas of trees planted privately which make a significant contribution to the wood industry and assist in improving smallholder livelihoods and alleviating poverty, which are important government policy objectives. The wood supply of acacia from informal plantings such as household-established "trees outside forests" have been estimated to account for over 9.0 million m^3/annum and are likely to be unaccounted for in official statistics[105].

A significant proportion of Viet Nam's domestic roundwood production is destined for woodchip production for export.
Viet Nam's woodchip production totalled 17.5 million m^3 in 2020 and was comprised mostly of acacia species. Commercial harvest by smallholders is used predominantly to produce woodchips due to increasing demand in international markets and because woodchip production does not require advanced technology or logs in large sizes. Viet Nam is the world's largest country exporter of woodchips (accounting for 48% of the value and 35% of the volume of world woodchip exports in 2020[106]) and has supplied growing markets for pulp, paper and paperboard industries within the Asian region.

Production of longer rotation plantation sawlogs will be required to move up the value chain.
With the objective of moving up the value chain, government is seeking to increase the supply of larger, higher value sawlogs to the wood processing industry. However, there are barriers to smallholder growers producing longer rotation, and hence larger, logs, which include their need for short-term income, the low-price differential between sawlogs and pulp logs, weak credit systems,

[104] Ibid.
[105] Midgley S.J., Stevens P.R., Arnold R.J. 2017. *Hidden assets: Asia's smallholder wood resources and their contribution to supply chains of commercial wood*. Aust. For. 80, 10-25.
[106] COMTRADE. *UN Commodity Trade Database*.

concerns about risks of storm damage and disease with longer rotation plantations, limited smallholder knowledge about stand management, and poor linkages in the furniture wood supply chain[107]. These issues will need to be addressed for greater smallholder participation in higher value-added wood supply chains.

Viet Nam's wood processing sector is mainly focused on wood furniture production for exports and is heavily dependent on imported raw materials.
The wood processing sector in Viet Nam has expanded considerably in recent years, and is mainly focused on wood furniture production and exports, in addition to plywood, veneer, and wood-based panels production which supplies both Viet Nam's furniture industry and export markets. Wood furniture production has more than doubled in value terms over the last decade and was valued at USD 12.0 billion in 2020. The sector has been dependent on imported raw materials, particularly logs and sawnwood, from a diverse range of suppliers. This reliance has posed a risk to the industry as supply chains have become disrupted due to COVID-19, and because of the policy dynamics of source countries and of the requirements in destination markets to ensure legal evidence of timber imported from "high-risk" countries such as Cambodia, Lao PDR, Myanmar, and a number of countries outside the LMR.

Viet Nam's wood processing industry has been highly competitive in international markets.
Key factors include a predictable regulatory framework, favourable environment for foreign investment, low labour costs, skilled manual labour and geographical location. Sector firms, particularly foreign investment enterprises (FIEs), have strong and established linkages to world scale companies and the government has supported the sector in developing its value chain, from plantation development to investment and trade support. There are a large number of companies with chain of custody and Forest Stewardship Council Certification (FSC) and the Programme for Endorsement of Forest Certification (PEFC) and a VPA between the EU and Viet Nam entered into force in June 2019. Viet Nam's timber legality assurance system VNTLAS was implemented in October 2020 with strict guidelines on how government authorities and companies would ensure the legality of Vietnam's imported timber from high-risk sources. The system will be key to maintaining access to important wood furniture markets such as the United States, United Kingdom and EU countries.

There are, however, some indications that Viet Nam's international competitiveness may be declining in terms of world rankings, with Viet Nam's rankings in the World Economic Forum's Global Competitiveness index dropping from 60th to 70th in 2020. On the World Bank's "Ease of Doing Business" index in 2020, Viet Nam (70th) ranked significantly lower than Thailand (21st). There had been rapid improvements in the wood processing industry from 2001, with the industry benefitting from inexpensive labour, a cost advantage in the international market, natural resources, skilled labour workers, and a favourable geographical location. However, the growth rate in competitiveness declined from 2008 due to low productivity gains and added industry value. This indicates that transformation and upgrading of its wood processing industry is needed, with a

[107] Kennan R. 2021. *Policy analysis for forest plantations in Lao PDR and Viet Nam*. Australian Centre for International Agricultural Research. Available at: https://www.aciar.gov.au/sites/default/files/2021-09/final-report-FST-2019-121.pdf

greater focus on higher value-added products, technological innovation, and product quality which meets international standards, including environmental standards[108].

Foreign investment enterprises (FIEs) have been the driver of growth in the wood processing industry. In 2019, before the COVID pandemic, Viet Nam's wood processing industry comprised about 5,000 domestic and FIEs, of which 99 were new investment projects[109]. FIEs play a significant role in wood processing and exports and their importance to the sector has grown in recent years. As of 2019 there were 966 FIEs in the wood processing sector, with a total investment of $6 billion. Most FIEs were from within the Asian region and the top 5 are shown in Table 8.

Table 8: Top Five Foreign Investors in Vietnam's Wood Processing Industry (2019)

Investing Economy	No. Projects	Investment Capital (USD million)
Taiwan P.O.C.	220	1,000
Hong Kong	58	952
British Virgin Islands	46	894
China	217	651
Rep. of Korea	103	650

Source: USDA 2020, cites: Vietnam Timber and Forest Product Association (VIFOREST)

In 2019, FIEs accounted for approximately 48 percent of Viet Nam's total wood and furniture exports, up 25 percent over 2018, and they have become the main drivers of Viet Nam's export growth. FIEs were also exporters of plywood and other wood-based panels. Although the COVID-19 pandemic had initially dampened demand for wood-based products in Viet Nam's major export markets, Viet Nam's production and exports of wooden furniture continued to grow in 2020, and the value of exports of wood and wood-based products had increased by 16.2% compared with 2019[110].

The export competitiveness of Viet Nam-owned wood processing enterprises remains low compared with foreign-invested enterprises operating in Viet Nam.
FIEs are larger in financial scale and production capacity than domestic manufacturers, who were less able to respond and adapt to the COVID-19 pandemic. FIEs were able to respond more quickly to the upturn in consumption and demand in the important US market for wooden furniture in 2020 and 2021. FIEs are also more export oriented and have better linkages through the supply chain to the final market. In 2020, there were 3,600 enterprises directly involved in exporting wood products, of which 653 FIEs accounted for 51% of Viet Nam's total value of exports of timber products.

The increase in FIE participation in the wood industry has been attributed to preferential policies and investment attraction measures by the government and partly the result of new free trade agreements, as well as its geographical location within the Asia-Pacific economic region. The

[108] Thi Thanh Huyen Vu, Gang Tian, Naveed Khan, Muhammad Zada, Bin Zhang and Thanh Van Nguyen, 2019. *Evaluating the International Competitiveness of Vietnam Wood Processing Industry by Combining the Variation Coefficient and the Entropy Method*. Forests 2019, 10, 901.
[109] USDA 2020. *GAIN Report VM2020-0058. Vietnam Wood Processing Industry*. Available at: https://apps.fas.usda.gov/newgainapi/api/Report/DownloadReportByFileName?fileName=Vietnam%20Wood%20Processing%20Industry_Ho%20Chi%20Minh%20City_Vietnam_06-11-2020
[110] Vietnam Investment Review 2021. *Balancing act required for open wood industry***.** Available at: https://vir.com.vn/balancing-act-required-for-open-wood-industry-84032.html

tensions within US-China trade also created opportunities for Viet Nam to receive capital flows from China, particularly in the wooden furniture and plywood industries.

