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The *ITTO-BMLEH Teak Newsletter* support and facilitates teak and other tropical species networking and information dissemination in the Asia Pacific and West Africa through ITTO member countries and partners, and support sharing lessons of the project through short news release, occasional papers, project related research and development information. The bi-monthly newsletter is released online through TEAKNET webpage www.teaknet.org and co-hosted by Kasetsart University, Thailand.

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Training Workshop Report

From Tree to Timber: Practical AI and Efficient Teak Round Wood Management

22–25 March 2026, PT Grand Hotel, Kanchanaburi Province, Thailand



Group photo of training participants and resource persons

Introduction

Teak (*Tectona grandis*) remains one of the world's most valuable hardwood species, widely used in construction, furniture, and high-value timber products. The Greater Mekong region accounts for a significant share of natural teak resources, about 30 million ha; however, natural teak forests have been steadily declining due to overexploitation, agricultural expansion, and unsustainable management practices.

At the same time, plantation-based teak production—often managed by smallholders and communities—faces challenges such as poor measurement, inefficient harvesting practices, and value losses across the supply chain.

To address these challenges, the International Tropical Timber Organization (ITTO), in collaboration with regional and

international partners, organized a Training Workshop titled **“From Tree to Timber: Practical AI and Efficient Teak Round Wood Management”**. Held from 22–25 March 2026 for 3 days in Kanchanaburi Province, Thailand, the workshop aimed to strengthen technical capacity by integrating artificial intelligence (AI) tools with improved forestry operations. Prof. Yongyut Trisurat, Regional Project Manager and his team from Kasetsart University, Bangkok coordinated the training programme. Dr. Ani Elias, Institute of Forest Genetics and Tree Breeding (IFGTB), Coimbatore, India handled the **“Artificial Intelligence in Forestry and accurate measurement of timber volume estimation using AI tools”**. Assoc. Prof. Nopparat Kaakkurivaara, Kasetsart Univeristy’s Faculty of Forestry offered training on **“Efficient teakwood transportation and processing”**. Apart from the class room lecture, field oriented practical lessons were also imparted to the participants.

Objectives and Scope

The workshop was conducted under the ITTO Teak Project, which focuses on promoting quality timber production in smallholder and community-based plantations across tropical regions. The primary objectives were:

- To introduce participants to conventional and AI-assisted methods for tree and log measurement.
- To enhance knowledge of efficient timber harvesting, transportation, and storage practices.

To provide hands-on field experiences, enabling participants to apply improved measurement techniques, harvesting and transportation practices in real-world operational settings.

Participants included forestry officials, plantation managers, and technical staff from government agencies and forestry organizations, reflecting a balanced representation of policy and operational stakeholders.

Application of AI in Tree Measurement

Dr. Ani Elias
Institute of Forest Genetics and Tree Breeding (IFGTB),
Coimbatore, India



Dr. Ani Elias, IFGTB, Coimbatore

The presentation by Dr. Ani Elias in the workshop highlighted the growing importance of artificial intelligence (AI) in forestry practices, particularly in tree measurement and timber volume estimation. Traditional methods, such as manual diameter measurement at breast height (DBH), are labour-intensive, time-consuming, and prone to human error. In contrast, AI-based systems-powered by machine learning and computer vision-offer faster, more accurate, and scalable solutions.

The training introduced key AI concepts, including machine learning (ML), deep learning (DL), and object detection technologies such as the YOLO (You Only Look Once) model. These tools enable automated identification and measurement of trees from images, providing real-time data processing and improved decision-making capabilities.



A view of audience

CONVENTIONAL VS. AI METHOD: TIMBER VOLUME MEASUREMENT

CONVENTIONAL METHOD

MANUAL FIELD WORK & ALLOMETRIC EQUATIONS

COMMON MEASUREMENT ERRORS & THEIR IMPACTS

- TAPE SAG & TWIST**: Illustration of a sagging tape measure.
- INCORRECT DBH HEIGHT**: Illustration of a person measuring a tree trunk at an angle on a slope. Text: "tape at wrong spot on slope".
- IRREGULAR TRUNKS**: Illustration of a tree trunk with a buttressed base. Text: "Buttressed base confusing the tape".
- PARALLAX EFFECT**: Illustration of an eye viewing a tree trunk from an angle.

IMPACTS: Skewed Valuation, Poor Logistics, Inaccurate sustainable yield calculations

AI METHOD

POINT-AND-SCAN DEEP LEARNING (EDGE AI)

AI-DRIVEN RESOURCE OPTIMIZATION

- TIME OPTIMIZATION**: Instant Capture vs. Minutes Per Tree
- LABOR COST**: 1 Person Crew vs. 2+
- MAXIMIZING LAND USE & YIELD**: 100% Census Mapping, Identifying underperforming Micro-Zones for targeted intervention

OUTCOMES: Standardized Verified Data, Enhanced ROI, Efficient Global Logistics

Conventional vs. AI- assisted Timber Measurements

1. Phase 1 & 2: Collection and Annotation

Data Collection

Data Annotation

Ground Truth

2. Phase 3: The YOLO Text Format

image_001.txt

object class	x _{center}	y _{center}	width	height
0	0.45	0.60	0.15	0.80

Class 0 (Log) Normalized X-Center Normalized Y-Center Width Normalized Height

3. Phase 4: Dataset Splitting

- Training Set (70% - 80%)**: Model Learns Patterns
- Validation Set (10% - 20%)**: Tune Hyperparameters (e.g., Learning Rate), Prevents Overfitting
- Testing Set (10%)**: Final Real-World Performance Check

