

Governing Teak Furniture Business: A Global Value-Chain System Dynamic Modeling Approach

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Abstract

Indonesian teak forest plantation contributes to more than 35% of world teak forests. Perhutani, a state owned company, manages one million Ha of teak plantation area, while local communities manages teak agro-forests outside the state forest that amounts to 160,000 Ha. Javanese teak provides employments and livelihoods to millions of people. However, teak related income distribution is rarely known as well as future scenarios to make it fairer and sustainable viable to teak growers. This paper describes the use of systems dynamics to mimic value chain of teak from the forest to the final furniture market using phases of conceptual design, model specification, model evaluation and model uses. The model comprises Perhutani plantation teak, community agro-forest, teak log trading, furniture manufacturing and market. From the trends we observe Indonesian furniture role in world market is shrinking. The power asymmetry makes the furniture small-medium enterprises (SMEs) and teak growers get a small share of value added. Scenarios of boosting teak planting, fair trade and upgrading SMEs through vertical integration with lead firms can improve the sustainability of teak furniture business and enhance incomes of the poorest actors within the teak value chain.

KEY WORDS: Teak, global value-chain, governance, model, poverty alleviation

Introduction

Teak (*Tectona grandis*) is one of the world's premier hardwood timbers. Teak is the most demanded tropical hardwood due to its physical and aesthetic qualities. More than 90% teak is located mostly in South and Southeast Asia as natural and plantation forests. Teak has its natural origins in India, Myanmar, the Lao People's Democratic Republic and Thailand, and it has been naturalized in Java, Indonesia, where it was probably introduced some 400 to 600 years ago (Pandey and Brown, 2000). Javanese teak plantations provides source of wood to many teak manufacturers and retailers in Indonesia and other part of the world. Millions of Indonesian people contribute to the teak value chain and depend on sustainability of wood supply from teak plantations for their livelihoods.

In 2005, global furniture production was worth about US\$267 billion. The global furniture trade accounted for US\$82 billion in 2005, equivalent to about 1% of the world trade in manufactures. About 54% of furniture exports come from developed countries. However, this share has decreased to 32 % since the mid 1990s to the advantage of some emerging countries. China's share increased from 3% in 1995 to 16% in 2005. Other major exporting emerging countries were Poland, Malaysia, Indonesia (2%) and Mexico. The most important structural phenomenon of the past decade has been the increased degree of openness in furniture markets. The overall import-consumption ratio rose from 20% in 1996 to 31% in 2005 (ITTO, 2006). Indonesia export annual growth was 5%, while China was 30% and Vietnam was providing more than 50% of USA, EU and Japan markets. In other words Indonesia is seriously threatened to be ousted by these two countries from the furniture market.

Teak logs go to sawmills and wood manufacturing through various auctions and sales, which involve traders and brokers. End consumers buy teak furniture through furniture retailers. Teak woods flow from teak forests and farming to the end consumers. Each actor participating in the flow adds value to the teak products. This forms a chain of added value or value chain. Gains are

distributed unevenly across teak value chain. Smallholders teak growers and small-scale furniture industries, where poor people work and located, rarely receive fairly gains. Understanding the governance of value chain helps to understand the distribution of gains along the chain. Fair gain distribution also ensures sustainability of teak plantation of Perhutani. Incentive to grow trees will be boosted if Perhutani and the communities take more gains from the value chain of teak.

Theoretical background and method

Theory

Value chain describes the full range of activities which are required to bring a product or service from conception or design, through different phases of production, delivery to final consumers, and final disposal after use. Value chain provides a systemic understanding of the production process of a particular good. With the growing division of labor and the global dispersion of the production of components, systemic competitiveness has become increasingly important (Kaplinsky and Morris, 2000). Value chain analysis is actor oriented. It is very effective in tracing product flows, showing the value adding stages, identifying key actors and the relationship with other actors in the chain. Often, however, these actors operate within certain rules that are set by others (Schmitz, 2005).