Collaboration between smallholder growers and enterprises across the value chain will be key to transformational change involving the participation of smallholders in higher value markets for legal and sustainable wood products.
The domestic wood industry recognises that engagement between the large number of Viet Nam's smallholder growers and private sector wood processors is not effective and lacks an appropriate mechanism to exchange information and experiences and to collaborate across value-added supply chains.

Recent research[111] identified the barriers to smallholders demonstrating environmental sustainability which include: low understanding of current environmental regulations; limited monitoring of environmental impacts or benefits of plantations; high costs, uncertain returns, and uneven distribution of the benefits of forest certification. It notes that demonstrating environmental sustainability of plantations through certification largely benefits processors and exporters rather than smallholder growers.

Although export demand has been robust, Viet Nam's wood processing sector currently faces a number of issues related to the COVID-19 pandemic.
In 2021 and 2022, supply chains have been interrupted by a scarcity of shipping vessels, a lack of shipping containers and increased freight rates which have affected inputs and outputs to the industry. These issues have been universal to wood processing and exporting countries worldwide. Further challenges to Viet Nam's industry have included scarcity of labour, inflation and its effects on production costs, scaling down of post-pandemic support programmes, and competition with other sectors for labour and facilities[112].

New free trade agreements will open up new markets but also competition in domestic wood product markets.
The wood furniture industry may also face new competition in domestic markets. New free trade agreements (see Section 2.3.1.1) will require Viet Nam to cut tariffs on wood product imports, opening up competition from wood furniture imports from its trading partners. In export markets, strict implementation of timber legality requirements in trade partner countries is now expected, with risks to the perception of Viet Nam's exports if there are exports of illegally sourced wood products.

Viet Nam's paper and paperboard production is rising but is reliant on imported raw materials.
Viet Nam's paper and paperboard production totalled 1.7 million tonnes in 2020, although Viet Nam is a net importer of paper and paperboard with imports amounting to 1.6 million tonnes in 2020. Viet Nam has a small number of large-capacity producers of commercial pulp but the domestic pulp industry only meets approximately 22% of domestic paper production demand. The rest is provided by imported pulp, paper, and waste paper for domestic paper production[113].

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[111] Kennan R. 2021. *Policy analysis for forest plantations in Lao PDR and Viet Nam*. Australian Centre for International Agricultural Research. Available at: https://www.aciar.gov.au/sites/default/files/2021-09/final-report-FST-2019-121.pdf
[112] ITTO Tropical Timber Market Report. 26:2, 16-31 January 2022
[113] Global Newswire 2021. *Vietnam Paper Packaging Market - Growth, Trends, COVID-19 Impact, and Forecasts (2021 - 2026).* August 18,2021. Available at:

Viet Nam's Paper consumption is dominated by the demand for packaging. Foreign invested companies are the major players, accounting for about 50% of paper production capacity, mainly from three major foreign paper manufacturers. In contrast, domestic paper manufacturers are typically small scale (less than 50,000 tonnes/annum capacity) with outdated technology and equipment. As paper manufacturing requires significant investment capital, foreign investors are seeking high capacity and integrated technology companies rather than merger and acquisitions with small Vietnamese companies.

Existing consumption of paper and paperboard per capita is low, but is expected to rise in response to rising incomes. Overall consumption will also rise in response to population growth and rising consumption of consumer goods, in addition to exports which utilise packaging materials.

Levels of domestic consumption of secondary processed wood-based products are unable to be determined with accuracy.
Similar to other LMR countries (and China), data and information on Viet Nam's domestic consumption of secondary processed wood-based products is minimal and insufficient to provide a detailed analysis of trends in wood consumption in domestic end-use markets. There is limited information on variables such as volumes and origins of raw material consumed by market sector, species composition and qualities of wood products consumed. For example, the trends in consumption of "at risk" species such as rosewood and natural teak in the wood furniture industry is unknown, as are the demand levels of rosewood and teak furniture consumed in Viet Nam's domestic market.

Derived consumption data (see Appendix 1) indicates that the value of wooden furniture consumption has increased over the last decade and amounted to about USD 2 billion in 2020 although the species used are unable to be determined from this data. The accuracy of derived consumption data is also dependent on the quality of trade and production data and it is unlikely to account for production in the informal sector.

Export data for additional secondary processed wood products indicates that builders' woodwork and joinery, and "other" SPWP exports, have increased considerably by value over the last decade (see Table 1). However, production data is unavailable and therefore domestic consumption levels cannot be determined with accuracy.

Viet Nam's domestic consumption of secondary processed wood products is expected to grow.
Viet Nam has the highest population among LMR countries (at over 96 million) and with an expected continuation in growth in GDP/capita, Viet Nam's consumer demand for secondary processed wood products in domestic end-use markets is expected to grow. Although only a small proportion (10-15%) of wooden furniture produced in Viet Nam is consumed domestically, pre-COVID forecasts in 2019 of furniture consumption in Viet Nam estimated real growth in consumption will be 5% in 2020 and 2021, well above the world average of 2%. This is from a low apparent consumption/capita of

https://www.globenewswire.com/news-release/2021/08/18/2282925/0/en/Vietnam-Paper-Packaging-Market-Growth-Trends-COVID-19-Impact-and-Forecasts-2021-2026.html

USD 18/capita in 2019, compared with estimates of USD 119/capita for Japan and USD91/capita for China[114].

Accurate estimates of wood consumption in domestic consumer markets are needed.
Export markets for Viet Nam's wood products will continue to be important. However, more accurate assessments of wood consumption (both domestically produced and imported) in Viet Nam's domestic end use markets will be required to comprehensively assess and determine the effectiveness of policies to control the legality and sustainability of wood supplies to Viet Nam's wood processing industry.

3.6 Thailand

Thailand is a significant wood processing hub in the LMR.
Thailand is a significant wood processing hub in the LMR and among ASEAN countries. Processing is mainly of pulp and paper, wood-based panels and wooden furniture, along with significant exports of rubberwood sawnwood and eucalypt woodchips to China. The industry currently utilises mostly domestic plantation species and imports from a number of sources, following significant restrictions on harvesting in natural forests.

Domestic roundwood production is mostly from plantations and wood processing is supplied by plantation raw material and imports.
Thailand's roundwood production amounted to 17.0 million m^3 in 2020. Most of the harvest comes from plantations (mainly rubberwood and eucalypts) because harvesting from natural forests has not been permitted since 1989. The country's wood processing industry is now reliant on raw material from both domestic plantations and imports. Nearly all legal domestic timber production comes from planted forests, including a large volume from private plantation owners, with very small volumes harvested in natural forests in areas of officially approved infrastructure projects.

Illegal harvesting in natural forests has declined considerably.
Illegal harvesting has declined significantly since the introduction of harvesting restrictions in 1989. Exports of rosewood species to China have declined sharply since 2014, following similar trends to other LMR countries' exports. However, illegal logging continues to occur, particularly of high-value species such as rosewood (*Dalbergia cochinchinensis*) and other redwood species, and agarwood (*Aquilaria spp*.). Most is reportedly smuggled out of Thailand to eventually reach the Chinese market. Illegal harvesting of teak and other species from natural stands does occur, although this is less frequent than in the past, with some wood being used in the domestic market[115].

