

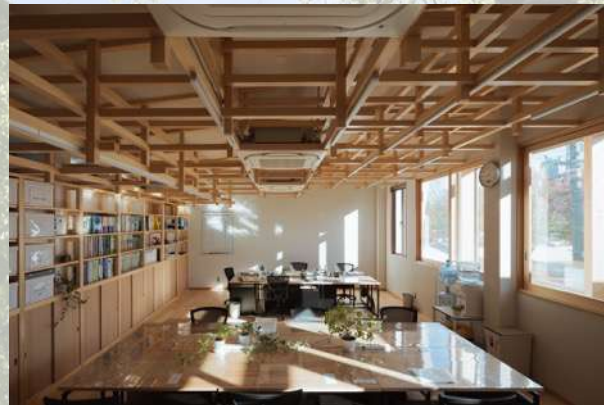
Drivers for Wood Construction 2023  
17th May 2023 Mon

# From Tradition to Sustainable Wood Construction

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# Introduction

- **Major :**  
Architecture design and planning (Wood architecture)
- **Field of Research:**  
Perception and evaluation of users for architecture and wood interior



# Wood Interior renovation with wood kit product



Wood interior



Any structure



Like furniture



Any building type

# Table of Contents

- Why wood construction?
- Situation wood utilization in Japan
- Barrier and potential of wood construction
- Summary

A low-angle photograph of a forest with tall trees and a blue sky, split horizontally by a semi-transparent white band containing text. The top half shows the dense canopy of green leaves against a clear blue sky. The bottom half shows the trunks of several tall trees reaching upwards, with a blue sky and some white clouds visible between them.

**Why wood construction?**

# Social and political background

## SUSTAINABLE DEVELOPMENT GOALS 17 GOALS TO TRANSFORM OUR WORLD



# Benefit of wood construction

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Towards sustainable society.....