Participation in global markets is not just governed by trade policies in final market countries. It also reflects the strategic decision of the lead firms in the value chain. Gareffi (2003) constructed the theory of value chain governance based on (1) Complexity of transactions; (2) Ability to codify transactions; and (3) Capability of the supply-based. If these factors are valued by 'high' and 'low' then there are eight possible combinations, of which five are actually found, i.e., market, modular, relational, captive and hierarchy. The emergence of an impressive variety of voluntary regulation systems is a key element of the globalization process. These systems are normally meant to set quality, social, or environmental standards, and typically involve a larger degree of coordination, traceability, and monitoring along different agents of the commodity chain (Muradian and Pelupessy, 2005).

Method

The research used value chain analysis to investigate the income distribution in teak furniture business and teak plantations in Java including Perhutani's and community plantations. The method outline is (a) Determining point of entry for value chain analysis; (b) mapping and modeling value chains using systems dynamics approach; (c) Evaluating model; and (d) Using the model to develop future scenarios.

Results

Model development

Determining Point of Entry for Value Chain Analysis

International and domestic furniture buyers drive not only furniture production but also furniture design. Furniture is a buyer-driven value chain. So the value chain entry point is the final consumers and buyers. The current added-value created by different actors participating in furniture value-chain is shown in Table 1.

Conceptual model

The detail of wood flow causal loop diagram is given in Figure 1. Arena, actors and wood flows constitute the model. Arena is a place where actors play role and institutions work and formulated. On 'Teak Forests' arena, where teak growers are located, comprises four kind teak wood sources, i.e., logging from KPHs (*Kesatuan Pemangkuan Hutan* or forest management units), illegal logging from KPH, logging of community teak agro-forests and logging of teak plantation outside Java. Teak growers play primary role here and get values from selling the logs to log traders. For each kind of wood source, two kinds of loops are working i.e. 'reinforcement loop of tree growth' and 'balancing loop of logging'. 'Teak planting' improves growth of teak. Achieving 'Normal KPH' and

‘Desired community teak plantation’ are the primary objectives of managing teak forests. ‘Normal KPH’ is a condition that area of harvesting is the same as area of planting. While ‘Desired community teak plantation’ means a multi-stakeholder agreement of area extent of community teak plantation. Illegal loggers, which could be part of community members and Perhutani staff enjoy value-added here.

Table 1: Value-added created by different actors participating in furniture value-chain (Rp. 1,000/m³ of their products; US\$ 1 = Rp. 9,200)

Actors	Product flow efficiency (%)	Remaining product (m ³)	Gross output values	Input costs	Net output values	Net value added (%)	Net value-added occurring
Teak Growers	-	> 1.00	2,000	1,200	800	16.1	35.9 %
Log traders	100	1.00	250	125	125	2.5	(inside
Sawmill owners	70	0.70	105	49	56	1.1	Indonesia)
Drying Kiln owners	90	0.63	76	57	19	0.4	
Furniture producers	50	0.32	630	468	162	3.3	
Furniture finishers	95	0.30	271	135	135	2.7	
Furniture exporters	100	0.30	974	487	487	9.8	
Importers	100	0.30	519	260	260	5.2	64.1 %
Int'l wholesales	100	0.30	1,870	935	935	18.8	(outside
Int'l Retailers	100	0.30	3,989	1,995	1,995	40.1	Indonesia
Total			10,683	5,710	4,973	100	

Source: MoI (2006), PENSA (2005).