Concerns remain about illegal wood entering the supply chain but these are being considered in FLEGT VPA negotiations.
The government has taken various measures to control harvesting in natural stands and stem illegal trade. Legality issues are now primarily associated with tenure systems for plantations, and are linked to legal rights to occupy and/or use specific areas for tree growing[116]. In order to promote plantation development, a revision of article 7 of the Forestry Act, allows all species, including teak, to be legally harvested on private land. It is also recognised that there are some risks of illegally

[114] CSIL 2019. *World Furniture Outlook 2020*. December 2019. Centre for Industrial Studies, Milan. Available at: http://www.csilmilano.com
[115] Durst P. 2019. *Thailand. Country report on forest product legality requirements and risks*. Available at: https://www.rinya.maff.go.jp/j/riyou/goho/jouhou/pdf/h30/H30report_nettaib_6.pdf
[116] Ibid

sourced wood (sawnwood and other products), from domestic and imported sources, entering the supply chain during transport and processing operations.

Thailand is currently exploring different approaches such as previously successful models for the control of the supply chain of timber derived from private lands and the legality of timber imports. One of the considerations as part of the FLEGT VPA negotiations is the development of guidelines for timber sources whose legal control is unclear or lacking, which will be required for implementation of the Thailand Timber Legality Assurance System (THA-TLAS)[117], particularly the development of Annex 6: the Supply Chain Control[118].

Rubber plantations supply the bulk of raw material for the wood furniture industry and sawnwood exports to China.
Thailand is the world's largest producer of rubberwood. A large volume is being sawn domestically to supply the export market in China and the domestic furniture manufacturing industry, and a lesser volume (of wood residues) supplies the domestic panel manufacturing industries, including particleboard, MDF and plywood. Total sawnwood production (most of which is rubberwood) is estimated at 4.3 million m^3 in 2020, with domestic consumption at 1.2 million m^3. Rubberwood is a secondary product to the production of rubber and is utilised when the trees have matured, after about 25 years. The supply of rubberwood for sawnwood, and rubberwood residues for the panel industry, is also dependent on international market conditions and prices of latex[119]. The panel industries consider that the fragmented smallholder grower supply base constrains fibre availability and security for internationally competitive, large industrial facilities.

Eucalypt plantations supply the domestic pulp and paper industry.
Eucalypt plantations supply a large proportion of Thailand's domestic pulp and paper industry with a large proportion established through contract farming of smallholder tree growers by private sector companies to establish domestic sources of wood supply for their processing plants.

Rapid growth in Thailand's pulp and paper industry was enabled by government support measures.
Paper and paperboard production totalled 5.6 million tonnes in 2020, and wood pulp production amounted to 1.1 million tonnes. The rapid growth in Thailand's pulp and paper industry in the 1980s and 1990s had been enabled through government measures to encourage foreign direct investment, including joint ventures and 100% ownership by foreign companies of domestic ventures. The Thailand government also actively supported the development of the industry through easy access to credit, infrastructure (port and highway) construction, and subsidies to plantation owners, tax relief and favourable import duties on machinery. The pulp and paper industry is reliant on smallholder growers for domestic supplies of wood.

In 2019, the Royal Forest Department (RFD) registered 14,703 wood processing plants and wood merchants, with 7,938 merchants selling lumber and other wood products. There were 1093 machine-powered and 1193 man-powered (presumably low-tech) sawmills, and 3073 machine-powered wood processing plants (although the products are not specified)[120].

Thailand's wooden furniture industry is predominantly small-medium scale.

[117] TEFSO 2022. Thai-EU FLEGT Secretariat Office. Available at: http://tefso.org/en/2022/03/16/flegt-vpa-ad-hoc-working-group-advocating-for-the-amendment-of-regulation-on-timber-on-sor-por-gor/
[118] https://tefso.org/en/supply-chain-control-2/
[119] Rubberwood Intelligence Unit. Available at: http://rubber.oie.go.th/f
[120] RFD 2019. *Forestry statistics data 2019*. Royal Forest Department. Bangkok.

Thailand's wooden furniture industry is now almost totally reliant on plantation rubberwood as a raw material source[121]. Wooden furniture production was valued at about USD 2.1 billion in 2020 and production has remained relatively static over the last decade although consumption has fluctuated and is estimated to be valued at USD 1.9 billion in 2020.

The domestic furniture market has been described as fragmented, although major players such as IKEA have entered the market, shifting the production focus to more emphasis on design techniques and trends. Production is predominantly by SMEs with the top 4 manufacturers capturing only about 24% of the total domestic market share. Domestic consumption has been affected by the COVID-19 pandemic. Domestic consumption reportedly declined from 420,000 units in the 1st quarter 2019 to a low of 310,000 units in the 4th quarter of 2020[122]. The Rubber Intelligence Unit reported that while domestic sales of rubberwood furniture were down by 11.7% year-on-year in 2021, production levels were up and had increased by 4.5% in the 4th quarter of 2021[123]. Although export data is not yet available, the increase in production levels may be in response to the recovery in demand levels in export markets.

Foreign investment in the wood products sector has been a driver of growth but growth has slowed. The pulp and paper and panel industries in Thailand have received significant foreign investment in the past and FDI has been a significant driver of growth in the industry. However, it has been observed that the extent of FDI regulatory restrictiveness in Thailand is much higher than in most other emerging and developing countries, and is higher than in Viet Nam[124]. Although information on the wood processing sectors is not available, total FDI inflows to Thailand have declined as a share of the ASEAN countries. This has been partly explained by Cambodia, Lao PDR, Myanmar, and Viet Nam becoming more important destinations of FDI within ASEAN, due to their low-cost labour and increasingly open investment and trade regimes[125]. The decline in FDI inflows after 2014 has been a result of Thailand's political turmoil and pessimistic business sentiment.

A recent OECD review of foreign investment in Thailand noted that foreign firms tend to outperform Thai firms in many areas. In furniture and paper manufacturing, they are more productive, employ higher shares of skilled workers and tend to spend more on R&D. In terms of energy efficiency, however, foreign invested firms tend to underperform Thai firms in the wood and paper sectors[126]. Importantly, the OECD notes that the benefits from FDI are not automatic and domestic firms must possess some basic skills and knowledge to benefit from the presence of foreign firms. It suggests that strengthening domestic firms' capabilities requires policy efforts in different areas including improving human capital development, boosting innovation, and engaging in responsible business conduct. These messages are also relevant to other countries in the LMR.

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[121] Durst P. 2019. *Thailand. Country report on forest product legality requirements and risks*. Available at: https://www.rinya.maff.go.jp/j/riyou/goho/jouhou/pdf/h30/H30report_nettaib_6.pdf

[122] https://www.statista.com/statistics/1052867/thailand-domestic-sales-volume-wooden-furniture-by-quarter/

[123] Rubber Intelligence Unit 2022. Available at: http://rubber.oie.go.th/

[124] OECD 2021. *OECD Foreign Investment Review. Thailand. Improving Thailand's foreign investment regime.* Available at: https://www.oecd-ilibrary.org/sites/93d56bd0-en/index.html?itemId=/content/component/93d56bd0-en

[125] OECD 2022. *OECD Investment Review. Thailand. Trends and qualities of FDI in Thailand*. Available at: https://www.oecd-ilibrary.org/sites/59874f17-en/index.html?itemId=/content/component/59874f17-en

[126] Ibid

3.7 Certified wood products production and trade in the LMR

Forest certification and chain of custody certification remains at a low level in the LMR relative to the size of the forest resource.