- **Environmental aspect**

Carbon storage, Less impact

- **Technical aspect**

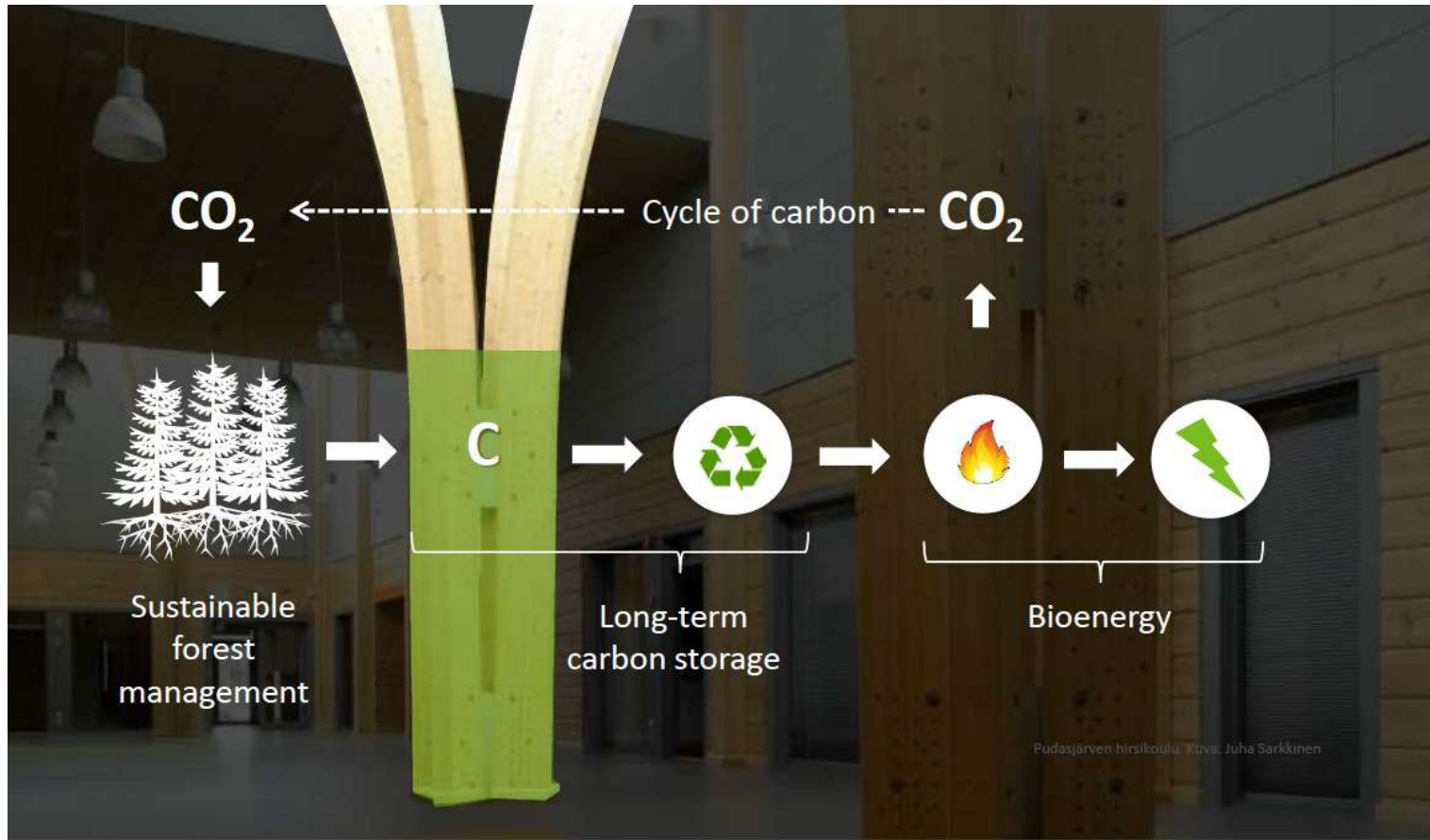
Shorter construction period, safety

- **Health aspect**

Wellness and well-being by wood interior

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# Environmental aspect

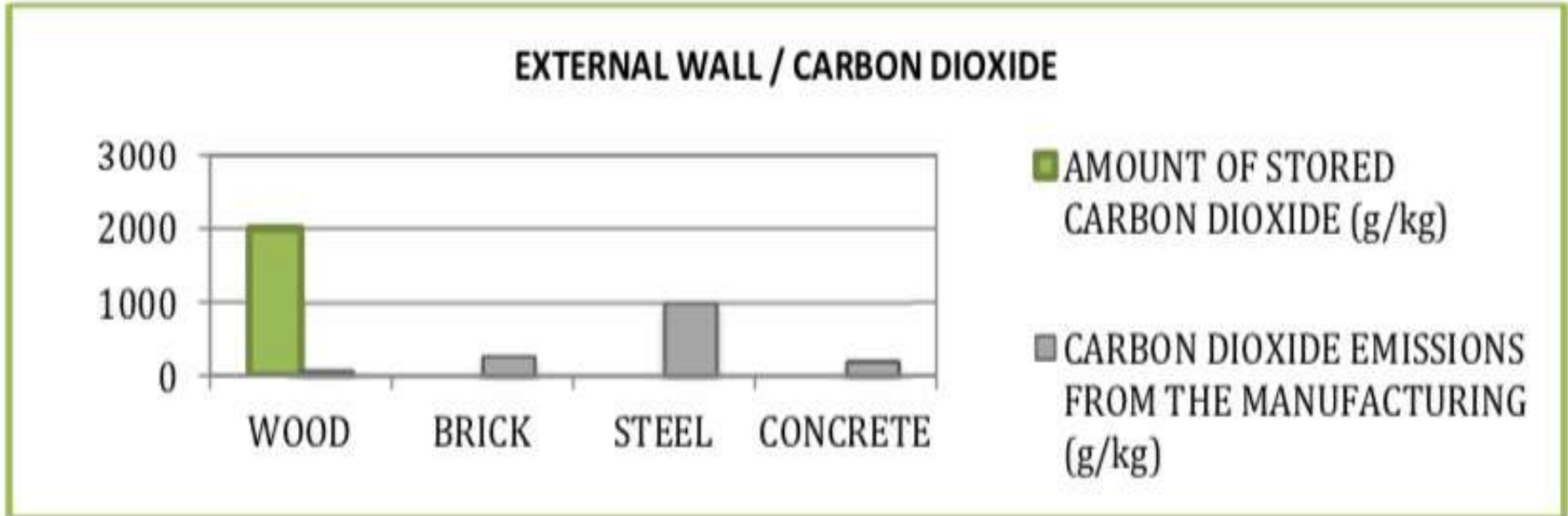


Sustainable life cycle can be achieved through utilizing wood



# Environmental aspect

Figure 2 Carbon Dioxide Storage and Emissions with Different Materials

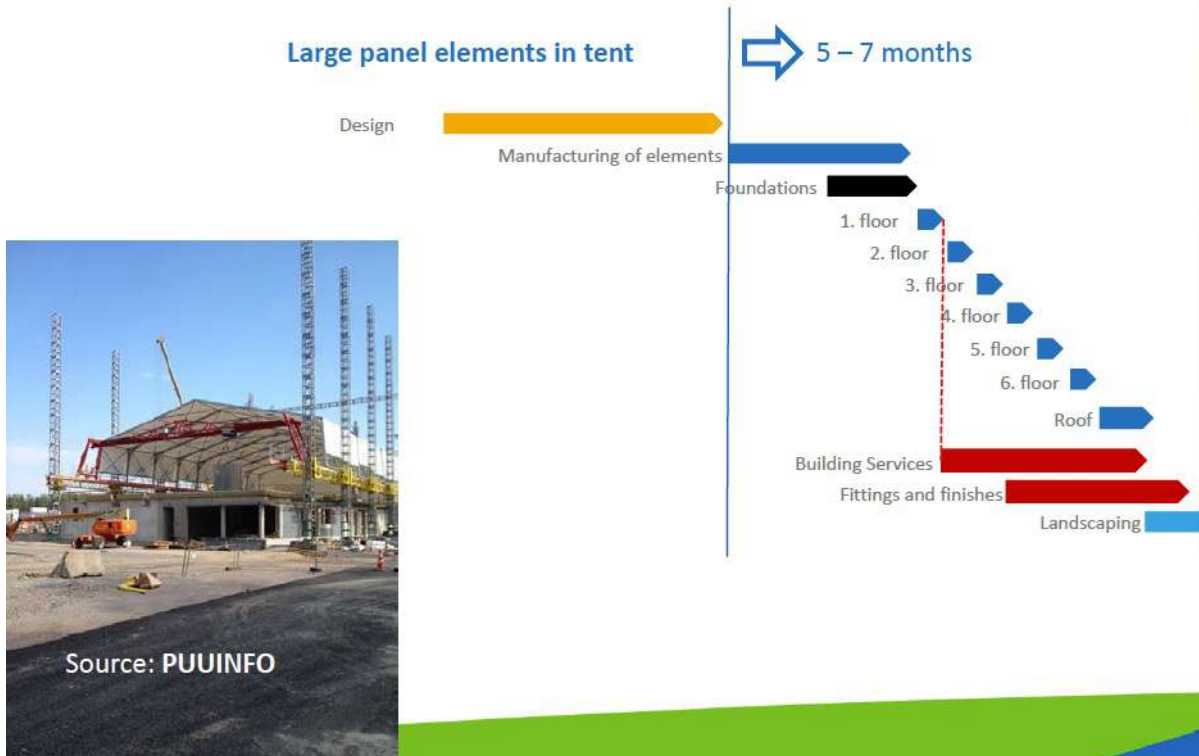


Source: Puuinfo brochure: The ecological footprint of buildings.

Less emission during the manufacturing process  
A lot of carbon storage using wood