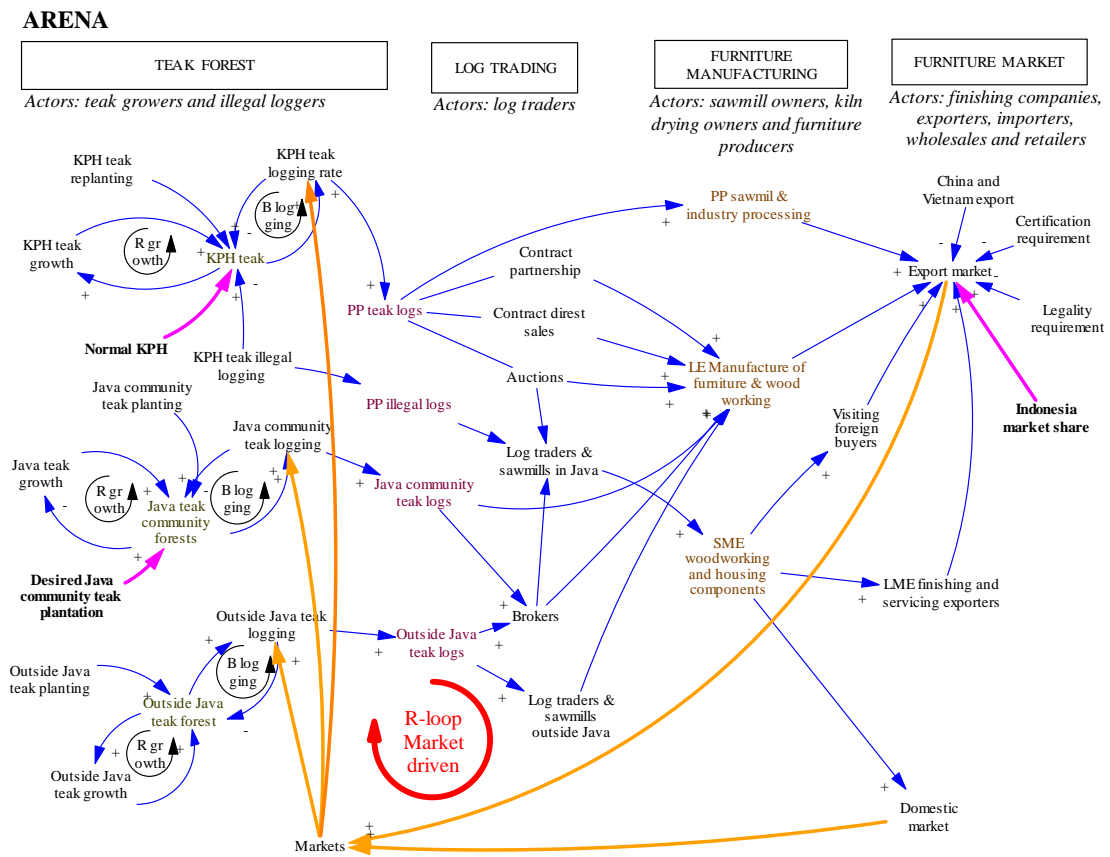


Figure 1: Causal-loop diagram of teak furniture business.

The second arena is ‘Log Trading’, where log traders are important actors. Log traders obtain Perhutani’s illegal logs from illegal loggers, outside Java logs from brokers and Perhutani’s legal logs from ‘Auction’ mechanism. While brokers get logs from community agro-forests and forest outside Java. Wood is traded in forms of logs or sawn-timber. Perhutani also acts as a log trader to sell its logs legally through ‘Contract partnership’, ‘Contract sales’ and ‘Auctions’ to big enterprises of furniture and woodworking. These big enterprises also obtain wood from brokers and log traders outside Java. While small and medium enterprises obtain wood from log traders in Java. These big and small enterprises manufacture furniture out of wood. Drying wood is important to get better quality furniture. Sawmill owners, drying kiln owners and furniture producers play in this ‘Furniture Manufacturing’ Arena. The fourth arena is ‘Market’, which comprises actors of finishing furniture companies, exporters, importers, wholesales and retailers. Furniture from small and medium enterprises is going to ‘Domestic market’ directly and ‘Export market’ through ‘Visiting foreign buyers’ and finishing companies. While big enterprises and Perhutani wood processing can enter directly to ‘Export Market’.

Model implementation and evaluation

The model is implemented using STELLA 8. Sectors model arenas and material transfers are symbolized with double lines and valves; they model wood flow. Information transfers that are symbolized with lines and arrows model influences among different entities. Boxes model stocks of wood from standing stocks in forest areas to furniture stocks in markets. The present model passed evaluation criteria of the logic of the model and its outcomes and the agreement between projections and expectations.

Baseline simulation

This section observes the distribution of incomes and sustainability of teak resources if we maintain the current situation. The baseline simulation was run under the assumption that the illegal logging affects only 5% of all class ages. Perhutani, as it does it now, replants illegal logging areas.