4. Phase 5: The Training Loop

Forward Pass: Training Image → YOLO → Predicted

Loss Calculation: Predictions - Ground Truth → Loc Loss: 0.12, Conf Loss: 0.05

Backpropagation: Weights weights → $\frac{dL}{dw} \rightarrow \frac{d^2L}{dw^2}$

Epochs, Early Stopping

Developing an effective AI model

A comparative analysis demonstrated the significant advantages of AI-based methods:

- * **Productivity:** Measurement time reduced from approximately 16 minutes per plot to about 2 minutes, enabling up to eight times higher productivity.
- * **Labor efficiency:** Reduced workforce requirements from two operators to one.
- * **Cost savings:** Operational costs decreased dramatically due to reduced labour and time inputs.
- * **Accuracy and consistency:** Automated detection minimizes measurement errors and improves data reliability.

Practical Applications and Challenges in Forestry:

Despite these benefits mentioned, the training also highlighted challenges such as the need for high-quality datasets, infrastructure requirements (e.g., CPUs, software frameworks), and adaptability to local forestry conditions. The distinction between custom-built AI models and commercial applications was emphasized, with each offering trade-offs in terms of cost, flexibility, and data privacy.

Operational and Strategic Advantages: Dr. Ani emphasized that mobile deployment, particularly via smartphones with AI and augmented reality, represents a practical and accessible solution for field applications such as tree measurement. Overall, the lecture suggests that while AI offers significant potential for improving forestry operations, careful consideration must be given to model selection, data management, cost, and long-term sustainability of implementation strategies. Furthermore, AI systems can operate offline in the field, making them suitable for remote forest environments without connectivity.



Lecture by Dr. Ani Elias

Improving the efficiency of timber harvesting operations

Dr. Nopparat Kaakkurivaara
Faculty of Forestry, Kasetsart University, Bangkok



Dr. Nopparat Kaakkurivaara, Kasetsart University

The presentation by Assoc. Prof. Nopparat, Consultant #4 to the ITTO-BMLEH Teak project, highlights the importance of understanding the entire timber value chain, which includes tree measurement, harvesting, transport, storage, processing, and marketing.

Beyond measurement, the workshop addressed efficiency across the entire timber value chain—from standing trees to processed wood products. Accurate measurement was identified as the foundation for all subsequent operations, including harvesting planning, pricing, and logistics.



Lecture by Dr. Nopparat

How can we improve operations?

ล้มไม้

(รวมใช้ทั้ง ดัดแปลง)

ชักลาก

ขนส่ง

หมายวัด

ตัดทอน

รวมกอง



Timber harvesting process

Participants examined the key determinants of timber value, such as log diameter, length, straightness, and defects. Even minor measurement errors can result in significant financial losses, affecting inventory accuracy and market outcomes. Since it is often impractical to measure every tree or operation, representative samples are selected to estimate overall performance. The relationship between population, sample, and inference is emphasized, showing how collected data can be used to draw conclusions about larger operational systems. Proper sampling design ensures reliable data for productivity analysis and decision-making.

Two primary sources of value loss were identified:

1. **Biophysical factors:** Poor tree genetics, defects, and damage caused by pests or diseases.
2. **Operational factors:** Inefficient harvesting techniques, improper handling, and poor logistics management.

The workshop emphasized that while natural factors are difficult to control, operational inefficiencies can be significantly reduced through improved training, planning, and technology adoption.

Work Study, Productivity, and Bottleneck Analysis

A systematic approach to improving harvesting operations was introduced through work study and productivity measurement. Productivity was defined as the ratio of output (timber volume) to input (time or labour), and participants were trained to analyze workflows across different harvesting stages.

A key concept was **bottleneck identification**—recognizing the slowest stage in the workflow that limits overall system performance. Even if other operations are efficient, a single bottleneck can reduce total productivity. Participants engaged in group exercises to analyze real-world cases, identify bottlenecks, and propose solutions such as resource reallocation, improved machinery, or workflow adjustments.

This approach highlighted the importance of continuous monitoring and adaptive management to maintain efficiency and reduce operational costs.



Group work and presentation



Intervention from the Audience



Marking the teak trees for AI assisted log volume estimation

Field Training and Practical Applications

The workshop included hands-on field sessions at the Wang Krachae Teak Plantation, managed by the Forest Industry Organization (FIO).

Participants conducted practical exercises in plot establishment, tree marking, and manual DBH measurement, while also collecting image data for AI model training.



Hands-on training activities for conducting manual tree measurements

These field activities provided valuable insights into real plantation conditions, including terrain challenges, operational practices, and market-driven requirements such as preferred log lengths. Participants also observed timber harvesting processes and discussed variations in practices across regions.