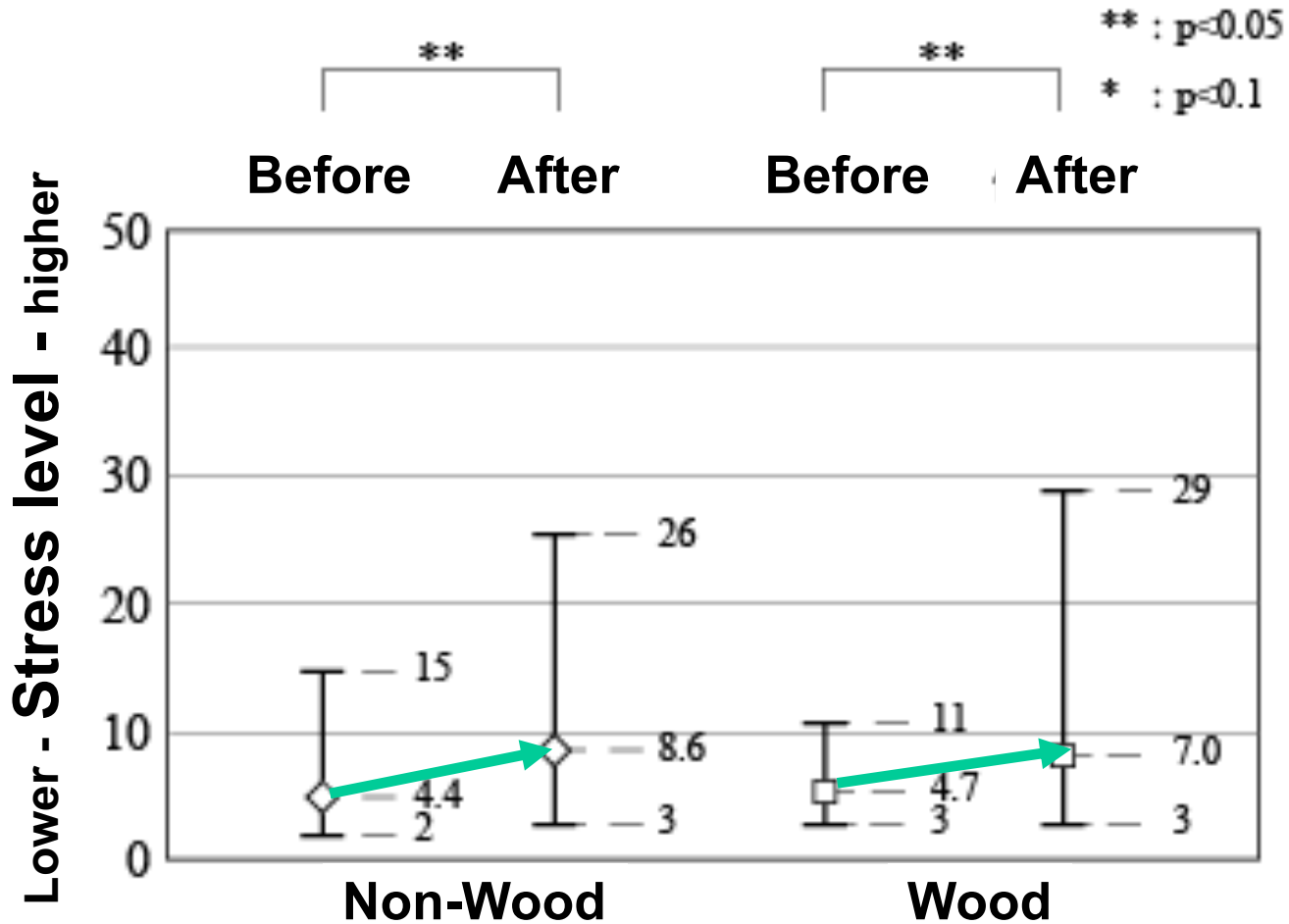
# Technical aspect

## Building with large elements under cover



Panelized elements shorten the period to 5-7 months

# Health aspect



Less stress in wood interior comparing Non-wood interior



# Situation of wood utilization in Japan

# Wood used in traditional building



**Wood is most familiar building material and has long history with human life**



河内工可及流  
奉開合龍前立本尊

団体専用御朱印所

御印文頂戴  
外陣参拝

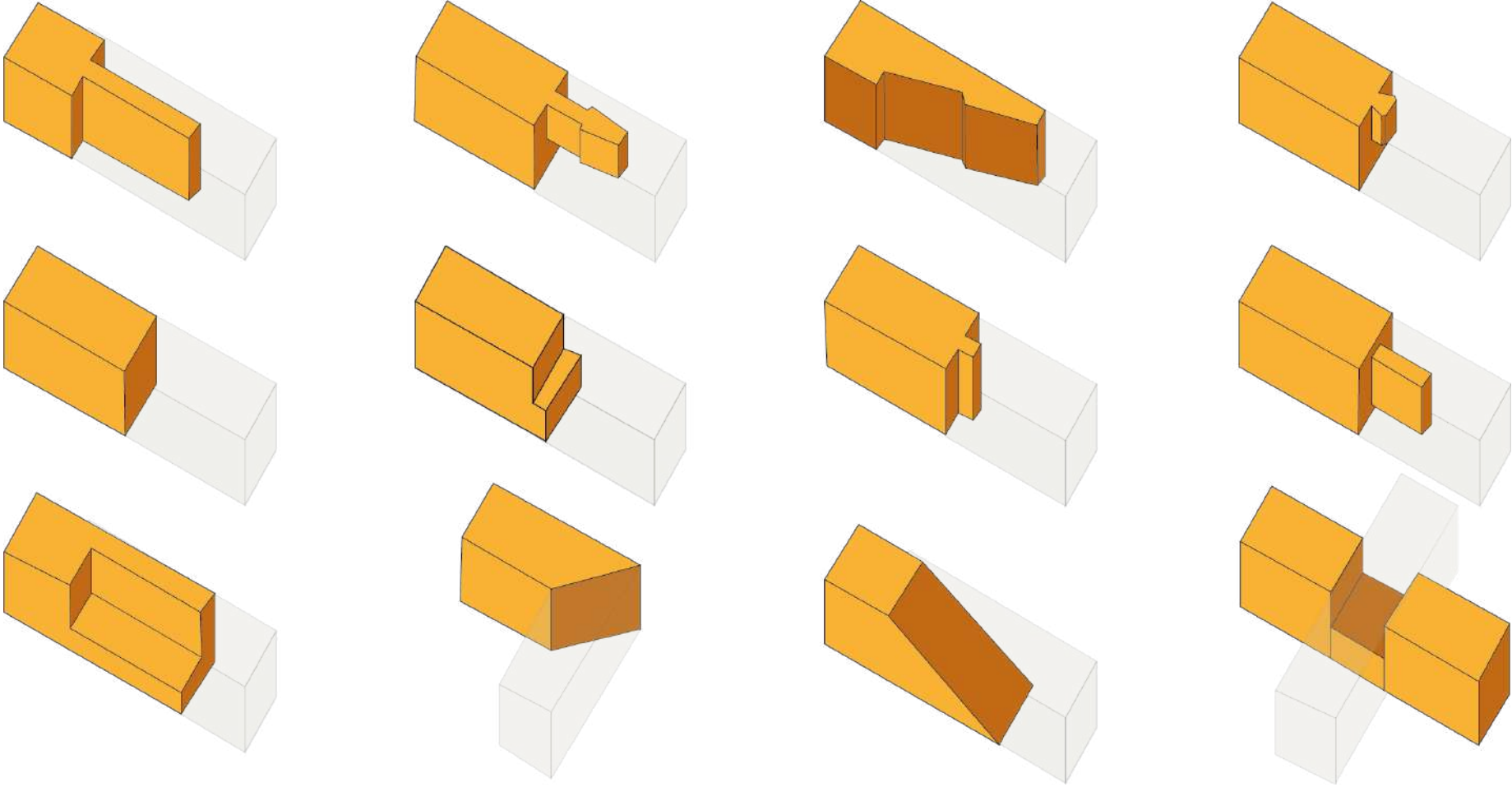
御朱印券売所

寺の本尊御開帳  
奉開合龍前立本尊

御朱印券売所

御朱印券売所

# Historical wood joint without nails or metals



# A variety of wood construction from small to large scale





# Large size-wood construction is realized

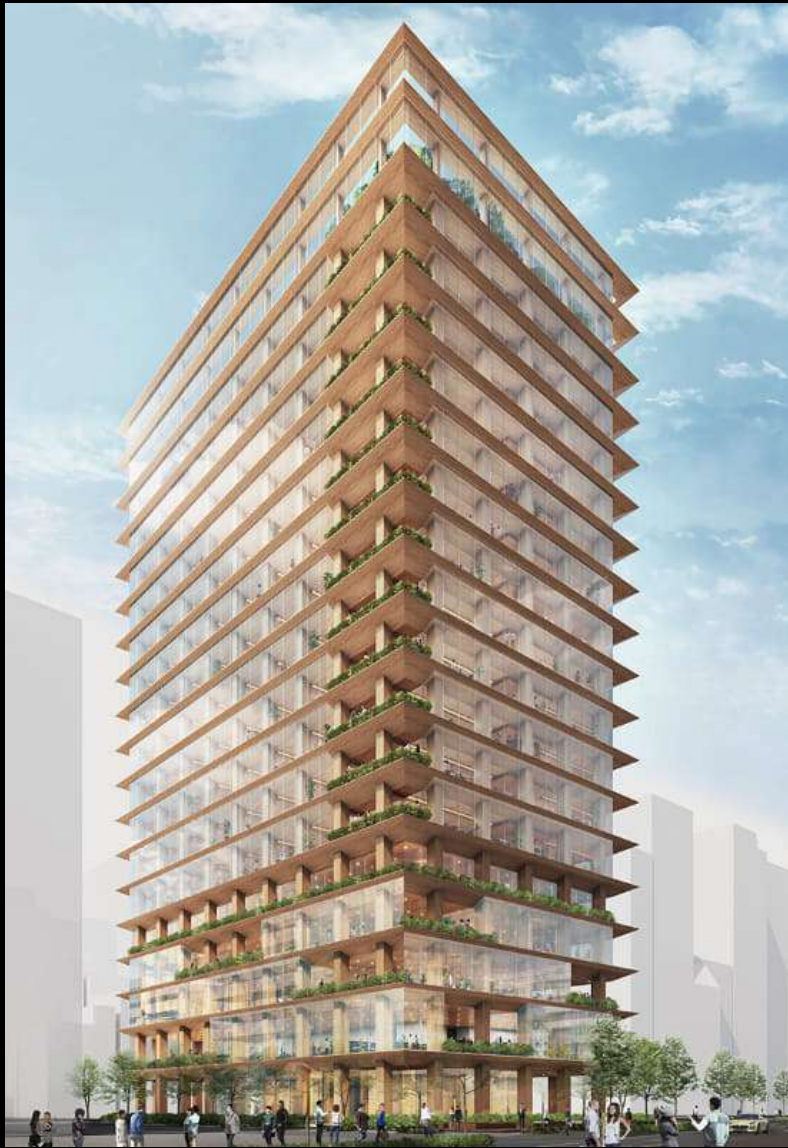


提供: 竹中工務店木造・木質建築推進本部

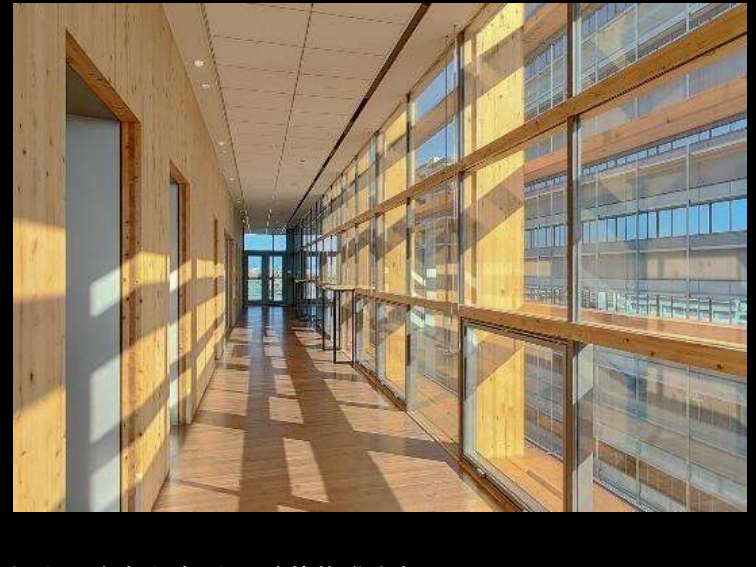
<https://www.shimz.co.jp/>

<https://www.taisei-design.jp/>