Table 9 shows the extent of FSC certification in LMR countries in 2022, which is significantly higher in Viet Nam and Thailand than in Lao PDR and Myanmar. This reflects their higher level of wood products exports to countries which require evidence of legality, such as the United States, Japan, and EU countries.

*Table 9: FSC Forest Management and Chain of Custody Certificates in the LMR**

FSC Country	Forest area total (ha)	FM certificates	CoC certificates
Cambodia	7,896	1	36
Lao PDR	78,891	4	2
Myanmar	-	-	18
Thailand	119,785	33	259
Viet Nam	226,219	52	1,085

**As of March 1, 2022. Source: FSC 2022[127].*

PEFC lists 46,657 ha of forest certified area in Viet Nam, and 30 CoC certificates issued[128]. Thailand achieved PEFC endorsement of its national forest certification system in 2019. Although there are currently there are no PEFC-certified forests in Thailand, 27 CoC certificates have been issued. The Myanmar Forest Certification Scheme was submitted to PEFC for endorsement in 2021. However, the assessment was suspended until further notice in September 2021 due to concerns that Myanmar-based stakeholders are unable to participate in the assessment process[129].

A large proportion of certified forests in the LMR are plantations.

Current data is unavailable on the proportion of certified forests that are plantations. However, a 2014 report indicated that almost two-thirds of the certified forests in the Greater Mekong region (which includes the China province of Guangxi) are plantations[130]. The smaller proportion of certified natural forests was concentrated in Lao PDR, Vietnam and, to a lesser degree, Guangxi. The report indicated that about two-thirds of the region's certified forests were managed by state entities, and the rest by private ones (ranging from large companies to smallholders).

There are challenges to expanding the area of certified forests in the LMR.

Expanding the area of certified forests and assurance of legal chain of custody of processed wood products in the LMR faces challenges. Countries in the LMR are not highly rated internationally for transparency and accountability due to high levels of perceived corruption. Table 10 shows Transparency International's ranking of LMR countries among 180 countries surveyed.

[127] FSC 2022. *Facts and Figures*. Available at: https://fsc.org/en/facts-figures

[128] PEFC 2021. *PEFC Global Statistics*. Data: December 2021. Available at: https://cdn.pefc.org/pefc.org/media/2022-03/b33a1b64-6d71-4dd1-a3dc-ede164221d2a/eaba7ece-0afd-56fa-bce9-b5ab265c95a4.pdf

[129] PEFC 2021. *PEFC suspends assessment of Myanmar forest certification system.* 14 September 2021. Available at: https://pefc.org/news/pefc-suspends-assessment-of-myanmar-forest-certification-system

[130] WWF 2014. *FSC in the Greater Mekong region: Past the half-million hectare mark, but where to next?* Available at: https://wwf.panda.org/wwf_news/?223011/FSC-in-the-Greater-Mekong-region-Past-the-half-million-hectare-mark-but-where-to-next

Table 10: Rankings of perceived corruption in LMR countries, 2021

Country	Global rank
Cambodia	157
Myanmar	140
Lao PDR	128
Thailand	110
Viet Nam	87

Source: Transparency International 2021 (#1 = least corrupt; #180 = most corrupt) [131]

Natural production forests in the LMR have suffered in the past from large-scale, uncontrolled, and illegal logging which has limited the incentives to improve forest management. However, harvest levels, and the incidence of illegal logging in the LMR, have declined considerably in recent years and measures such as the FLEGT VPAs which are being negotiated are assisting in facilitating standard setting and certification.

There are a number of challenges to forest certification in the LMR including the high certification process cost, often requiring external funding and technical assistance, insufficient sourcing of certified timber, lack of demand for certified products and lack of a harmonised certification system across the region[132]. Certification of plantations is considered easier than certification of natural production forests, although large group certification schemes are needed to achieve the necessary economies of scale in production and marketing, and these demand intensive coordination. Even then, locally produced certified wood products may compete with imports from larger, more efficient certified producers.

Certification is more challenging for the large number of smallholder growers in the LMR.

With most secondary processed wood product markets having mandatory legality and sustainability requirements, certification will be key to connecting smallholder growers and SME wood processors in the LMR to global markets and moving up the value chain. Only a very small proportion of smallholders are certified and those who are certified may have been assisted by international agencies in meeting the costs. In 2019, only 1.4% of smallholders were certified in Viet Nam and less in other LMR countries[133]. Some researchers argue that certification criteria have been designed for forest management elsewhere and they need to be revised so that they are more relevant to local landscape ecology and consider community needs and aspirations[134].

Larger organisations are, however, more able to respond to global consumer demands and the implementation of legality and sustainability requirements.

The volume and value of certified exports of wood products from the LMR is unknown as this is not captured in customs data or international reporting systems. In Viet Nam, the proportion of forest plantation area that is FSC or PEFC-certified is only about 6%, suggesting that the proportion of wood exports exported which are certified is low. Wooden furniture production also utilises wood from a range of importing countries, which further complicates the chain of custody certification processes.

[131] Transparency International 2021. *Corruption Perceptions Index 2021*. Available at: https://www.transparency.org/en/cpi/2021

[132] UN-REDD 2020. *Lower Mekong Regional Partners Dialogue*. https://www.unredd.net/documents/un-redd-partner-countries-181/asia-the-pacific-333/a-p-knowledge-management-a-resources/lower-mekong-initiative/17439-regional-partners-dialogue-lower-mekong.html

[133] Nambiar 2021. Op cit.

[134] Ibid.

4 DISCUSSION

A vision for transformational change in the LMR

Transformational change in forest product value chains in the LMR implies a shift in forest product value chains from systems that support deforestation and forest degradation, illegal logging and trade, to systems that support sustainable management of LMR forests and legal and sustainable forest product value chains which benefit all stakeholders.

What is needed to achieve transformational change in the LMR

The pathways to achieve the vision of transformational change would require a reorientation away from business-as-usual policies and practises to new approaches which support a transition to SFM and sustainable forest product value chains. At a broad level, we have identified some key actions required to activate this change, based on the insights provided in chapters 2 and 3. These include the following:

1) Transition from production and trade based on unmanaged/poorly managed natural stands to that based on plantations and sustainably managed natural stands

- "Responsible" plantation development (which does not have adverse social, environmental and economic impacts on communities). Sustainable forest management of natural stands.
- Increase the area, stand productivity and quality of sustainably managed plantations in the LMR, to relieve pressure on natural stands in the LMR and as harvesting of natural stands has become increasingly uneconomic, and to bridge the gap between wood processing demand and supply from existing plantations.
- Reduce pressures on high value species (such as rosewood) from natural stands and leakage from imports from "high risk" suppliers (particularly from the African and Pacific regions) by development of plantations of high value species. This is a long-term pathway requiring significant R&D.
- Improve resource recovery from sustainably managed natural stands (e.g., through improved forest management, restoration of degraded areas, etc.).

2) Adopt systems to support the transition to legal and sustainable wood resources

- Strengthen forest law enforcement, controls on illegal logging and cross-border trade.
- Adopt timber tracking systems, forest management and chain of custody certification verification.
- Improve data transparency, through improved data reporting systems and understanding of the size of the informal harvesting and wood processing sectors.
- Escalate progress to implementation of Timber Legality Assurance Systems.
- Invest in community forestry where forest dependent communities are supported to protect forests.