Teak plantation area and teak logs

Teak wood resource comprises teak plantation from Perhutani, agro-forests and teak outside Java. The overall productive teak plantation area in Indonesia is currently amounting to 732,000 ha. This number is projected to increase to 784,000 ha after 100 years, with new plantation increase from 33,000 to 38,000 ha and harvesting increase from 18,000 to 23,000 ha per year. The teak logs are coming from Perhutani, illegal logging, agro-forests and outer island teak plantation (Figure 2). The total teak logs at the beginning of the simulation are 800,000 m³ and they are increasing to 9,000,000 m³ in the end of simulation. The Perhutani’s teak logs of 410,000 m³ dominate the logs market. It is followed by almost the same number of illegal logs and agro-forest logs at the beginning of the simulation are 175,000 m³. However, agro-forest logs will increase to 210,000 m³ at the end of simulation. Logs import from outer islands is 100,000 m³ at the beginning and will increase to 115,000 m³ at the end of simulation.

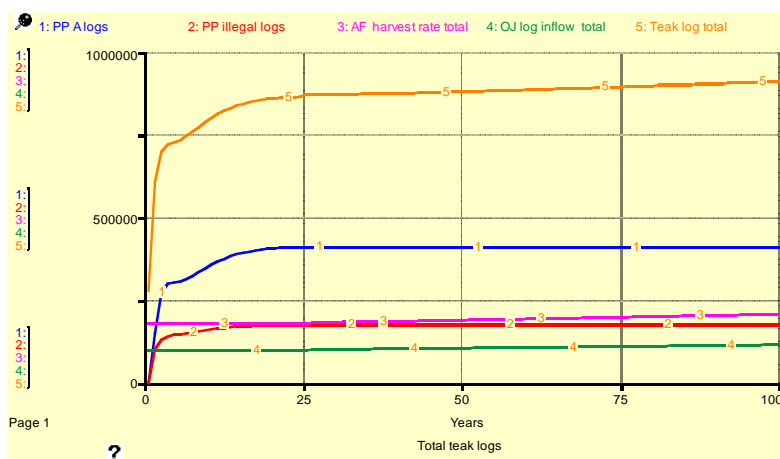


Figure 2: Teak logs projection of (1) Perhutani (2) Illegal logging (3) Agro-forests (4) outer islands and (5) total (in cubic meter)

Distribution of value added

World furniture retailers make the biggest net value added (NVA), which is increasing from 1 to 1.6 trillion rupiahs or Rp. (Figure 3). It is followed by Perhutani plantation added value, which is constantly about 650 billion rupiahs. The third largest is enjoyed by world furniture wholesales, which make added value increasing from 400 to 600 billion Rp. Following them the others NVA makers are exporters (250 to 350 billion Rp.), importers (150 to 210 billion Rp.), SMEs (130 to 170 billion Rp.), large enterprises (30 to 60 billion Rp.) and Perhutani furniture division (a less than one billion Rp.).

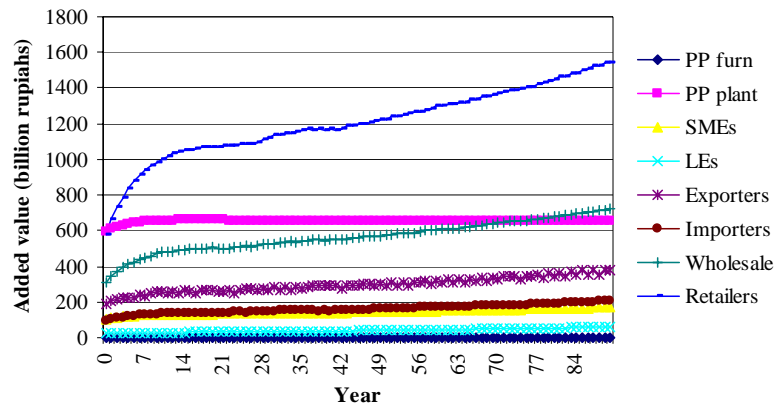


Figure 3: Distribution of net value added (in billion Rp.) among Indonesian furniture actors.