# To high-rise wood building

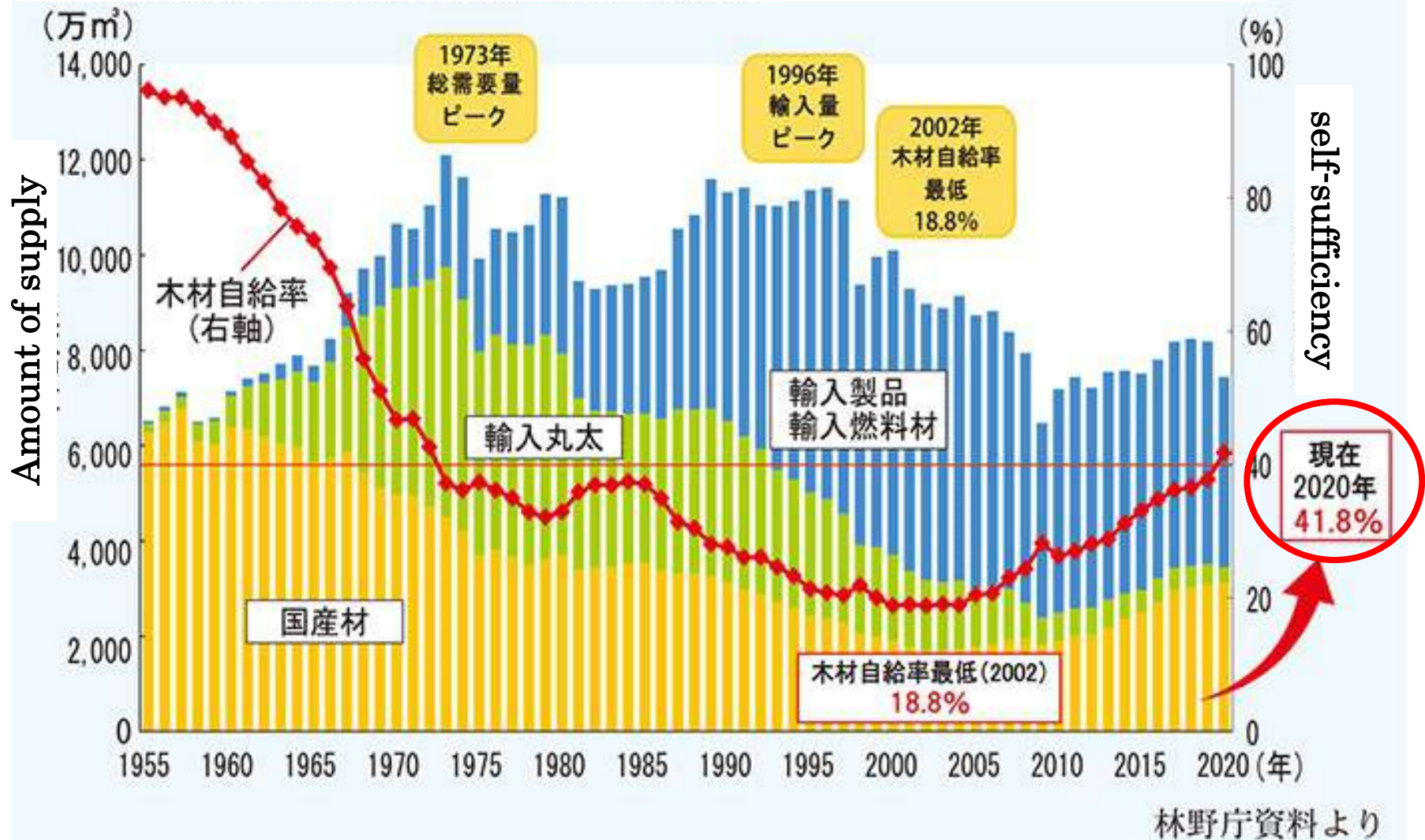


# To high-rise wood building



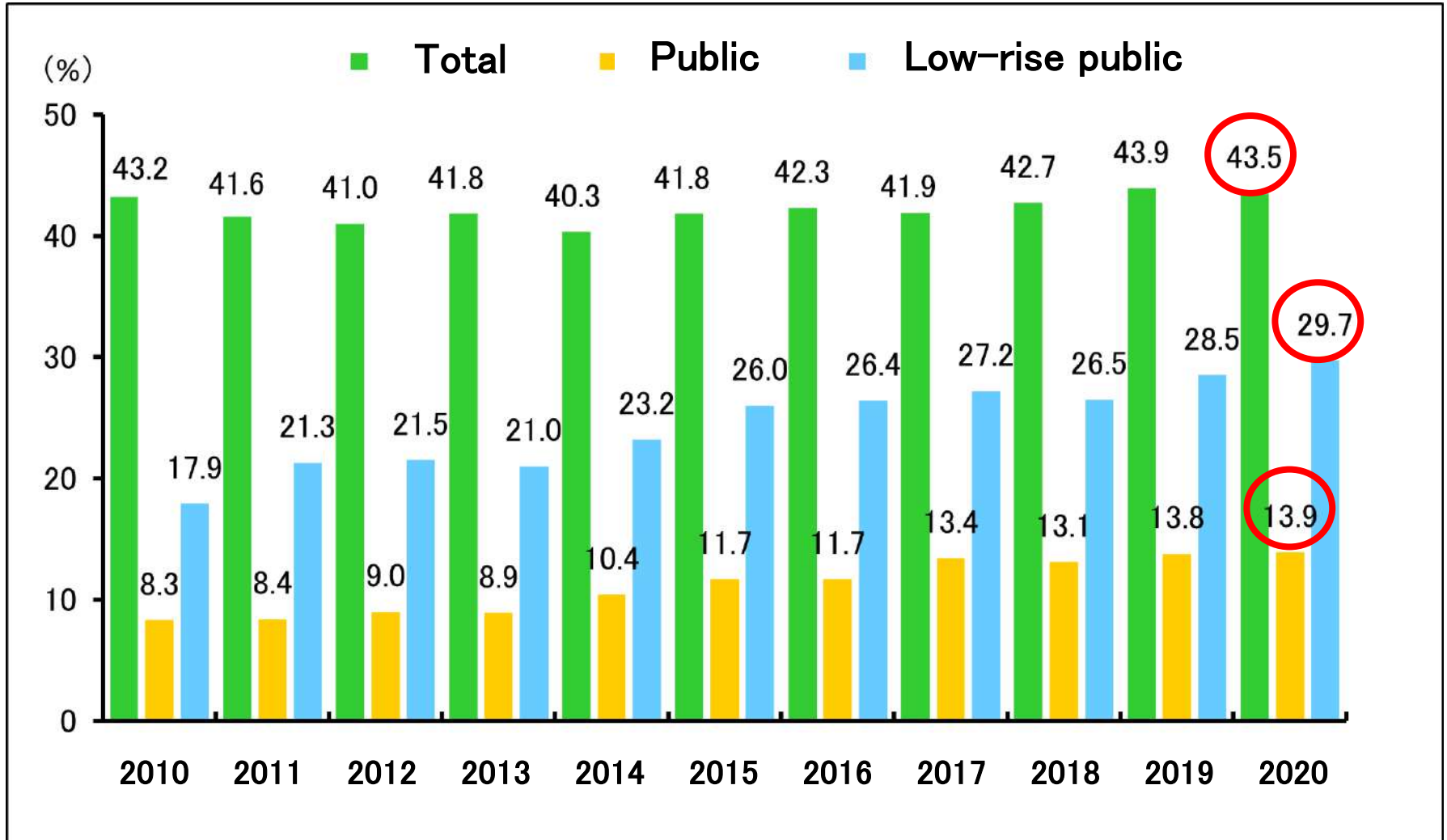
# Situation of wood supply and self-sufficiency

## Situation of wood supply and self-sufficiency



# Percentage of public buildings made of wood

## Percentage of public buildings made of wood





# Barrier and potential of wood construction

# Barrier and challenge of wood construction

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Cost competitiveness vs other structures

→ Wood structure is still quite expensive

Fire regulations and design

→ Especially for middle-high rise

Visualization of benefit of wood construction

→ MORE evidence and data needed

**Visualization of benefit is a key!!!**

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# Case study – Various facilities-