Field demonstration to participants by Dr. Nopparat

In addition, participants tested commercially available digital tools for forestry applications. These included mobile-based solutions for measuring log volumes and conducting forest inventories. While these tools demonstrated potential for improving efficiency, limitations such as dependence on internet connectivity and lack of adaptation to tropical conditions were noted.

Training Outcomes and Participant Feedback

The training was well received, with high levels of satisfaction reported across both technical content and logistical arrangements. Participants particularly appreciated the practical relevance of AI applications and harvesting efficiency techniques.

Key outcomes included:

- Enhanced understanding of AI-assisted tree measurement and its practical benefits.
- Improved knowledge of timber harvesting operations and value chain optimization.
- Strengthened capacity to identify and address operational inefficiencies.

- Increased awareness of emerging digital tools and their applications in forestry.

Participants also provided constructive feedback, suggesting increased emphasis on field data collection, practical data analysis, and broader knowledge exchange across regions. Prof. Yongyut Trisurat, Projects Manager awarded the Training Certificates to the participants.



Training certificate distribution by Prof. Yongyut Trisurat

Conclusion

The “From Tree to Timber” training workshop demonstrated the transformative potential of integrating artificial intelligence with improved forestry practices. By combining advanced measurement technologies with efficient harvesting and management strategies, the program addressed critical challenges in teak production systems.

The adoption of AI-based tools can significantly enhance productivity, reduce costs, and improve data accuracy, while better operational practices can minimize value losses across the timber value chain. Together, these innovations contribute to more sustainable, efficient, and economically viable forestry systems.

As teak resources continue to face pressure, such capacity-building initiatives play a vital role in supporting smallholders, strengthening institutional collaboration, and advancing sustainable forest management in tropical regions.



The workshop training team with Prof. Yongyut Trisurat



Group photo of participants and instructors at FIO timber log yard

Report by
Dr. Nopparat Kaakkurivaara and Prof. Yongyut Trisurat
ITTO-BMLEH Teak project

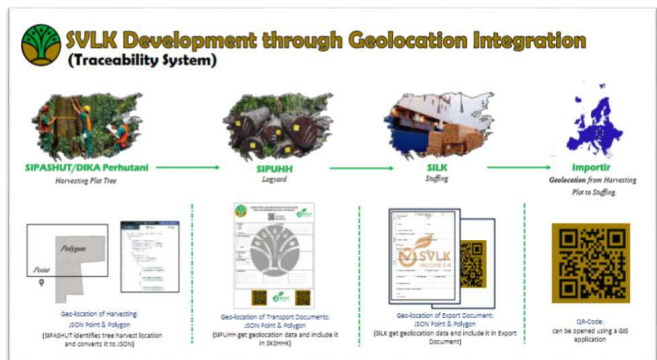
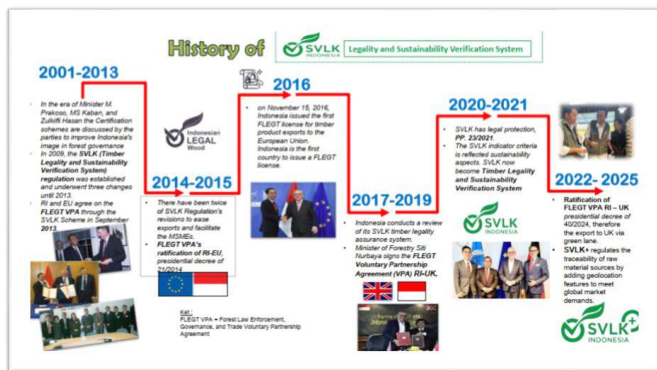


**7th Webinar: Legality of Timber Supply Chains:
Experiences and Practices in the Tropics**
20 February 2026 @ 2:00 – 3:30 PM

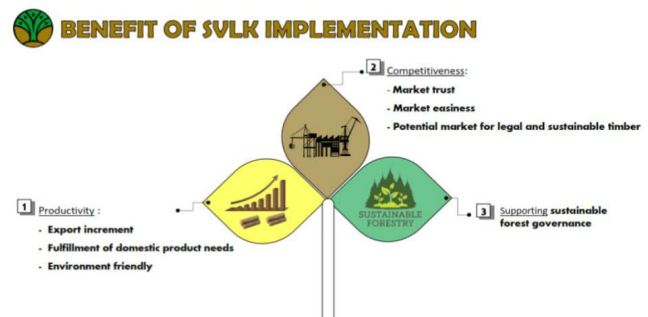
The seventh webinar on the topic “Legality of Timber Supply Chains: Experiences and Practices in the Tropics” was held on Friday, 20 February 2026 as part of the ongoing second phase of the ITTO-BMLEH teak project, “Promoting Quality Timber Production in Small-holders and Community-based Teak and Other Valuable Species Plantations in the Tropics (PP-A /54-331A)”. This webinar explored timber supply chain legality, bringing together forestry practitioners, academics, and private sector representatives to examine how lessons from Indonesia and Viet Nam could form knowledge transfer and sharing with other tropical countries. Dr Rina Kristanti of the Republic of Indonesia’s Ministry of Forestry and Dr. Ngo Sy Hoai of the Viet Nam Timber and Forest Product Association (VIFOREST), shared insightful case studies from their respective countries, illustrating how implementing timber legality frameworks can positively strengthen domestic wood industries market while improving SFM. The webinar was moderated by Prof. Yongyut Trisurat, Faculty of Forestry, Kasetsart University, Bangkok. Dr. Jennifer Conje, Director of Forest Management Division of ITTO offered the opening remarks.



