Intermediate results and outcomes

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Laos teak estate

- Lao PDR is one of the least developed countries in South-East Asia
- Total land area of 23.68 million hectares (ha), 40% is forest
- The population around 7 million, mainly rural
- Wood and wood products account for 12% of overall government revenue or about US$57 million
- Teak: about 28,000 ha of smallholder plantations mainly in one location (~10 m³/ha/year)
- Harvesting from 12 years; 15 cm DBH; 40,000 m³ in 2013
- Ambitious Forestry Strategy to 2020 with a target of a total of 500,000 hectares of plantation
Value chain for plantation teak in Lao PDR

- Teak cultivators
- Contractors
- Exporters
- Export market
- Local market
- Local salesmen
- Exporters

- Cultivation
- Felling
- Skidding
- Grading
- Transport to sawmill
- Sawing
- Drying
- Grading
- Transport squared logs
- Value-addition to offcuts and residues
- Primary Processors
- Secondary Processors
- Processing into components
- Processing into furniture
- Export squared logs (low benefits)
- Export of components and products (maximal returns to value chain actors)
- Log export (Illegal)
Aim and Objectives

Improve livelihoods and international competitiveness of Lao teak industry through improved efficiency of key elements:

A. address constraints and inefficiencies in the value chain, from harvest to processor stages, that limit returns to smallholder growers

B. increase returns to processors and smallholders through improved efficiencies of the primary wood processing sector

C. improve the value and quality of wood products for domestic and export markets (secondary processing = manufacturing)

D. enhance the competitiveness and capacity of wood processing industries
A- Improve returns to smallholder growers = address constraints and inefficiencies in the value chain

1. What is the extent and age class distribution of smallholder planted trees available for value added processing in the Luang Prabang region?

2. How can barriers to legal registration of smallholder planted trees be addressed, and transaction costs in their sale and delivery be diminished?

3. What forms of grower organisation and group certification are feasible and sustainable, and will improve returns to smallholders?
A1. Small Holder Teak Mapping

Methods

• Use of High-resolution digital aerial photography to map the extent of the smallholder teak resource
• Classification of the teak resource into 4 age/size classes.
• Minimum polygon size 0.5ha

Outcomes

• Mapping is ongoing
• Over 50% of Luang Prabang Province Teak has been mapped

Issues/Challenges

• Much of the resource is in small blocks which are difficult to map
A2. Legal Barriers and Transaction Costs

Methods
• Review/mapping of regulatory environment and costs
• Interviews with farmers, government and industry

Outcomes
• Regulations are overly complex, with numerous steps and associated costs
• Any regulations are based on laws for native forests and industrial plantations, not smallholder plantations
• There are few incentives for farmers to comply with laws
• Inconsistencies and unofficial costs add to the burden on farmers

Issues/Challenges
• There are Gov’t budgetary implications for simplifying laws and reducing official transaction costs
• Many livelihood issues influence farmer compliance with laws
A3. Certification and Grower Groups

Methods

• Risk-based value chain analysis of certification and verification systems
• Action research with farmer grower groups

Outcomes

• Certification is costly. There are many certification and verification options and it is not clear which is the most beneficial to farmers
• Four rounds of action research were undertaken with 5 farmer grower groups. It is too soon to determine whether they improving returns to smallholders

Issues/Challenges

• The market for certified or verified legal wood is evolving. Improvements in returns, simplification of compliance, flexibility in approach and a reduction in costs are needed
• Feasible and sustainable grower groups are challenged by complex and conflicting laws and regulations, unfavourable tax policies, the lack of a domestic teak processing industry and the ability to supply the market regularly
B - Increase returns through improved efficiencies of the primary wood processing sector

GENERAL GOAL
Increase efficiencies and product recoveries
- Savings
- Increased capacity for primary and secondary processors to pay growers more for their logs

HOW?
- Network of sawmilling companies
- Development of processing, grading and drying production protocols in the context on the current infrastructure
# Plantation Log Grading

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Round logs</th>
<th>Square logs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Heartwood proportion</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2. Bend</td>
<td>✓</td>
<td>✗</td>
</tr>
<tr>
<td>3. Pipe</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4. Knots</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>5. Knot holes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6. End split</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>7. Decay</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8. Insect holes</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>9. Want/wane (damage/bark)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>10. Metal objects</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Heartwood proportion measurement:

\[
HP(\%) = \frac{d_{hs} + d_{hl}}{d_{ts} + d_{tl}} \times 100
\]