**Educational facility**

**student**  
**M: 14**  
**F: 15**

**User**  
**M: 23**  
**F: 6**



**Community facility**



**Children facility**

**User**  
**F: 21**

**User**  
**M: 8**  
**F: 4**



**Facility for disabled people**



# Case study – Various facilities-



**nursery  
room 1**

**M : 21  
F : 15  
Mother  
23**

**nursery  
room 2**

**M : 4  
F : 5  
Mother  
7**

**After  
school1**

**M : 16  
F : 10  
Parents  
14**

**After  
school2**

**M : 12  
F : 11**

**Wood and non-wood interior prepared in different facility**

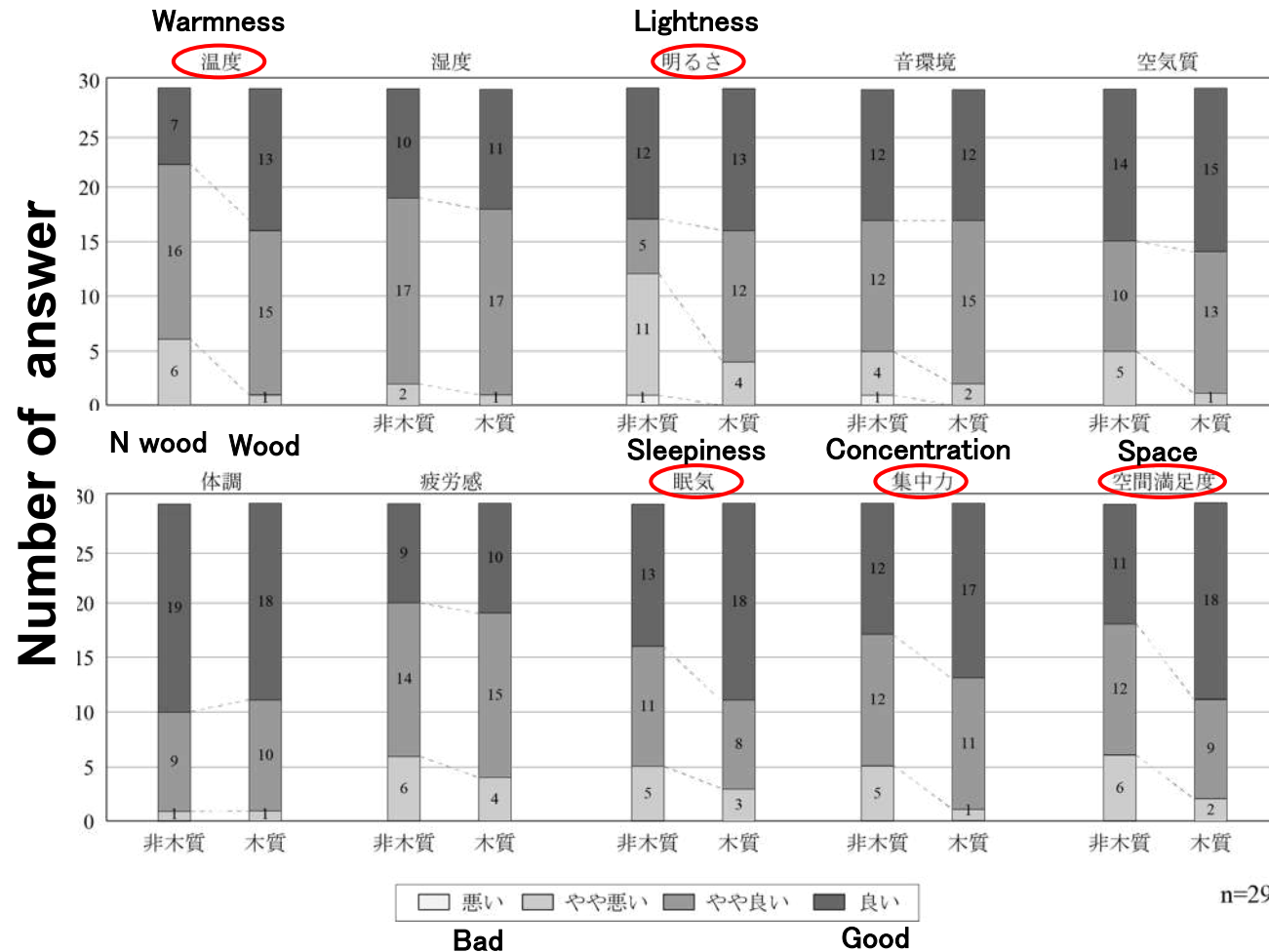
# Case study1 –Various facilities-

## Wood space and non-wood space



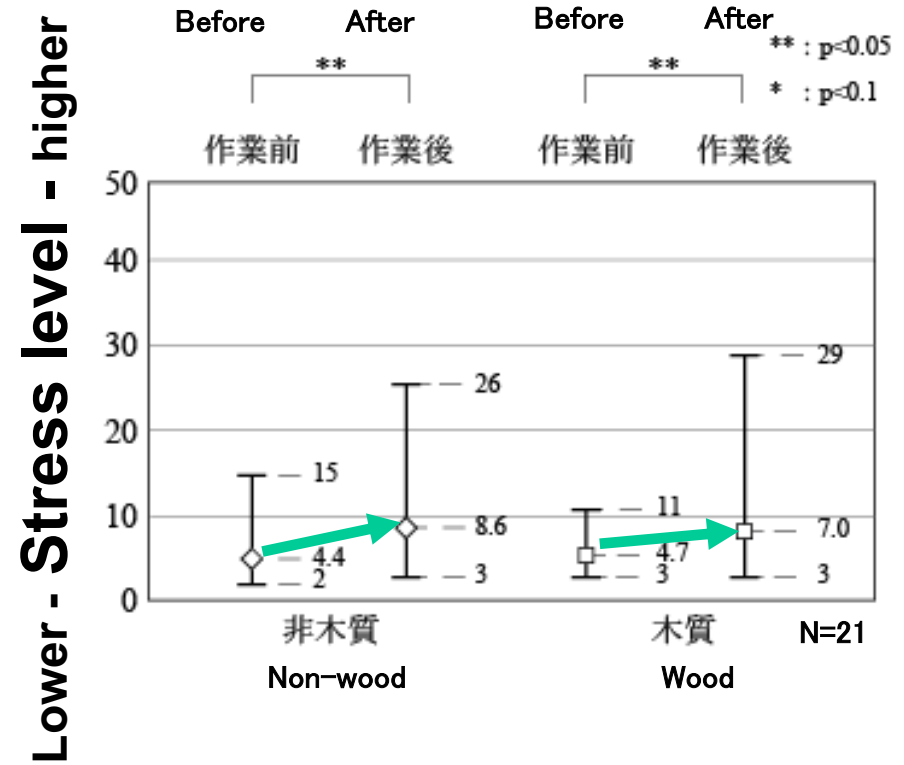
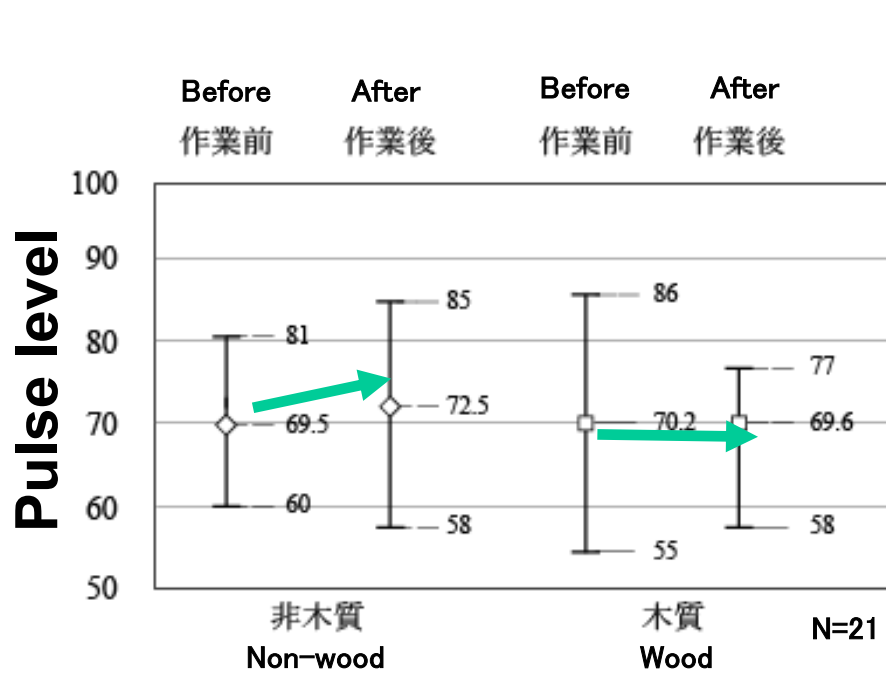
1. Preparing same size of space with wood and non-wood
2. Ask people to do some tasks
3. Measure different kind of effects by wood interior

# Case of community facility (Questionnaire)



Wood interior clearly shows better results in warmness, lightness, sleepiness, concentration and space satisfaction