3) Increase the value of natural stands by developing alternative revenue sources

- Forest carbon markets have the potential to increase the value of LMR natural stands, both in protected areas and in areas under SFM. This will require the development of functioning carbon markets that recognize the carbon benefits of improved forest management (including timber utilization).

- Hydropower, if planned and developed with appropriate environmental safeguards, has the potential to generate payments for environmental services (PES) as an alternative rent for natural forests (e.g., Lao PDR). The development of dams and other hydropower infrastructure can also encourage better forest management in surrounding areas to prevent erosion and siltation impacting generating capacity.
- Other PES schemes may have potential in the LMR to increase the standing value of forests, including ecotourism, non-timber forest products, biodiversity credits etc. Even more than for carbon, the primary challenge is the development of functioning markets for these services.

4) Develop internationally competitive forestry enterprises

- To encourage value addition, incentivise value-added production and exports, technological innovation and product quality which meets international standards.
- Increase/stabilise the supply of wood to processing industries.
- Invest in workforce upskilling and training for value-added processing.
- Provide support for mSME competitiveness and productivity in wood processing including market intelligence and business upskilling.
- Ensure implementation, as well as development, of wood processing roadmaps.

5) Grow domestic/LMR regional markets for legal and sustainable wood products

- Increase domestic/regional markets for legal and sustainable wood products, recognising the anticipated growth in LMR domestic markets for wood products with expected population and economic growth in the region.
- Develop public sector procurement policies to activate and demonstrate markets for legal/sustainable wood products.
- Facilitate private sector procurement initiatives (GGSC initiative provides a useful model).
- Invest in domestic market consumer outreach, with consumers being key agents of change in consumption of sustainable products.
- Strengthen LMR forest governance through cross-border integration of policy initiatives, recognising that China, Viet Nam and Thailand are the major processing hubs for LMR primary wood products. Develop mandatory import and procurement policies for sustainable and legal wood products in China, Viet Nam and Thailand.

6) Grow and diversify export markets for LMR legal and sustainable wood products

- Meet environmental and technical requirements in target export markets.
- Incentivise group certification of mSMEs to achieve economies of scale in production and marketing. Certification will be key to connecting smallholder growers and SME wood processors in the LMR to global markets and moving up the value chain. Encourage collaboration between smallholder growers and enterprises across the value chain.
- Grow and diversify export markets with high (rather than low) requirements for sustainability. To access new markets, expand the portfolio of products for export in primary and secondary processed wood products.
- Trade facilitation at government level through negotiation of FTAs, export incentives, etc. Exploit opportunities presented by existing FTAs, which can reduce the

complexities of doing business and encourage foreign investment. E.g., the EU-Viet Nam FTA has the potential to enable growth in the EU market for sustainable wood products from Viet Nam.

- Re-image LMR wood products as legal and sustainable in international markets, with importer participation. Import markets in the US and EU can drive transformational change in the LMR.

7) Transformative and responsible public and private investments

- Understand investor expectations.
- Create a favourable investment environment.
- Regulate foreign investment – support legal and sustainable forestry sector development.
- Target mSMEs. In the wood processing industries mSMEs require investment and working capital for capacity expansion, technology upgrades, and investments in skilled labour.

Challenges to transformational change in forest product value chains in the LMR

There are many challenges at regional and country levels to the vision of transformational change in forest product value chains in the LMR. Many of these challenges have been discussed comprehensively in sections 2 and 3. The following is a summary of these major challenges:

Meeting international environmental standards

- Forest certification and chain of custody certification remains at a low level in the LMR.
- mSMEs are challenged by high compliance costs and only a small proportion of growers and processors are certified (all LMR countries).
- Lack of a harmonised certification system across the region.
- Leakage of imports from “high risk” regions, particularly Africa and the Pacific. (Viet Nam).
- Slow progress in VPA negotiations and implementation of TLASs.

Limited information on the extent of illegal harvesting and trade

- The size of the unregulated sector in all LMR countries is suspected to be large but has not been quantified.
- Domestic consumption of wood products from global and LMR sources in China and Viet Nam is unquantified. This data is fundamental to determining the volume of cross-border trade from LMR countries.
- Data transparency and information on wood product value chains in Cambodia and Myanmar is very limited.

High proportion of mSMEs in wood growing and processing

- Significant in LMR growing and processing but challenged to meet timber legality requirements, technical standards, competitiveness with informal operators, large enterprises and imports. In wood processing, mSMEs lack the capital investment required in technologies to meet industry export technical standards, market intelligence to diversify products and geographic markets, and the business management skills to meet complex government regulations for exporting (in the case of Lao PDR).

- Domestic LMR wood producers may compete with imports from larger, more efficient certified producers and low-priced competitors in the informal space.
- Productivity and quality of mSMEs is generally uncompetitive compared with large enterprises and imported products.

Procurement policies

- No public or private procurement schemes yet in operation in the LMR (although in development in Viet Nam).

Low levels of technology in all aspects of the supply chain

- Dependence on primary wood processing and exports from Myanmar, Cambodia and Lao PDR.
- International competitiveness in wood processing is declining in Viet Nam and Thailand.
- Limited access to public and private investment financing in wood processing.

China market

- China is a significant market for LMR wood products but lacks mandatory controls on value chains of unsustainable and illegal wood products.

Market perceptions

- Imports of forest products from LMR countries are perceived as illegal and unsustainable in value-added export markets with high legality and sustainability requirements.

Corruption

- Corruption and lack of transparency are a major obstacle to the essential foreign investment required for transformational change in the LMR forest industries.
- Lack of stringent controls on intra-regional LMR trade in forest products provides risks for exporters of value-added products from the region.

Regional prospects for transformational change in the LMR

The prospects and opportunities for transformational change differ across the region.

Political instability in Myanmar, the resumption of illegal logging due to poor regulatory controls, and sanctions imposed on Myanmar imports in major importing countries, limits the opportunity to achieve transformational change in forest product value chains in Myanmar. Opportunities for change will only be achieved with changes to the current political environment.

In Cambodia, the opportunities for transformational change will also be restrained by corruption, poor governance and a lack of transparency in data and other information regarding the forestry sector and its sustainability. Government plans for the sector are unclear, particularly in terms of legal and sustainable forest product value chains, indicating that the prospects for transformational change are minimal.

In Lao PDR, the government has indicated a clear direction towards legal and sustainable forest product value chains, developing policies to reduce deforestation, and to expand the wood processing sector and improve its sustainability. The challenge for Lao PDR will be in implementation of the policies and plans developed under its comprehensive Wood Processing Sector Export

Roadmap 2021-2025, developed with the private sector. Progress has been made in FLEGT VPA negotiations, although not as advanced as with Viet Nam.

Viet Nam and Thailand are the wood processing hubs in the LMR, and their forestry sectors have been assisted by significant government support and incentives. Viet Nam provides an example of successful transition from net forest area loss and dependence on natural forest resources for its wood processing industries to forest area gain and significant growth in plantation forest area and wood supply (although some industrial wood supply is now sourced from "high risk" imports). The forestry sector has been inclusive of rural households and community organisations as direct stakeholders although there has been some criticism that much of the rehabilitated natural forest has been of low quality, that some of Viet Nam's deforestation has been displaced to other LMR countries and beyond, and that large tree planting programmes have had adverse social, environmental, and economic impacts for some stakeholders, particularly poor communities[135]. Viet Nam's forest transition has been achieved by a number of government interventions targeting poverty reduction, forest allocation, forest protection, plantation development and value chain development. The development of forest data monitoring systems by means of ground inventories and remote sensing techniques has enabled implementation of the government's objectives for the sector[136]. The wood processing sector has been well supported by a favourable business environment, attracting external investments, and negotiation of a proliferation of FTAs to assist exports. Viet Nam is the most advanced country in the region towards negotiating a FLEGT-licensing scheme.