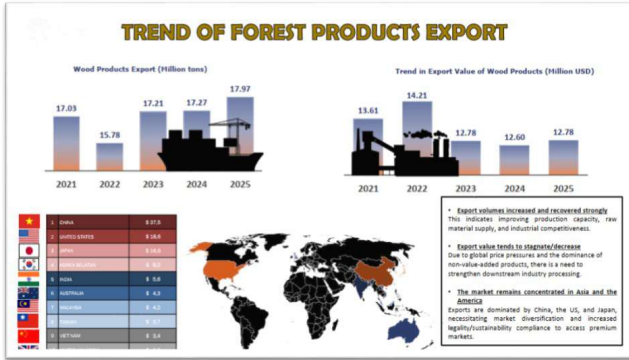
Indonesia: The first speaker, Dr Rina Kristanti outlined Indonesia’s experience implementing its domestic timber legality and verification system (Sistem Informasi Legalitas Kayu-SVLK). Out of the 125. 7 million hectares of total forest area, half of it is designated as production forests. Established in 2001, the SVLK verifies the compliance of SFM, timber legality and forest product declarations across the country’s wood industry sectors. SVLK regulates the raw material sources by adding the geolocation features to meet the global market demands and transparency of its records of origin.



Traceability is central to the system’s effectiveness, said Dr. Rina. The integration of the above three systems allows timber to be tracked from forest to market, strengthening accountability across the whole supply chain.



Indonesia's wood sector has seen improvements in productivity alongside growth in exports, particularly to key markets in China, the United States and Japan because these efforts have produced measurable results as shown in the below slide.



The global acceptance of SVLK by major trading partners like the European Union, United Kingdom, and Australia, has helped boost the market confidence and support export recovery following the Covid-19 pandemic.

Global Market Acceptance

FLEGT VPA in Indonesia

Posting of Information on Study Results on SVLK on MFPP Japan Page

SVLK Under Siege: Indonesia's Timber Credibility and Economy at Stake

Country Specific Guideline for Indonesia

SVLK INDONESIA

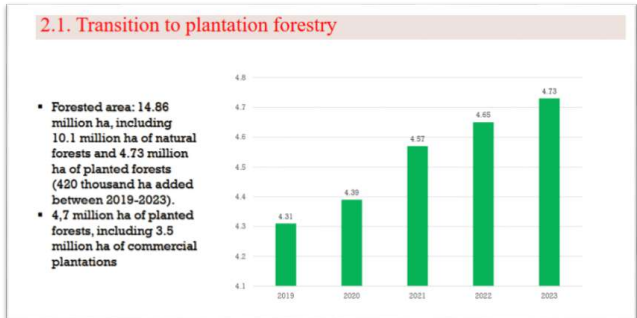
Support to SMEs, industry associations, and provincial governments to implement SFM, legality practices, and compliance frameworks, while strengthening opportunities for smallholders, community forests, and industry growth.

Viet Nam: The legality process in Viet Nam was presented by Dr. Ngo Sy Hoai of Viet Nam Timber and Forest Product Association (VIFOREST).

Ever since logging ban in natural forests was implemented in Viet Nam in 2003, the country shifted its priority towards plantation forestry, and today the country has 14.8 million hectares of forest area and 42% forest cover, and is one of the world's leading exporters of wood and wood products.

Ensuring timber legality for sustainable forest development in Vietnam

Ngo Sy Hoai
Vice President & Secretary General
VIFOREST



2.8. Journey of Vietnam forestry/wood industry development

- 1975-1985:** Severe deforestation, forest coverage dropped from 43% down to 23% due to shifting cultivation, fire-wood for cooking, forest conversion and illegal logging.
- 1985-1995:** Woodchip factories build creating market driver for planted wood; Land reform, forest land owned by SFEs transferred to farmers; Seed improvement, acacia took over eucalyptus.
- 1995-2005:** Radical transform to plantation forestry; restricting log/sawn timber and semi-finished product exports, shift to high-end product outdoor-indoor furniture exports.
- 2005 - now:** Robust growth of W&P exports, topping WP exports with 4 WFP groups (woodchip, wood-based panel, wood pellet, furniture), W - important currency earner (US\$ 500 million (2005)- 16.2 billion (2024); shift from OEM to ODM/OBM).

The Viet Nam Timber Legality Assurance System (VNTLAS) ensures that domestically harvested timber and imported wood are legally harvested and compliant with destination market requirements. The system emphasizes transparency through risk assessment, verification and accountability across the supply chain.

3. Legal Framework for Timber Legality in Vietnam

VN comprehensive legal framework to ensure timber legality:

3.1 National Legislation

- Law on Forestry (2017)
- Decrees on timber legality assurance
- Regulations on forest origin tracing and customs control

3.2 International Commitments

Vietnam is actively engaged in global timber governance frameworks:

- ✓ VPA/FLEGT: a significant milestone in strengthening Vietnam's Timber Legality Assurance System (VNTLAS).
- ✓ CITES - Compliance with endangered species regulations
- ✓ EUDR readiness getting

Viet Nam has further strengthened its framework through its Voluntary Partnership Agreement under the EU's Forest Law Enforcement, Governance and Trade (FLEGT) initiative, compliance with CITES regulations and ongoing efforts to meet the requirements of the EU Deforestation Regulation.