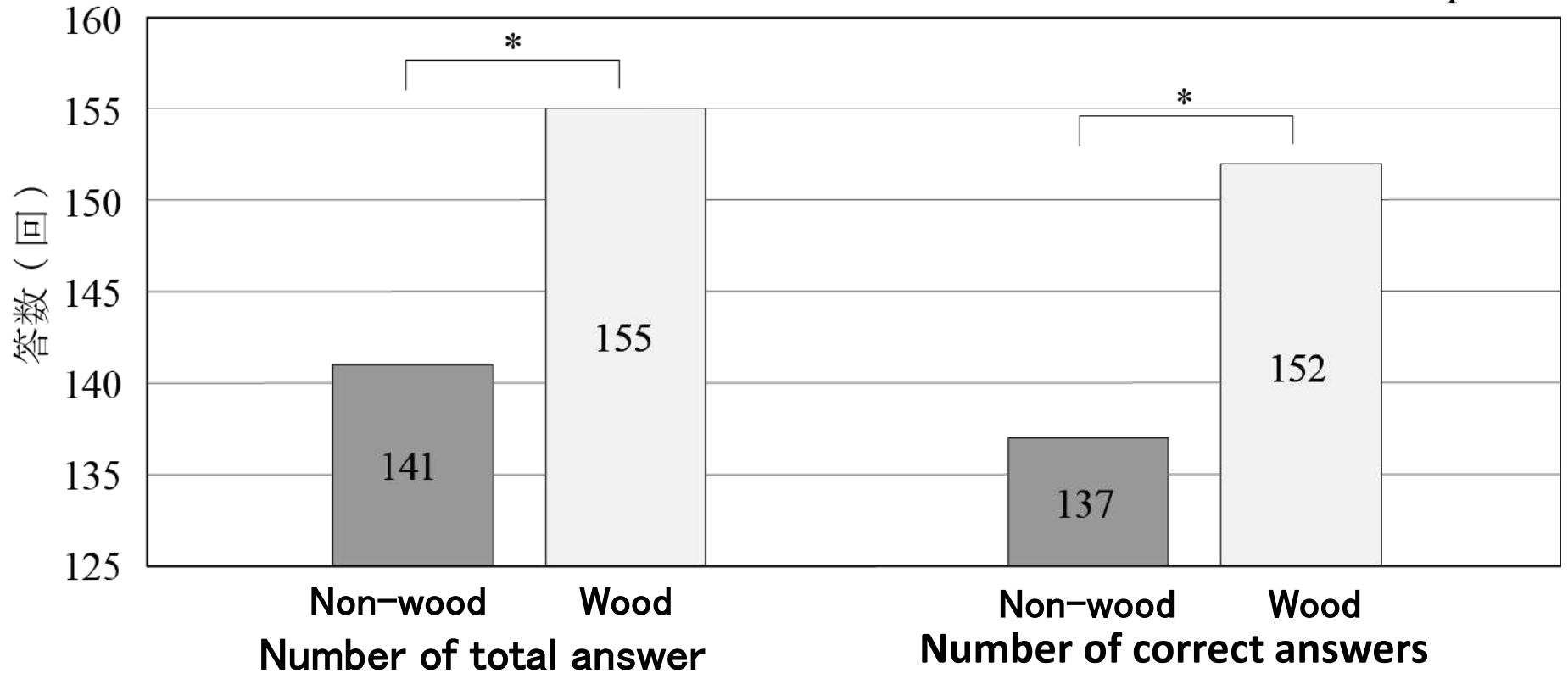
# Case of Children facility (Stress level)



**Wood interior: Decrease in pulse and less rise in stress level comparing non-wood space before/after task**

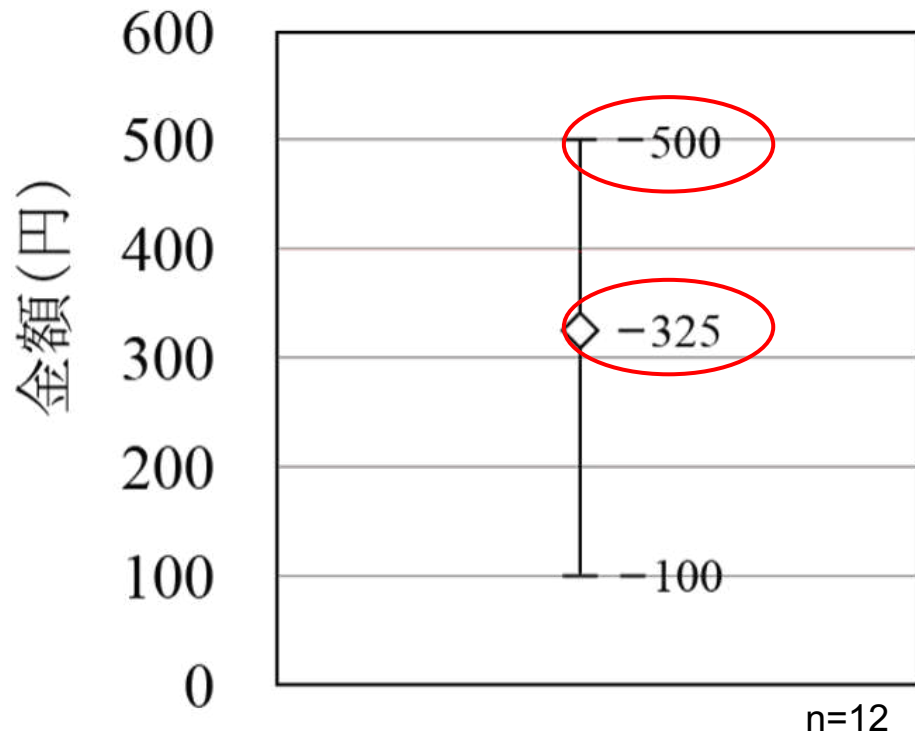
# Case of after school1 (Productivity)

\*p<.05



**Simple math test in wood interior and non-wood interior**  
**The score significantly raised in wood interior**

# Case of children nursery room 1 (Profitability)



How much additional price you would like to pay monthly?

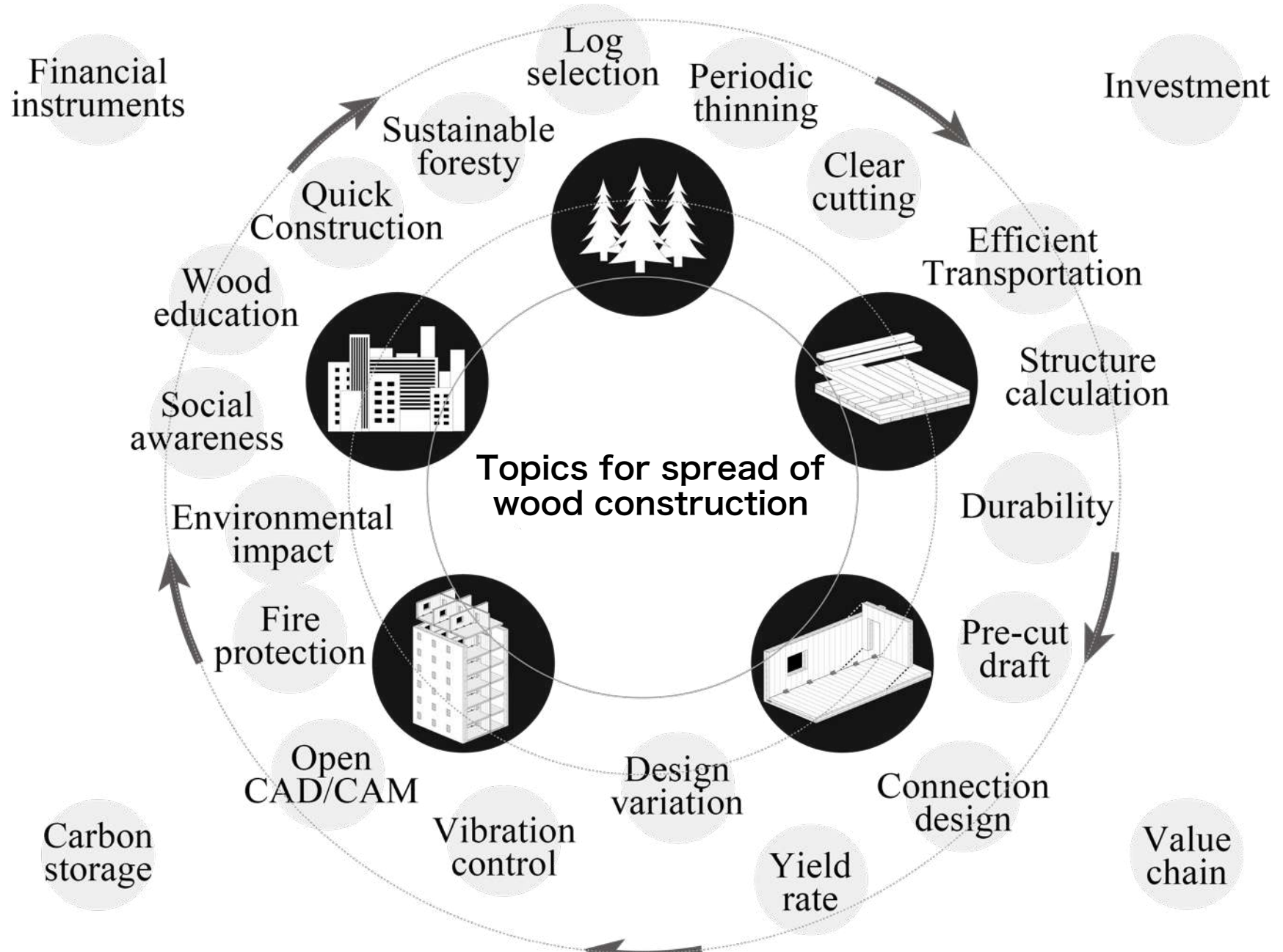
Wood interior  
Max 500, average 325 yen  
→ Good profitability