In conclusion, while there are similarities in the challenges faced by different countries in the region (and in some of the potential approaches for overcoming these challenges), there is unlikely to be a single approach or program that leads to transformational change towards SFM in all of the countries in the region. Ongoing work (some of which has been identified in this report) will be required in all countries, with some countries requiring the focus to start on basic forest management practices and others requiring improvements further down the value chain. There is no doubt, however, that the countries of the LMR and the major importers of their forest products can learn from each other's experiences as they continue the transformation to sustainable forest management and trade.

[135] Neeff T., Steel E. A., Kleinn C., Nguyen D. H., Nguyen N. B., Cerutti P. O. and Moutinho P. 2020. *How forest data catalysed change in four successful case studies.* Journal of Environmental Management 271 (2020) 110736.
[136] Ibid.

APPENDIX 1: Wood products production, consumption and trade in the LMR and China, 2010, 2015 and 2020.

	2010				2015				2020			
	Ex	**Imp**	**Prod**	**Cons**	**Ex**	**Imp**	**Prod**	**Cons**	**Ex**	**Imp**	**Prod**	**Cons**
Cambodia												
Logs (000 m^3)	6	0	291	285	113	1	1,063	951	13	21	813	821
Plywood (000 m^3)	0	3	12	15	8	25	12	29	116	76	202	162
Sawnwood (000 m^3)	90	0	102	13	438	1	452	15	11	33	100	122
Veneer (000 m^3)	9	2	21	14	10	27	21	38	4	92	21	110
Paper and paperboard (000 t)	0	71	0	71	0	92	0	92	1	244	0	244
Wood chips and particles (000 m^3)	64	0	0	(64)	2	0	0	(2)	9	0	0	(9)
Wood pulp (000 t)	0	0	0	(0)	0	0	0	0	0	3	0	3
Wood-based panels (000 m^3)	0	5	12	17	9	34	12	37	116	143	202	228
Wooden furniture (USD million)	0.5	16.5	N/A	N/A	1.2	10.6	7.3	16.7	160.4	23.4	169.2	32.2
China												
Logs (000 m^3)	28	35,502	160,347	195,821	20	49,291	147,228	196,499	40	59,500	170,000	229,460
Plywood (000 m^3)	7,255	210	50,915	43,871	10,094	140	73,194	63,239	8,147	170	63,661	55,684
Sawnwood (000 m^3)	533	14,756	37,200	51,422	348	26,625	74,304	100,582	178	33,860	84,000	117,682
Veneer (000 m^3)	198	109	3,000	2,912	371	997	3,000	3,625	446	1,572	2,700	3,826
Paper and paperboard (000 t)	4,881	5,237	96,545	96,901	6,656	4,497	111,150	108,991	6,255	13,931	117,150	124,826
Wood chips and particles (000 m^3)	9	9,528	18,735	28,254	0	17,893	42,858	60,751	3	21,132	44,381	65,510
Wood pulp (000 t)	50	12,137	9,578	21,666	86	20,562	11,399	31,876	183	29,883	14,865	44,565
Wood-based panels (000 m^3)	10,033	2,729	113,893	106,588	13,459	2,297	150,113	138,951	12,547	2,949	160,668	151,070
Wooden furniture (USD million)	17,267.1	387.9	96,387.0	79,507.9	22,848.5	884.1	164,781.0	142,816.6	20,019.6	911.9	179,245.0	160,137.3
Lao People's Dem. Rep.												
Logs (000 m^3)	207	0	1,092	885	1,596	0	3,800	2,204	60	0	1,140	1,080
Plywood (000 m^3)	6	2	51	47	4	5	51	51	1	6	51	56

	2010				2015				2020			
	Ex	**Imp**	**Prod**	**Cons**	**Ex**	**Imp**	**Prod**	**Cons**	**Ex**	**Imp**	**Prod**	**Cons**
Lao People's Dem. Rep. (contd.)												
Sawnwood (000 m^3)	302	0	370	68	699	0	805	106	137	2	185	49
Veneer (000 m^3)	0	0	5	5	20	0	24	4	1	0	30	29
Paper and paperboard (000 t)	0	11	0	11	0	29	0	29	1	72	0	72
Wood chips and particles (000 m^3)	0	1	0	1	0	0	0	0	2	765	0	763
Wood pulp (000 t)	0	4	0	4	0	0	0	(0)	304	0	370	67
Wood-based panels (000 m^3)	3	4	24	24	4	7	51	53	5	10	51	56
Wooden furniture (USD million)	2.8	6.9	N/A	N/A	6.9	4.9	N/A	N/A	11.2	3.1	N/A	N/A
Myanmar												
Logs (000 m^3)	1,864	0	5,324	3,460	586	0	4,860	4,274	4	0	4,360	4,356
Plywood (000 m^3)	23	3	116	96	17	43	116	142	2	53	116	166
Sawnwood (000 m^3)	162	0	1,610	1,448	213	0	1,830	1,617	145	13	1,670	1,538
Veneer (000 m^3)	30	0	33	3	157	6	170	18	97	4	220	126
Paper and paperboard (000 t)	0	46	45	91	1	242	45	286	12	245	356	590
Wood chips and particles (000 m^3)	0	0	0	0	0	0	0	0	0	0	0	(0)
Wood pulp (000 t)	0	1	1	2	0	3		5	0	3	0	2
Wood-based panels (000 m^3)	23	10	116	103	17	67	116	166	2	103	116	216
Wooden furniture (USD million)	3.4	32.8	N/A	N/A	4.8	17.5	N/A	N/A	2.8	18.5	N/A	N/A
Thailand												
Logs (000 m^3)	9	268	14,600	14,859	14	63	14,600	14,649	14	13	17,000	17,000
Plywood (000 m^3)	37	287	120	369	57	228	120	291	91	362	120	391
Sawnwood (000 m^3)	1,547	1,125	2,850	2,429	3,477	998	2,850	371	3,578	522	4,300	1,244
Veneer (000 m^3)	3	32	185	215	10	14	185	189	134	12	185	64
Paper and paperboard (000 t)	963	737	4,362	4,136	1,169	999	4,829	4,660	1,361	1,037	5,621	5,297
Wood chips and particles (000 m^3)	3,161	73	2,080	(1,008)	4,398	52	4,239	(107)	1,823	32	1,736	(55)
Wood pulp (000 t)	58	562	1,014	1,518	172	631	927	1,387	223	509	1,074	1,360