Legality assurance has become both a market requirement and a central component of Viet Nam's national commitment to sustainable forest management and development. Viet Nam ensures that timber entering as imported wood are free of deforestation and legally harvested. The legal reforms, verification systems and strong industry participation supported by government policies and incentives drive the growth of the industry. There are about 340 wood industry villages in Viet Nam.

7. Timber Legality & Sustainable Forest Development

7.1 Environmental Sustainability

- Reduced illegal logging
- Protection of biodiversity
- Better forest governance

7.2 Economic Sustainability

- Market access stability
- Increased investor confidence
- Higher value-added production

7.3 Social Sustainability

- Improved rural livelihoods
- Clear land tenure systems
- Responsible supply chain practices

Legality is the foundation upon which sustainability is built. For Vietnam, Legality Assurance has become the "To be or not to be question."

8. Strategic Directions for the Future

To strengthen timber legality and sustainable forest development, Vietnam is focusing on:

- Enhancing digital traceability systems
- Supporting SMEs in compliance adaptation
- Promoting plantation timber quality upgrading
- Strengthening risk-based import control
- Deepening international cooperation
- Aligning legality with climate commitments (REDD+, carbon markets)

Public-private partnership will be critical in this next phase.

Dr. Hoai highlighted the importance of pursuing forest management reforms alongside broader industry development. Land tenure reforms, which allocated forest land to farmers' built trust among producers, while government-supported industrial zones and trade agreements created new investment and growth destined for export. These policies

have encouraged strong engagement from the private sector, which has come to view legality not as a constraint but as an important component to improved competitiveness and market access. Dr. Hoai emphasized that timber legality remains a dynamic process requiring continuous improvement. Strengthening digital traceability systems, supporting SMEs in meeting compliance requirements and upgrading plantation timber quality remain key priorities.

In conclusion, Dr. Hoi said:

“Timber legality is not simply about meeting international trade requirements but building trust in global markets, protecting forest resources for future generations and elevating Viet Nam's position as a responsible timber processing hub.”

9. Conclusion

Ensuring timber legality is not simply about meeting international trade requirements.

It is about:

- Building trust in global markets
- Protecting forest resources for future generations
- Elevating Vietnam's position as a responsible timber processing hub

Vietnam remains committed to strengthening timber legality as a cornerstone of sustainable forest development & see timber legality from both challenge & opportunity perspectives.

The experiences of Indonesia and Viet Nam highlight how strong legality frameworks can support both sustainable forest management and economic growth. As global demand for timber products sourced from transparent and responsible supply chains continues to grow, such reforms will play an increasingly important role in shaping the future of the tropical timber sector.

Watch the full webinar video in the [project website](#) and download the presentations

Report by

PK Thulasidas, Yongyut Trisurat and Tetra Yanuariadi

ITTO-BMLEH Teak project team

Teak Value Chains across India, Indonesia, Thailand, Vietnam and Togo: A Preliminary Review

C Nalin Kumar¹, Rekha R Warriar¹ and Yasodha Ramasamy²

Abstract

Based on a review of studies and selected field visits (India-based), this article examines smallholder teak value chain in the context of India, Indonesia, Thailand, Vietnam, and Togo. By adopting an integrated value chain approach, we look into smallholder diversities, policy backfiring and market dynamics. Pilot field visits and preliminary reviews indicate that some regulatory and seemingly enabling and conservation-oriented policies result in counterproductive outcomes. The discussions so carried out highlight, to begin with, the definitional ambiguity of 'smallholder' and further, in the way it is considered in policy conception and implementation. Nevertheless, successful inclusive models offer lessons, emphasizing adaptive policy packages that accommodate diverse requirements.

The teak value chains in these five countries preliminarily demonstrate the limits of top-down forestry governance over Trees Outside Forests (ToF). While industry giants in destinations drive the demand for high-quality, certified teak, the smallholders in the producing countries are not a uniform group. The smallholders, in particular, their diverse needs such as liquidity or security means that policy interventions must be as flexible as the trust-based partnerships they often operate within. To enable upgrading the value chain and to ensure sustainability of the teak sector, state and regulating entities may enable transition from 'gatekeepers' to 'facilitators', removing policy backfires and the transaction costs that penalize the very smallholders that requires facilitation.

Beyond Log: Why growing the finest teak is not enough

Growing a straight, large diameter teakwood is a great accomplishment through the intervention of silviculture and management. The smallholder nurtures teak trees for nearly

20 plus years, straight, defect-free trunk with perfect grain, but when harvested they fetch an amount barely covering the costs spent all these years. At the same time, the exporters and furniture manufacturers exploit them and pocket many multiples of it. This is the value chain at work, the journey from farm to the end user. In Togo, a smallholder gets a significantly lower price for a shorter rotation teak compared to a longer rotation industrial plantation teak. In Vietnam, a smallholder sells a certified teakwood at a premium price compared to a non-certified one. The underlying incentives matter – at the centre of all these is the smallholder who is caught in a paradox at the centre of the global teakwood industry. Across these countries, excellence in production is only half the battle, and we need to look beyond the mapping and value additions to a map of power, relationship and risks.