Mothers tend to pay more child care fee for wood interior



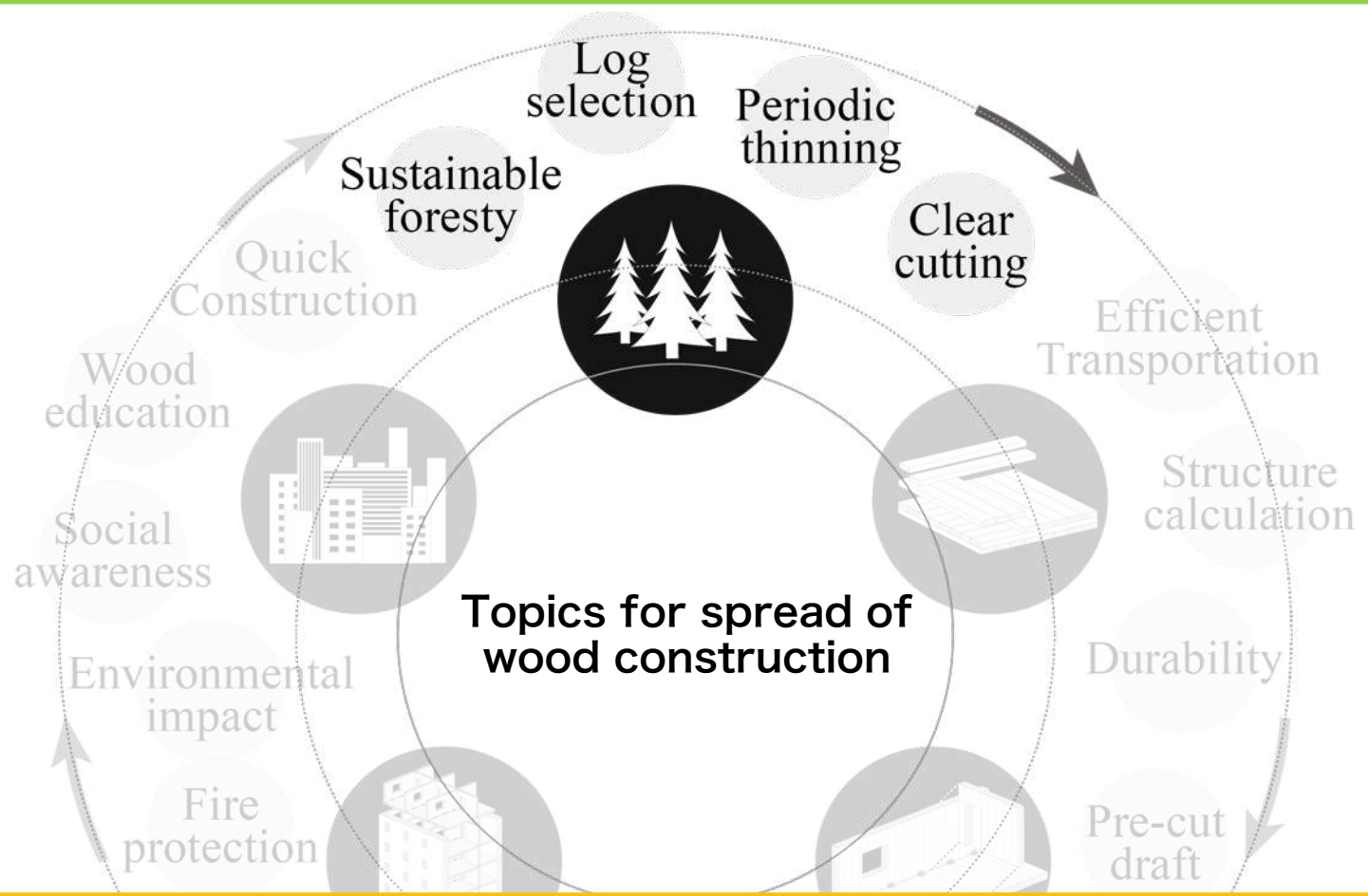
# **Towards sustainable wood construction**