Future scenarios

Scenario means what could happen in the future, not what will happen. The poor in the furniture value chain are located mostly in furniture manufacturing and agro-forests. First of all, the sustainability of furniture manufacturing has to be secured through providing adequate teak raw materials. If industry collapses then their employees will suffer. Governing teak-value chain to benefit the poor means (a) Sustaining the supply of teak raw materials in the future and (b) Improving the NVA for furniture SMEs.

Illegal logging continued and un-recovered

If illegal logging continues, Perhutani legal and illegal logs production would collapse totally in 50 years. Logs coming from agro-forests and outer islands plantation can partly take the place of Perhutani production. The scarcity of Perhutani's logs creates price incentive for forest outside state land to grow.

Giant investment into teak plantation

If Perhutani is able to contain the illegal logging at 5% of its area and then to replant it, while all teak plantations including Perhutani, agro-forests and outer islands teak plantation grow annually by 90 000 ha then more than 3 million cubic meters of logs will be obtained in 50 years. In 72 years more than 10 million logs will be available in the market, more than 50 million logs in 100 years. Even this giant plantation investment would not fulfill the domestic and international demand of furniture; according to current trends international demand would reach 10 million m³ in only 33 years and domestic demand will reach 10 million m³ in 86 years. Annual plantation should reach 135 000 ha annually for the future production meet the future demand (Figure 4).

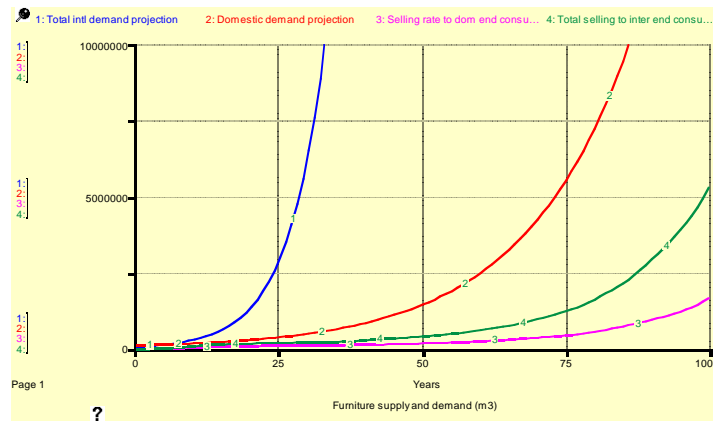


Figure 4: Demand (1: international; 2: domestic) and supply (3: domestic; 4: international) of furniture given the giant investment into teak plantation.

Fair trade and vertical integration

We propose to have two scenarios of governing furniture chain to benefit the poor i.e. fair trade for domestic market and SMEs upgrading through vertical integration for international market. The main goal of “Fair Trade” is to guarantee a minimum price to tree growers and furniture workshop owners by charging a price premium to consumers. Vertical integration is a way of upgrading the furniture SMEs through strong coordination with the lead firms. The impacts of these scenarios are shown in Table 2.

Table 2: Scenarios of furniture chain governance to benefit the poor

Impacts	Fair trade	Vertical integration
Distance between standards and “common” practices	Large	Short
Importance of “extra-standards” information	High	High
Monitoring	Third party	Third party
Overall entry Barrier	Medium	High
Expected impact on price	High	Medium
Target group	Tree growers and SMEs	Tree growers and SMEs
Upgrading constraints	Limited	Control by lead firms
Stakeholder coordination type	Strong	Strong

Conclusions

The current practice of the teak furniture business faces stagnancy and will not benefit the poor. The future of Indonesian furniture exports will be shrinking due to collapse of teak log supplies. Mismanagement and illegal logging threaten the future of teak plantation in Indonesia. The low value added gained by furniture SMEs make furniture play less significant role in poverty alleviation. Future scenarios to boost teak planting are very important and teak production will not be limited by the future demand of teak furniture. According to our model annual plantation should reach 135,000 ha annually for the future production meet the future demand. However, teak plantation development in Indonesia might be limited by conflicting land use. Fair trade and vertical integration can create better premium price for the tree grower and furniture SMEs. Huge investment, fair trade and SMEs upgrading will ensure the sustainability and equitability of teak furniture business.

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