The Value Chain Framework

The existing literature on the teakwood across these countries offer a diverse set of insights and a varied set of incentives and challenges to smallholders. To investigate the underlying dynamics through the lens of three major value chain-oriented works, we turn towards:

1. **Upgrading:** Kaplinsky and Morris (2001) help to explain why values differ the moment it leaves the farm. We need to locate where the rent (economic profit) is hidden – is it in a brand, processing technology or the certification?
2. **Governance:** Gereffi's (2005) framework typically asks who is the lead actor? High-end furniture manufacturer or the local middlemen? Who controls the value?
3. **Social roots:** Collin's (2005) asks why some farmers are stuck at the lower rungs of the ladder? Is there a cultural, social and historical context specific to this geographic region or the 'social embeddedness'?

¹Consultant #6- Value chain, ITTO - BMLEH Teak Project, India component

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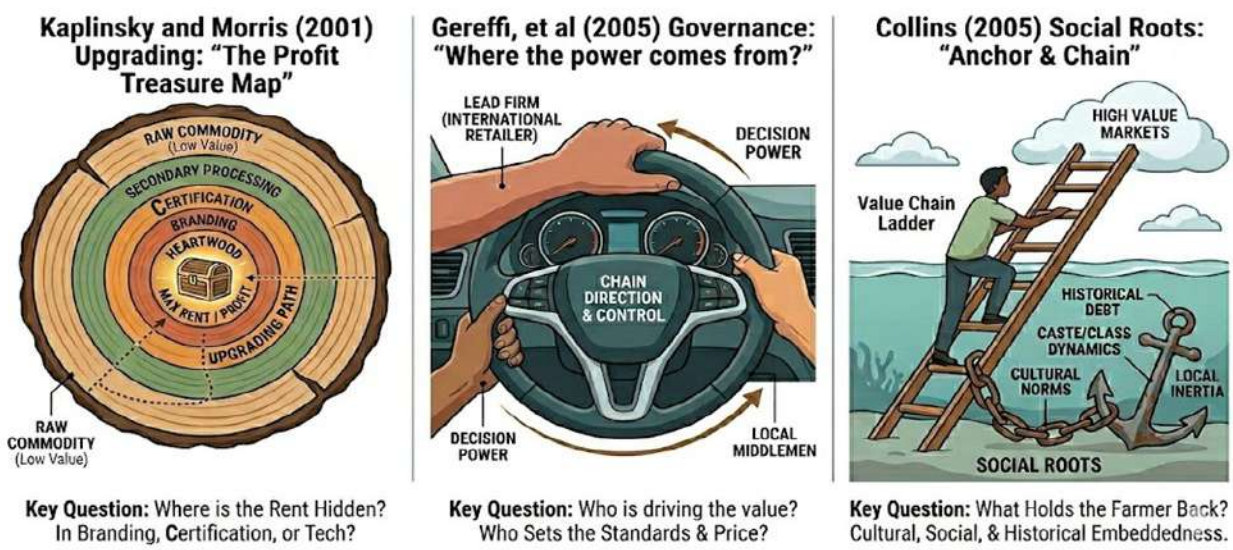


Figure 1: Value Chain – An integrated three framework diagnostic toolkit

The research task of following a commodity/product along its value chain through this integrated framework explains how the connections and disconnections across geography create a world of contrasts and comparisons. It also fine-tunes the way we think about opening up or liberalising a sector in order to emphasize the 'Here and Now' specifics of decisions, strategies and actions of actors (smallholders, businesses, governments or non-governmental organizations). As we visualize teak through this perspective, attention is given to the concepts of governance and upgrading, the two flagship notions associated with global value chain research approach. Investigating the teak economy and trade across

five countries - India, Indonesia, Thailand, Vietnam and Togo -through the lens of this combined framework, we understand why smallholders are particularly at the receiving end.

Teak Economy and Policy Snapshot across Five Countries

This section presents the snapshot of five countries in focus: India, Indonesia, Thailand, Vietnam and Togo, attempting to connect their positioning in the world teak chains and the specific policy-institutional network and system. Figure 2 provides an overview of these countries in terms of their role and connections and the specific challenge to smallholders.

<p>INDIA</p> <p>Primary Incentive: Demand supply gap</p> <p>Key Entry Challenges: TOF - Legal & Regulatory hurdles, felling and transit legacy issues</p> <p>Policy Barrier: Imports easier than domestic sourcing</p> <p>[Policy Backfires]</p>	<p>INDONESIA</p> <p>Primary Incentive: Living savings account/ Family exigency fund</p> <p>Key Entry Challenge: Certification costs</p> <p>Policy Barrier: Industrial/Large plantation rules for smallholders</p> <p>[Cost Barrier]</p>	<p>THAILAND</p> <p>Primary Incentive: Economic forests post-2019</p> <p>Key Entry Challenge: Historical protected status</p> <p>Policy Barrier: Informal taxes on transport</p> <p>[Legacy Issues]</p>	<p>VIETNAM</p> <p>Primary Incentive: Processing hub</p> <p>Key Entry Challenge: Land tenure and capital</p> <p>Policy Barrier: Focus on short-rotation acacia</p> <p>[Tenure Limits]</p>	<p>TOGO</p> <p>Primary Incentive: Rural finance</p> <p>Key Entry Challenge: State pricing</p> <p>Policy Barrier: Below-market pricing</p> <p>[Price Distortion]</p>
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Figure 2: Comparative smallholder entry and policy challenges