	2010				2015				2020			
	Ex	**Imp**	**Prod**	**Cons**	**Ex**	**Imp**	**Prod**	**Cons**	**Ex**	**Imp**	**Prod**	**Cons**
Thailand (contd.)												
Wood-based panels (000 m^3)	3,368	312	5,215	2,160	4,152	294	7,279	3,420	5,927	417	7,705	2,195
Wooden furniture (USD million)	790.6	698.4	2,367.0	2,274.8	533.6	161.0	1,979.0	1,606.4	536.4	213.5	2,053.0	1,730.1
Viet Nam												
Logs (000 m^3)	111	894	24,400	25,183	105	1,911	33,435	35,241	27	2,125	37,535	39,633
Plywood (000 m^3)	179	192	195	208	641	242	600	201	1,711	578	2,050	918
Sawnwood (000 m^3)	229	1,123	5,800	6,694	565	1,902	6,000	7,337	223	2,611	6,000	8,389
Veneer (000 m^3)	38	20	60	43	1,012	52	1,050	90	978	140	1,402	564
Paper and paperboard (000 t)	70	871	1,601	2,402	112	1,225	1,742	2,855	1,270	1,564	1,742	2,036
Wood chips and particles (000 m^3)	7,542	177	8,000	635	13,347	3	13,500	156	18,560	1	17,500	(1,059)
Wood pulp (000 t)	13	158	370	515	8	264	540	796	6	391	540	925
Wood-based panels (000 m^3)	209	656	620	1,067	707	1,105	1,040	1,438	1,822	1,294	2,490	1,962
Wooden furniture (USD million)	3,435.8	75.5	4,353.0	992.7	5,728.7	85.4	7,791.0	2,147.7	10,173.8	128.8	11,985.0	1,940.0

Sources: ITTO Statistics Database; FAOStat; CSIL (2019).

Note:

Logs= industrial roundwood.

Net consumption = sum of production plus imports minus exports.

Wooden furniture production in 2020 for Viet Nam and Thailand was unavailable. Data for 2019 has been included as a proxy for 2020 data.

Woodchip and particle consumption for Thailand (2000, 2015 and 2020) and Viet Nam (2020) is estimated to be negative and indicates an underestimation of production

APPENDIX 2: Trade of selected wood products, by LMR country and world total, 2019

Trade of tropical logs, 2019 (m^3)

Exporter Importer	*China*	*Cambodia*	*Lao PDR*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**21,947**	**84,500**	**11,245**	**2,190**	**19,017**	**9,516,425**	**9,655,324 (C)** **2,414,757 (CB)**
		-	*61,418*	*7,357*	*5,876*	*416*		
Cambodia	**28**		**-**	**-**	**-**	**-**	**3,924**	**3,950 (C)** **393 (CB)**
	-		-	-	-	-		
Lao PDR	**-**	**-**		**-**	**2**	**-**	**0**	**2 (C)** **0 (CB)**
	-	-		-	-	-		
Myanmar	**-**	**-**	**-**		**-**	**-**	**321**	**321 (C)** **0 (CB)**
	-	-	-		-	-		
Thailand	**37**	**-**	**80**	**-**		**-**	**3,393**	**3,510 (C)** **10,225 (CB)**
	-	-	-	*1,086*		-		
Vietnam	**-**	**5,349**	**1,952**	**-**	**827**		**1,146,890**	**1,155,018 (MIS1)** **808,054 (C)** **1,269,642 (CB)**
	35,462	*9*	*438*	-	*335*			
Rest of the world	***5,797***	***192***	***395***	***7,595***	***6,665***	***8,307***		
World	***41,259 (C)*** *1,723 (CB)*	***27,488 (CB)*** *9 (C)*	***86,927 (CB)*** *62,711 (C)*	***18,840 (C)*** *12,927 (CB)*	***9,684 (C)*** *194,583 (CB)*	***27,324 (CB)*** *2,790 (C)*		

Trade of tropical sawnwood (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**11,510**	**51,903**	**78,367**	**3,592,067**	**127,890**	**2,188,263**	**6,050,000 (MIS2)** **5,778,912 (C)** **2,404,398 (CB)**
		14,991	*82*	*57,190*	*1,341,493*	*73,787*		
Cambodia	**709**		**-**	**-**	**-**	**-**	**557**	**1,266 (C)** **989 (CB)**
	21		*-*	*-*	*358*	*40*		
Laos	**-**	**-**		**-**	**2,372**	**-**	**96**	**2,468 (C)** **57 (CB)**
	-	*-*		*-*	*-*	*57*		
Myanmar	**-**	**-**	**-**		**363**	**-**	**6**	**369 (C)** **51 (CB)**
	-	*-*	*-*		*-*	*51*		
Thailand	**232**	**-**	**9,976**	**12,110**		**343**	**279,802**	**282,618 (CB)** **191,520 (C)**
	77	*-*	*598*	*1,983*		*157*		
Vietnam	**90**	**42,703**	**72,570**	**887**	**2,588**		**465,829**	**584,667 (I)** **402,907 (C)** **142,270 (CB)**
	517	*269*	*-*	*722*	*2,962*			
Rest of the world	***4,686***	***603***	***418***	***47,636***	***25,452***	***92,463***		
World	***5,301 (C)*** *27,954 (CB)*	***54,852 (CB)*** *(15,260 C)*	***134,867 (CB)*** *(680 C)*	***139,000 (CBI)*** *78,544 (C)* *355,245 (CB)*	***3,622,842 (CB)*** *1,355,949 (C)*	***220,696 (CB)*** *85,199 (C)*		

Trade of tropical veneer (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**-**	**808**	**6,332**	**121,229**	**724,868**	**114,127**	**967,364 (C)** **69,900 (CB)**
		-	*-*	*193*	*40,692*	*14,442*		
Cambodia	**407**		**-**	**-**	**-**	**-**	**331**	**1,061 (CB)** **1,061 (C)**
	-		*-*	*-*	*730*	*-*		
Laos	**39**	**-**		**-**	**8**	**48**	**0**	**95 (C)** **25 (CB)**
	-	*-*		*-*	*24*	*1*		
Myanmar	**1,304**	**-**	**-**		**6**	**5**	**52**	**1,367 (C)** **146 (CB)**
	-	*-*	*-*		*145*	*-*		
Thailand	**112**	**-**	**117**	**2,742**		**1,679**	**1,119**	**5,769 (C)** **2,120 (CB)**
	509	*1*	*406*	*39*		*355*		
Vietnam	**3,821**	**14**	**532**	**-**	**26**		**777**	**5,170 (C)** **15,295 (CB)**
	3,203	*-*	*10,516*	*-*	*295*			
Rest of the world	***13,646***	***4,342***	***1,492***	***75,603***	***584***	***32,473***		
World	***17,358 (C)*** *147,269 (CB)*	***4,356 (CB)*** *1 (C)*	***2,949 (C)*** *12,285 CB*	***84,677 (CB)*** *14,828 (C)*	***121,853 (CB)*** *43,064 (C)*	***759,073 (CB)*** *17,886 (C)*		

Trade of tropical plywood (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**3**	**1**	**39**	**49**	**5,155**	**89,019**	**102,433 (CB)** **45,217 (C)**
		-	*3,758*	-	*474*	*9,182*		
Cambodia	**194**		**-**	**-**	**6,420**	**2,587**	**1,128**	**12,564 (CB)** **26,164 (C)**
	8,218		-	-	*157*	*3,061*		
Laos	**-**	**-**		**-**	**531**	**4,615**	**1**	**1,940 (CB)** **5,148 (C)**
	174	-		-	*744*	*1,021*		
Myanmar	**15,528**	**-**	**-**		**531**	**1,688**	**2,991**	**3,486 (CB)** **19,672 C**
	264	-	-		*159*	*72*		
Thailand	**21,582**	**32**	**19**	**1,744**		**10,656**	**71,525**	**96,425 (CB)** **148,190 (C)**
	11,802	*13*	*976*	*1,268*		*10,841*		
Vietnam	**2,296**	**1,012**	**-**	**-**	**76**		**18,939**	**47,888 (CB)** **8,049 (C)**
	26,333	*1,984*	*458*	*154*	*20*			
Rest of the world	***693,207***	***118,412***	***4,425***	***1,249***	***82,398***	***1,093,583***		
World	***739,998 (C)*** *1,133,091 (CB)*	***119,456 (CB)*** *151,655 (C)*	***4,445 (CB)*** *5,199 (C)*	***2,671 (C)*** *2,739 (CB)*	***90,005 (CB)*** *26,283 (C)*	***1,118,284 (CB)*** *243,715 (C)*		