Pipe measurement:

\[
P(\%) = \frac{d}{D} \times 100
\]
<table>
<thead>
<tr>
<th>Criteria</th>
<th>Grade A</th>
<th>Grade B</th>
<th>Grade C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heartwood Proportion</td>
<td>&gt; 80%</td>
<td>60 - 80%</td>
<td>&lt; 60%</td>
</tr>
<tr>
<td>Pipe</td>
<td>&lt; 10%</td>
<td>10 – 20%</td>
<td>&gt; 20 – 30 % (&gt; 30 % reject)</td>
</tr>
<tr>
<td>Knot</td>
<td>Maximum 5 knots all &lt; 5 cm diameter per 2.1 m length</td>
<td>Maximum 5 knots all &lt; 7 cm diameter per 2.1 m length</td>
<td>No limit</td>
</tr>
<tr>
<td>Knot holes</td>
<td>Not permitted</td>
<td>Maximum 5 knot holes all &lt; 5 cm diameter per 2.1 m length</td>
<td>No limit</td>
</tr>
<tr>
<td>Total end split</td>
<td>Total split &lt; 10% log length measured both ends</td>
<td>Total split &lt; 33% log length measured both ends</td>
<td>Total split &gt;= 33% &lt; 50% log length (&gt; 50% reject) measured both ends</td>
</tr>
<tr>
<td>Decay</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>No limit</td>
</tr>
<tr>
<td>Insect holes/galleries</td>
<td>Not permitted</td>
<td>Not permitted</td>
<td>No limit</td>
</tr>
<tr>
<td>Want/wane</td>
<td>Visual estimate of face (log end) area &lt;5%</td>
<td>Visual estimate of face (log end) area &lt;20%</td>
<td>No limit</td>
</tr>
<tr>
<td>Metal objects</td>
<td>Not permitted</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Grading Rule:** The log is assigned the grade that is the lowest grade encountered for each criteria.
## Pricing framework

### Suggested pricing framework for round and square GRADED logs

<table>
<thead>
<tr>
<th>Size class</th>
<th>Grade A</th>
<th>Grade B</th>
<th>Grade C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cost 1 (kip/m³)</td>
<td>Cost 2 (kip/m³)</td>
<td>Cost 3 (kip/m³)</td>
</tr>
<tr>
<td>2</td>
<td>Cost 4 (kip/m³)</td>
<td>Cost 5 (kip/m³)</td>
<td>Cost 6 (kip/m³)</td>
</tr>
<tr>
<td>3</td>
<td>Cost 7 (kip/m³)</td>
<td>Cost 8 (kip/m³)</td>
<td>Cost 9 (kip/m³)</td>
</tr>
<tr>
<td>4</td>
<td>Cost 10 (kip/m³)</td>
<td>Cost 11 (kip/m³)</td>
<td>Cost 12 (kip/m³)</td>
</tr>
<tr>
<td>5</td>
<td>Cost 13 (kip/m³)</td>
<td>Cost 14 (kip/m³)</td>
<td>Cost 15 (kip/m³)</td>
</tr>
</tbody>
</table>
C- improve the value and quality of wood products (secondary processing = manufacturing)

Recovery study
Flooring manufacture

Number of boards: 30
Total volume: 48,695.3 cm³
Material rejected prior step #1: 4.1%
31.28 boards required for 30 boards
(approx. 2,077.7 cm³)

Planing (all 4 sides)

Number of boards: 30
Total volume: 43,238.4 cm³
Avg thickness: 14.33 mm
Var. within pieces: 0.32 mm
Var. between pieces: 0.32 mm
Avg material remove: 1.18 mm/2
Avg width: 98.32 mm
Var. within pieces: 0.48 mm
Var. between pieces: 0.82 mm
Avg material remove: 3.90 mm/2
Wood recovery: 89%

Shavings

Shaving storage

Overall recovery rate: 63%

Packaging

Number of boards: 27 out of 30
Total volume: 30,442.9 cm³
Wood recovery: 93%

Quality control

100 cm-long flooring strips and offcuts

Flooring manufacture

Number of boards: 30
Total volume: 33,618.5 cm³
Avg thickness: 12.12 mm
Var. within pieces: 0.18 mm
Var. between pieces: 0.17 mm
Avg material remove: 2.21 mm/2
Avg width: 90.38 mm
Var. within pieces: 0.24 mm
Var. between pieces: 0.22 mm
Avg material remove: 7.94 mm/2
Wood recovery: 78%
Quality control all along the manufacturing process
Quality control all along the manufacturing process
D- Enhance the competitiveness and capacity of wood processing industries
Training on key processing techniques
Training for trainers
New processing approach for teak: peeling with spindleless lathe
D- Enhance the competitiveness and capacity of wood processing industries

Current production practices and processing efficiency: Industry survey results
Adam Redman, Gary Hopewell, Douangta Bouaphavong - January 2014

Optimal processing equipment for small-scale sawmilling
Chris Fitzgerald and Henri Bailleres - May 2014

Assessment of current training programmes for smallholder groups and timber industry and identification of gaps
Khamtan Phonetip, Assoc.Prof. Latsamy Boupha, Sangkhan Xaypha, LouxiongSiakor, Benoit Belleville - March 2014

International Markets Overview and Market Trends
For the development of an industry-led value-added timber market strategy in Lao
Benoit Belleville and Júlia Fideles - January 2014

Global Markets for Plantation Teak Implications for Growers in Lao PDR
Stephen Midgley, Khamphone Mounlamai, Aidan Flanagan and Kaisone Phengsophapha - March 2015
Expected impacts

Technical and methodological solutions for improving efficiency have been proposed.

Good potential to improve the quality of products by applying rigorous quality control systems in the production processes.

Numerous opportunities can be identified which indicate that the industry has a good chance of succeeding.

Strong commitment from the companies which are open to suggestions and willing to implement recommended changes and improvements.

Combined with the enthusiasm of the companies to change and modernise their production processes promises positive outcomes.
Thank you