Adopting this integrated approach ensures the analysis moves beyond surface-level diagnostics to reveal how institutional factors, buyer standards, and policy rents influence participations and value addition. It is also possible that a country exhibits multiple chains (producer driven or buyer driven) but identifying them and the magnitude of prevalence would be the key for a more robust and evidence-based study.

As evident from these country profiles, the value chain set up and organizations are different across locations. Though moving up in the value chain is generally considered as the imperative, the commodity in question and the nature of it being influenced by agroclimatic factors and labour conditions, may present practical challenges and economic limitations. By processing raw materials into finished products, countries tend to capture a larger share of the final product's value. However, there are financial, logistic, transport and infrastructure constraints and supply chain realities where not all countries can move simultaneously. Further, economic theory would suggest countries benefit the most by focussing on what they do best. In this sense, burden of regulatory compliances and transaction costs (including the 'perceived' costs) could be addressed. Small-holders vary in terms of land ownership, labour availability, planting motivations and capital adequacy.

Given these diversities both across as well as within countries there cannot be a uniform policy approach. At the same time, many well intended policies of the past had counterproductive outcomes, mostly referred to as perverse incentives.

India's Teak Sector and Preliminary Aspects of Value Chain

The limited pilot visits in India helped unpack some of the paradoxes such as lower farmgate prices despite high demand, import preferences and regulatory dynamics influencing the teak value chain. Sawmill owners in Bengaluru, India report that most of the sourcing is through imports and there is a perceived bias against sourcing from domestic private smallholder plots. Though there is an enhanced demand for teakwood value-added products, the region witnessed closures of many units over recent years. Karnataka State Forest Industries Corporation (KSFIC) runs an enterprise, KSFIC furniture with several customizable options in furniture in teakwood and other valuable species and has branches across the state. Table 1 provides a price list of teakwood available at an outlet that customised furniture production, doors and windows

Table 1: Price List of Teakwood (As reported by vendors during field visit in May 2025)

No.	Wood Specification	Price per CFT in Indian Rupees (INR) / (US\$)
1	OTHER TEAK	
a)	Sizes 4"x3", 5"x3", 6"x3", 6"x4", 5"x4"	4500 / (\$55)
b)	Width 2" to 10" thickness 1.5"	4800 / (\$58.5)
c)	Width 3" to 12" thickness 2", 11"x1.5", 12"x1.5", 8"x3", 9"x3", 10"x3", 8"x4", 9"x4", 10"x4"	5500 / (\$67)
d)	13"x1.5", 14"x1.5", 13"x2", 14"x2", 11"x3", 11"x4", 12"x3", 2"x4"	7000 / (\$85.3)
e)	Above length 7 feet – extra rate	500.00 / (\$6) Per CFT Extra
2	IMPORTED BURMA TEAK	
a)	Width 2" to 10" thickness 1.5" and 2", Size: 4"x3", 5"x3", 6"x3", 5"x4", 6"x4"	9000 / (\$110)
b)	11"x1.5", 12"x1.5", 11"x2", 12"x2", 8"x3", 9"x3", 10"x3", 8"x4", 9"x4", 10"x4", 12"x3"	11000 / (\$134)
c)	13"x1.5", 14"x1.5", 13"x2", 14"x2", 11"x4", 12"x4"	13000 / (\$158.5)
d)	Above length 7 feet – extra rate	1,000.00 / (\$12.2) Per CFT Extra
	GST @ 18%	All prices subject to GST

Source: Authors' field visit, as reported by vendors in Bengaluru. (Prevalent average exchange rate 1US\$=INR 82).

As evident from the table, imported Burma teak commands a significant premium over other teak in the market. Table 2

shows the prices of an end-use teakwood based door at various specifications.

Table 2: Price of Teakwood Based Doors (As reported by vendors during field visit in May 2025)

Selling Rates of Flush Door w.e.f: 05.01.2022									
<i>Made out of Hardwood Built in Lipping, Chemically Treated, Kiln Seasoned Core Mat, P F Resin Bonded, Hot Pressed & Boiling Water Proof</i>									
Particulars	Unit	25 MM		30 MM		35 MM		40 MM	
		SD	DD	SD	DD	SD	DD	SD	DD
COMMERCIAL	M2	2594	2766	2788	3003	2971	3240	3175	3520
	SFT	241	257	259	279	276	301	295	327
ONE SIDE TEAK	M2	3111	3283	3305	3520	3488	3757	3692	4037
	SFT	289	305	307	327	324	349	343	375
BOTH SIDE TEAK	M2	3627	3800	3821	4037	4004	4273	4209	4553
	SFT	337	353	355	375	372	397	391	423
OSN/OSPD	M2	3143	3315	3337	3552	3520	3789	3724	4069
	SFT	292	308	310	330	327	352	346	378
BSN/BSPD	M2	3681	3854	3875	4090	4058	4327	4263	4607
	SFT	342	358	360	380	377	402	396	428
OST/OSN	M2	3660	3832	3854	4069	4037	4306	4241	4585
	SFT	340	356	358	378	375	400	394	426
SD = Rate for Single Door DD = Rate for Double Door									
Addition Cost of Vision Opening based on Single Vision Open = ₹100									
All rates are in Indian Rupees (INR) without GST (Prevalent average exchange rate 1US\$=INR 82)									