Trade of hardboard (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**-**	**-**	**<1**	**383**	**<1**		**34,202**
		-	-	-	*921*	-		
Cambodia	**-**		**-**	**-**	**-**	**-**		**580**
	81		*3,636*	-	*473*	-		
Laos	**-**	**-**		**-**	**-**	**-**		**493**
	31	-		-	*493*	-		
Myanmar	**4,786**	**-**	**-**		**216**	**<1**		**5,076**
	1,481	-	-		*232*	*23*		
Thailand	**3,421**	**-**	**-**	**-**		**-**		**13,696**
	2,376	-	-	-		*8*		
Vietnam	**6,654**	**-**	**-**	**-**	**3,543**			**34,848**
	4,467	-	-	-	*2,505*			
World	*208,666*	*67*	*3,636*	*1*	*62,004*	*6,783*		

Trade of MDF/HDF (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**-**	**-**	**-**	**15,287**	**9,145**		**228,221**
		-	-	-	*7,494*	*3,959*		
Cambodia	**5,439**		**-**	**-**	**14,068**	**97**		**23,966**
	5,674		-	-	*19,695*	*4,051*		
Laos	**313**	**-**		**-**	**22**	**-**		**382**
	-	-		-	*1,319*	*48*		
Myanmar	**30,771**	**-**	**-**		**4,195**	**17**		**36,598**
	14,553	-	-		*4,821*	*187*		
Thailand	**4,912**	**-**	**-**	**-**		**129**		**25,000**
	12,041	-	-	-		*163*		
Vietnam	**55,101**	**-**	**-**	**-**	**177,490**			**350,550**
	63,448	-	-	-	*196,771*			
World	*990,604*	*25*	*26*	-	*2,522,000*	*81,951*		

Trade of particleboard (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*		*World*
China		**-**	**1**	**-**	**240,875**	**16,211**		**934,515**
		-	*715*	-	*161,994*	*7,748*		
Cambodia	**15,957**		**-**	**-**	**971**	**298**		**4,388**
	3,958		-	-	*4,108*	*242*		
Laos	**2,876**	**-**		**-**	**137**	**424**		**3,466**
	103	-		-	*871*	-		
Myanmar	**1,936**	**-**	**-**		**9,734**	**-**		**13,379**
	2,745	-	-		*5,726*	-		
Thailand	**4,150**	**-**	**809**	**46**		**-**		**13,749**
	2,865	-	*1,514*	-		*12*		
Vietnam	**31,379**	**-**	**-**	**-**	**75,637**			**147,165**
	14,060	-	*93*	-	*112,497*			
World	*256,880*	*14*	*3,987*	*47*	*2,520,000*	*38,547*		

Trade of OSB (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*		*World*
China		**-**	**-**	**-**	**1,517**	**<1**		**274,860**
		-	-	-	-	-		
Cambodia	**245**		**-**	**-**	**115**	**8,194**		**54**
	597		-	-	*54*	-		
Laos	**93**	**-**			**21**	**41**		**156**
	-	-		-	*37*	-		
Myanmar	**69**	**-**	**-**		**23**	**-**		**93**
	4,028	-	-		*24*	-		
Thailand	**3,547**	**-**	**205**	**-**		**-**		**17,089**
	4,303	-	*7*	-		-		
Vietnam	**12,804**	**-**	**-**	**-**	**-**			**128,374**
	13,009	-	-	-	-			
World	*97,007*	-	*7*	-	*190*	*169*		

Trade of other fibreboard (m^3)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*		*World*
China		**-**	**-**	**-**	**69**	**13**		**46,815**
		-	-	-	*1,898*	-		
Cambodia	**855**		**-**	**-**	**-**	**55**		**3**
	173		-	-	*3*	-		
Laos	**8**	**-**		**-**	**-**	**-**		**60**
	-	-			*36*			
Myanmar	**1,433**	**-**	**-**		**19**	**92**		**1,759**
	-	-	-		*6,911*			
Thailand	**659**	**-**	**-**	**-**		**-**		**5,314**
	177	-	-	-		-		
Vietnam	**22,801**	**-**	**-**	**-**	**2,300**			**39,472**
	64	*64*	-	-	*42,908*			
World	*27,592*	*141*	-	*34*	*297,473*	*523*		

Trade of wooden furniture (USD '000)

Exporter Importer	*China*	*Cambodia*	*Laos*	*Myanmar*	*Thailand*	*Viet Nam*	*Rest of the world*	*World*
China		**112**	**15,267**	**754**	**33,744**	**133,964**	**880,637**	**1,064,478 (C)** **1,029,474 (CB)**
		-	*63,044*	*49*	*31,872*	*106,675*		
Cambodia	**6,262**		**-**	**11**	**2,877**	**9,104**	**6,844**	**36,002 (CB)** **22,691 (C)**
	20,035		*<1*	*7*	*6,927*	*2,188*		
Laos	**2,020**	**-**		**-**	**1,492**	**456**	**1,305**	**7,602 (CB)** **4,042 (C)**
	2,110	-		-	*4,036*	*151*		
Myanmar	**12,077**	**<1**	**-**		**1,427**	**676**	**3,251**	**36,458 (CB)** **16,097 (C)**
	29,280	-	-		*3,131*	*796*		
Thailand	**85,359**	**4**	**54**	**54**		**5,710**	**58,213**	**176,308 (CB)** **144,235 (C)**
	113,746	*<1*	*235*	*110*		*4,003*		
Vietnam	**45,662**	**101**	**145**	**22**	**1,379**		**44,689**	**157,421 (CB)** **82,817 (C)**
	104,178	*14*	*7,681*	*4*	*855*			
Rest of the world	***19,650,351***	***117,523***	***132***	***6,393***	***433,338***	***8,660,860***		
World	***19,919,700 (C)*** *18,014,920 (CB)*	***117,740 (CB)*** *20,3825 (C)*	***71,092 (C)*** *15,617 (CB)*	***7,185 (CB)*** *1,029 C*	***474,257 (CB)*** *403,920 (C)*	***8,810,770 (CB)*** *6,019,372 (C)*		

Source: COMTRADE

Figures in **bold** denote imports reported by importing country. Figures in *italics* denote exports reported by exporting country.

"C": Comtrade. Refers to world data reported by the importer/exporter reporting country in Comtrade.

"CB": Comtrade Backwards. Refers to the sum of trading partners' imports/exports from/to an individual country, as reported in Comtrade.

"CBI": volume estimated by ITTO from Comtrade Backwards. Refers to the sum of trading partners' imports/exports from/to an individual country, as reported in Comtrade.

"I": volume estimated by ITTO.

"MIS1": ITTO Tropical Timber Market Report 1-15 Feb. 2021.

"MIS2": ITTO Tropical Timber Market Report 1-15 Apr. 2021.