Direct Supply Chain from Forest to House Builder: A Japanese Business Model

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The features of the Natural Material House

- Domestic wood with low temperature drying,
- Use of completely natural materials: plaster from grind shell, wool insulation, natural adhesives,
- No use of plywood, laminating wood, no use of any synthetic chemical materials
- Hand carved traditional wooden structure
- Long life hard concrete
- Direct purchase of wood from forestry industry not through markets
- Direct delivery from lumbermill to construction site
The purpose of this study

JST.RISTEX.Project 2008〜2013
“Achieving Climate Change Abatement and Comfortable Life by a Partnership between Forestry and Natural Material Housing (NMH) in Urban Areas,”
Purpose: to achieve carbon neutral housing by 2050 and simultaneously realize comfortable and healthy living by the direct linking of forest management to the use of domestic wood in environmentally friendly Natural Material Housing.

Direct Wood Supply Chain System and Conventional System

Conventional Supply

Direct Chain Supply
Business model of NMH supply

‘Tennen Jyutaku’ = Natural Material House (NMH)
- environment-friendly wooden long-life house
- a direct supply chain of lumber from a forest to a NMH builder
- based on the “progressive market-in” method
- with a certification system for NMH
- with a low interest loan for NMH from civic financial
- with a NMH inspection by ten years
- NMH price in second hand house fully incorporates the external environmental value of the house.

Background and summary of this study
Problems of wood and housing market in Japan

Main stream

Foreign forest
- Import log wood
- Larger lumbermill
- Larger housing builder
- Houses are scrapped in a few decades, shorter than the harvest age of the tree

Domestic forest
- Log wood market
- Smaller lumbermill
- Lumber market
- Smaller housing builder
- Premature second-hand market

Minor stream

Built house

New wood and housing market in Japan

Main stream

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Omission of distribution markets of wood and lumber

The alternative flow

By our certification system

Second-hand market functions by civic financial mechanism
The environmental effect by the alternative flow

• CO2 emissions from haul of log wood and lumber products from forestry to construction site reduces.

• Because the forest becomes a sustainable condition by our certification system and civic financial mechanism, the CO2 absorption ability of forests improves.

The situation of a forest in Japan
Japanese forest area accounting for 10% in East Asia

Trends in extent of forest 1990-2010 (FAO data)

<table>
<thead>
<tr>
<th>Country/area</th>
<th>Forest area (1,000 ha)</th>
<th>1990-2000</th>
<th>2000-2005</th>
<th>2005-2010</th>
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<tr>
<td></td>
<td>1,000 ha/yr</td>
<td>%a</td>
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<tr>
<td>China</td>
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<td>World</td>
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<td>-8</td>
<td>-0.20</td>
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</tr>
</tbody>
</table>

The forest area ratio of the third in the OECD countries

The forest area ratio(%) of land area in the OECD countries

(Higher 10 countries in OECD(34 countries), 2010)

1. Finland 72.9
2. Sweden 68.7
3. Japan 68.5

Source: FAO "Global Forest Resources Assessment 2010", Table2
Carbon stock of artificial forest in Japan increasing

Change of Growing cubic volume of forest resources in Japan

Source: Forest Agency "The present situation of the forest resource"

Low wood self-sufficiency of Japan

Wood self-sufficiency Ratio of the Japanese Lumber

Only less than 30%

Source: Forest Agency "Wood supply and demand list"
The Japanese forest not to be harvested

Areas of Planted Forest by Age class in Japan

The period of the intensive afforestation

Not to harvest forest resources

A new tree is not planted

变更の数量（m3/ha）を示すグラフ：木の体积が成長する速度

increment of the volume of the tree diminishing gradually

Age class possible for wood harvest

Source: Forest Agency "The present situation of the forest resource"

* Maeda estimated based on information provided by the Forest Agency
The problems of housing markets in Japan
- the Japanese house which is shorter than the harvest age of the tree -

Housing market in Japan
The mean number of years of the house destruction

Source: Ministry of Land, Infrastructure, Transport and Tourism (MLIT)
Very Short Life of Houses in Japan

![Graph showing existing houses in Japan and the United States](image)


A Japanese House where a Decrease in Value is Early

In Japan, this is an accounting viewpoint. However, a lot of bank accept only the value of the land-part except the building-part in the house of more than 20 built-year when a bank finances for the house purchasing.

![Graph showing housing value in Japan and the United States](image)

Note: (U.S.) We estimated each housing prices were excluded land prices according to Lincoln Institute of Land Policy. (Japan) The figure is made by Aoyama Realty Advisers Inc. for the study of MLIT.
The our systems developed and the environmental effect

Direct Supply Chain from Forest to House Builder

Certification system to connect a forest and the house market

- Evaluation of productivity
- Evaluation of productivity
- Evaluating traceability and fund circulation
- Evaluation of house construction method

Domestic forest

Forest products industry (lumbermill)

House maker

Progressive market-in

Newly built house

Omission of distribution markets of wood and lumber

A Civic Financial Mechanism

named “Civic Bank” to provide home loans for the second hand market deals
The inspection about this system
– Does this system function economically? –

Is there cost cut effect by this direct system?

- Cost of general forest industry & lumbermill
  - 86,600 Yen/m³

- Cost of standard drying lumber price
  - 75,900 Yen/m³

- Cost of our direct system
  - 28,900 Yen/m³

- Cost of our direct system gain
  - 14,800 Yen/m³

- Cost of general forest industry & lumbermill loss
  - 10,700 Yen/m³

Expense of the transport: ¥6,350
Profit and interest (forest industry & lumbermill): ¥6,930
Depreciation and amortization: ¥4,620
Sawing production cost: ¥6,350
Cost of forest industry: ¥4,620
Cost of lumbermill: ¥6,350
Is domestic lumber used by this system?

- **Company-A**
- **Company-D**

![Graph showing Young's modulus for different materials](image)

- Fixtures
- Lumber
- Plywood

Young's modulus vs. Frequency (%)

Is the secondary market activated by this system?

**Certification system for existing houses**

- **Certification authority**
- Evaluation of house maintenance
- Evaluating house value
- Effect on second hand market

- **Buying and selling of the house**
  - Checking condition of house using interest payments
  - Influence to second hand market

- **Market for existing houses**
  - Functioning as benchmark

- **Newly built house**

- **Existing house**

- **Passage of time**

- **Home loan**
  - Bank

- **Civic financial mechanism**
  - Home loan for houses in second hand market (Lending amount equal to discounted value of future price)
Conclusion

• We promote a business model on domestic wood house building by directly linking forestry to urban housing with our certification and financial system.

• With this system in place, CO2 emissions from haul of log wood and lumber products from forestry to construction site reduces.

• The forest becomes a sustainable condition, because the average life span of the house is longer than the growth period of tree by our certification system and civic financial mechanism. The CO2 absorption ability of forests could improve.

• And the future value of the house could be kept high by the system of certification and house safety inspection. Reflecting these, the price in second hand house market could be also kept high by continuous maintenance.

• The CO2 fixation effect of houses could improve as well.

Thank You!