Source: Authors' field visit, as reported by vendors in Bengaluru

There is a noticeable uptake of the tissue-cultured clonal teak due to the significantly shorter rotations and there are entities supplying saplings and lifetime advisory services to adopting farmers. The licensing and regulation system for these suppliers and their extension services and packages in a smallholder context is an area for further study. The 'conservation-first' regulatory approach in India had a back-firing effect to encourage imports. The primary goal of these regulations was to protect forest cover and control the illegal timber trade. However, the unintended consequence was the creation of a massive administrative burden for smallholders managing their scattered ToF resources. The sheer difficulty and transaction costs associated with navigating these state-level regulations – combined with instances of illegal felling

highlighted by the Supreme Court of India – created a powerful perverse incentive for smallholders to turn towards other species. Further, a regulation, intended to ensure legality, becomes a cost barrier that drives smallholders into the shadows and provide middle stream wood processors an unintended incentive to import. Kandla, Mangalore and Tuticorin ports became key hubs for imports.

The preliminary pilot visits and literature-based findings in these cases would form a basis for a primary survey – based larger value chain study (with an overarching focus on smallholders) and such a study could specifically identify the challenges in governance and upgradations, and the

preliminary tasks related to the survey across (1) smallholders, (2) sawmills and wood-processing units and (3) furniture and end- use product manufacturing firms in India, Indonesia and Thailand are in progress.



New Mangalore Port (Karnataka Timber Importers' Association, Discussion with KM Patel & Co – Mr Ankit Patel, pers. communication)



Dr. Nalin Kumar visit to New Mangalore Port in Karnataka; log yard at Mangalore port (left)

Conclusion

The teak value chains in India, Indonesia, Thailand, Vietnam, and Togo, though diverse, preliminarily indicate the limits of top-down forestry governance. While lead firms in export destinations drive the demand for high-quality certified teak furniture, the producers in these countries are not a uniform group. The smallholders, in particular, their diverse needs such as liquidity or security means that policy packages must be as flexible as the governance structures they often operate within. To enable upgrading and ensure the sustainability of the teak sector, state and regulating entities may enable transition from 'gatekeepers' to 'facilitators', removing the unintended incentives that penalize the very smallholders that requires facilitation.

ITTO-BMLEH Webinar: Roles of Smallholder Plantation in the Production Forest Landscape



ITTO-BMLEH Teak and Other Valuable Species Plantations Project

Invitation to
8th
Webinar:
Roles of Smallholder Plantation in the Production Forest Landscape

Date: Wednesday 22 April 2026
Time: 1:00 PM for Thailand, Cambodia, Lao PDR, Viet Nam and Indonesia, Myanmar: 12:30 AM, India: 1:30 AM, Japan: 3:00 PM, Ghana & Togo: 7:00 AM (GMT)



join meeting



Meeting ID:
620 285 4622
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Such@494

Opening: Ms Jennifer Conje
Director of Forest Management Division, ITTO
Moderator: Prof Yongyut Trisurat
Kasetsart University, Thailand

Presentations:

Productivity of Teak in Relation to Site Conditions and Management Regimes
Dr C. Buaneswaran, ICFRE- Institute of Forest Genetics and Tree Breeding, India

Empowering Smallholder Plantation for Sustainable Future
Dr Anto Rimbawanto, Research Centre for Applied Botany, BRIN, Indonesia

Q&A

This webinar is part of the Bimonthly Webinar Series (Jan 2025 – Oct 2026) under the ITTO-BMLEH project, "Promoting Quality Timber Production in Smallholder and Community-based Teak and Other Valuable Species Plantations in the Tropics" (PP-A/54-331A).



More Details of the Webinar

Date 📅 Wednesday, 22 April 2026 Online Webinar

Time 🕒 1:00 PM Bangkok / 7:00 Lomé / 3:00 AM São Paulo

Presentations:



Productivity of Teak in Relation to Site Conditions and Management Regimes

Dr C Buvaneswaran, Institute of Forest Genetics and Tree Breeding (ICFRE), India

Empowering Smallholder Plantation for Sustainable Future

Dr Anto Rimbawanto, Centre for Forest Biotechnology and Tree Improvement (BRIN), Indonesia

Please join us in the Zoom meeting:



Meeting ID - 620 285 4622

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ITTO –BMLEH Teak Newsletter is a bi-monthly electronic newsletter of the Project Team which is intended for circulation among the stakeholders of global teak sector. The views expressed in the newsletter are those of the authors and do not necessarily reflect the views of the organization. The readers are welcome to express their opinions or pass on information concerned with teak. However, we reserves the information on the project and publishing through this newsletter for our esteemed readers.

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