# Diagram of Wood construction industry



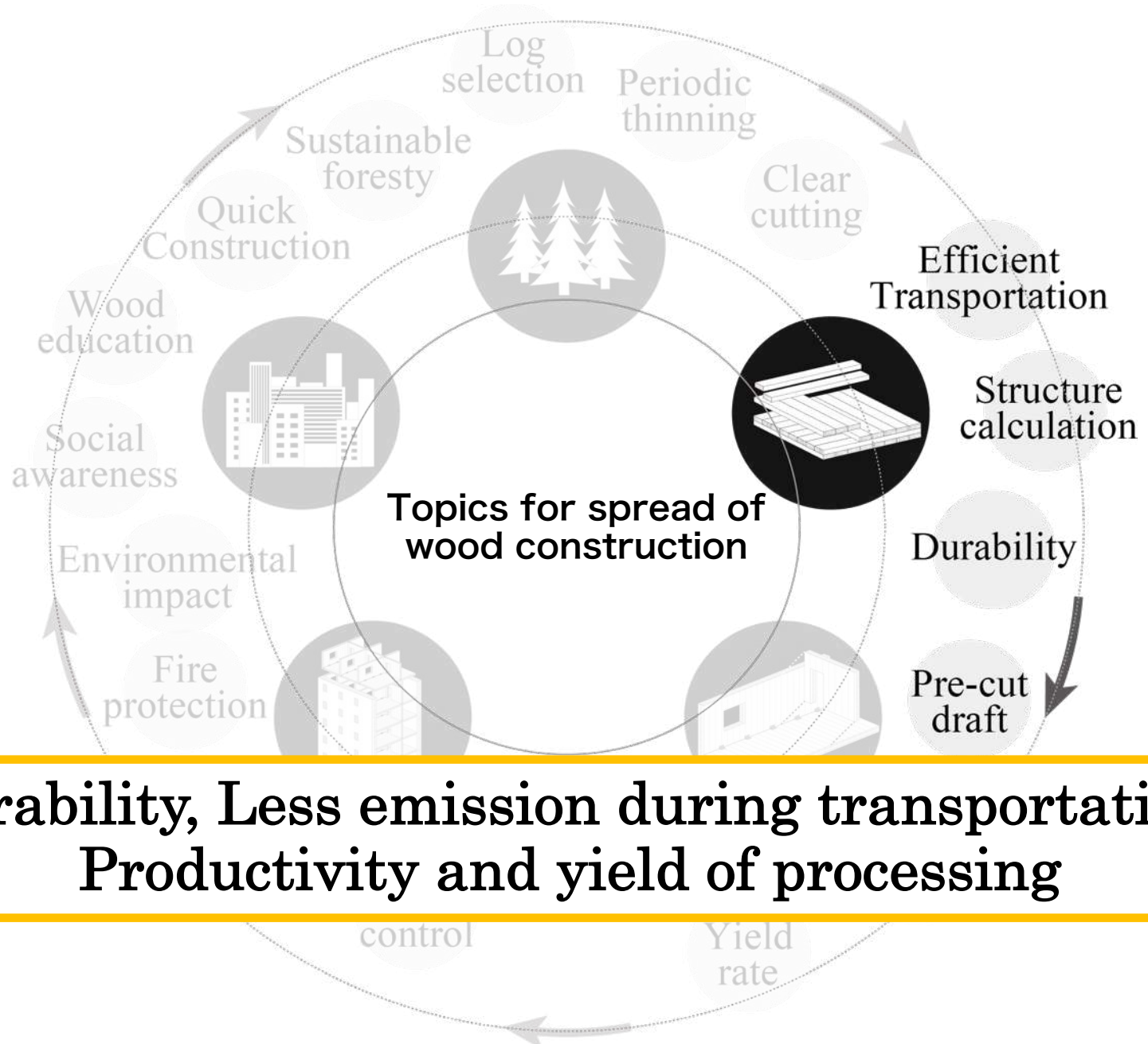


# Key factor for spread of wood construction



**Supply chain, Sustainable forest management, Productivity and yield of production process of wood products**

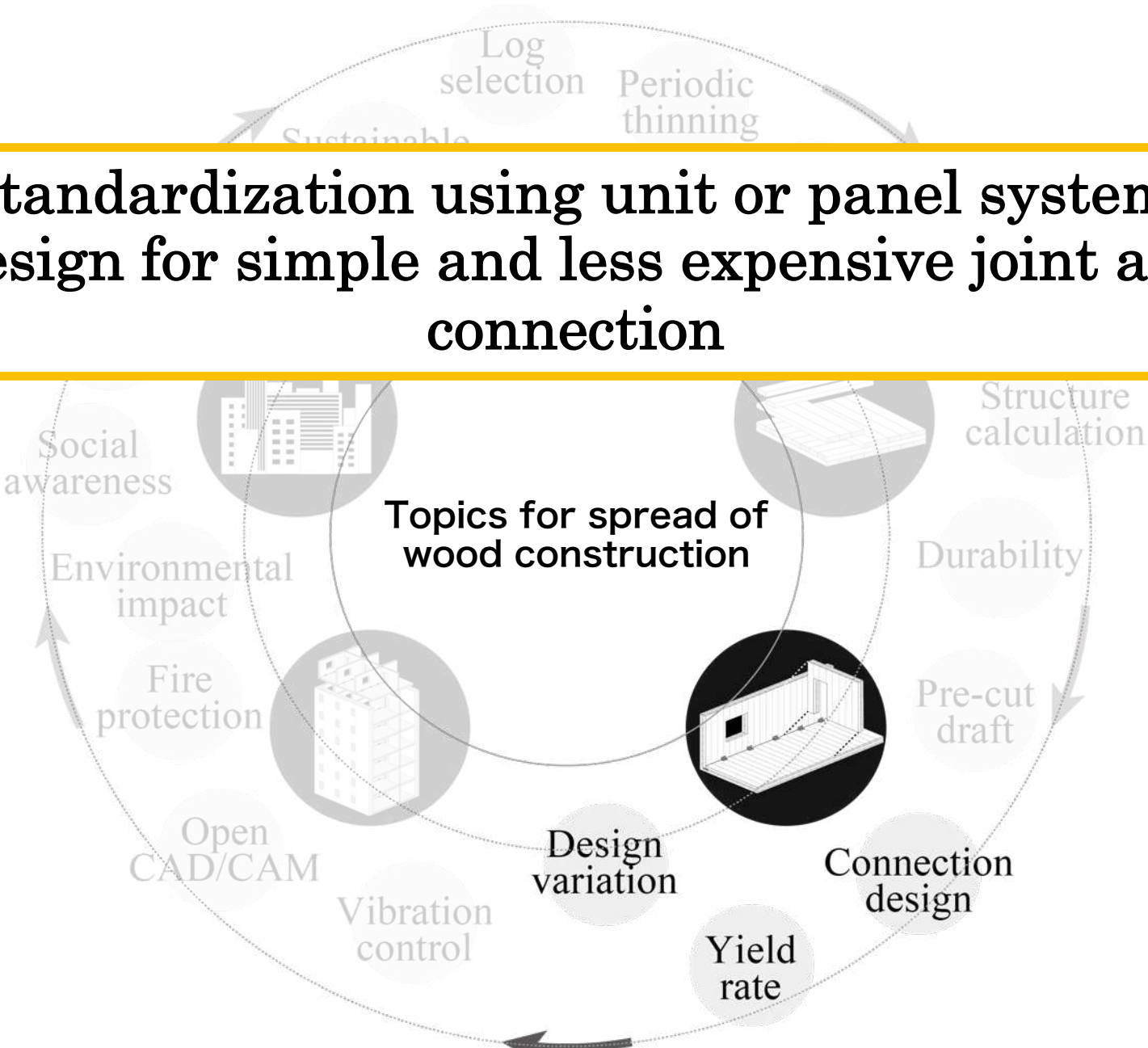
# Key factor for spread of wood construction



**Durability, Less emission during transportation, Productivity and yield of processing**

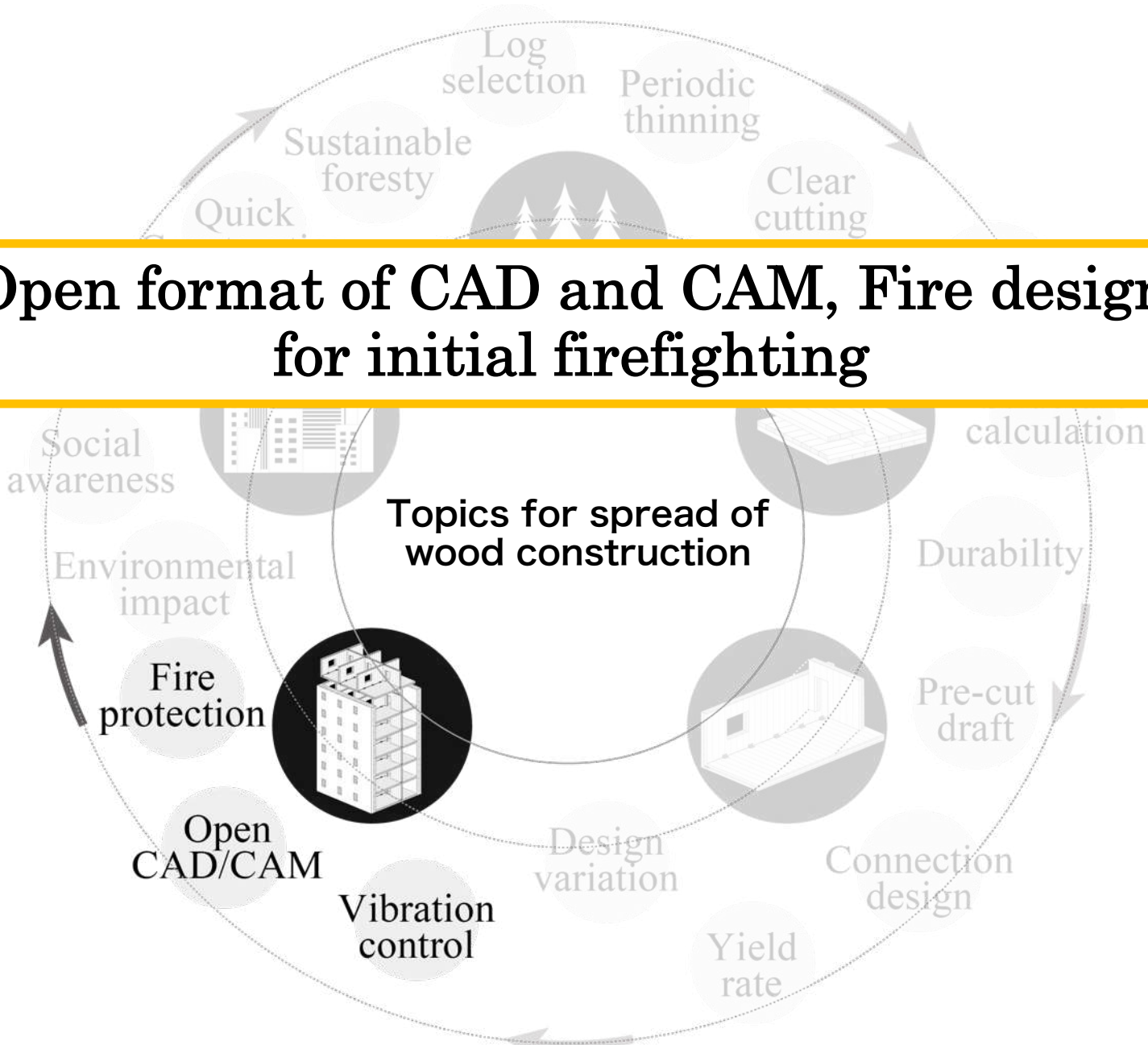
# Key factor for spread of wood construction

**Standardization using unit or panel system,  
Design for simple and less expensive joint and connection**

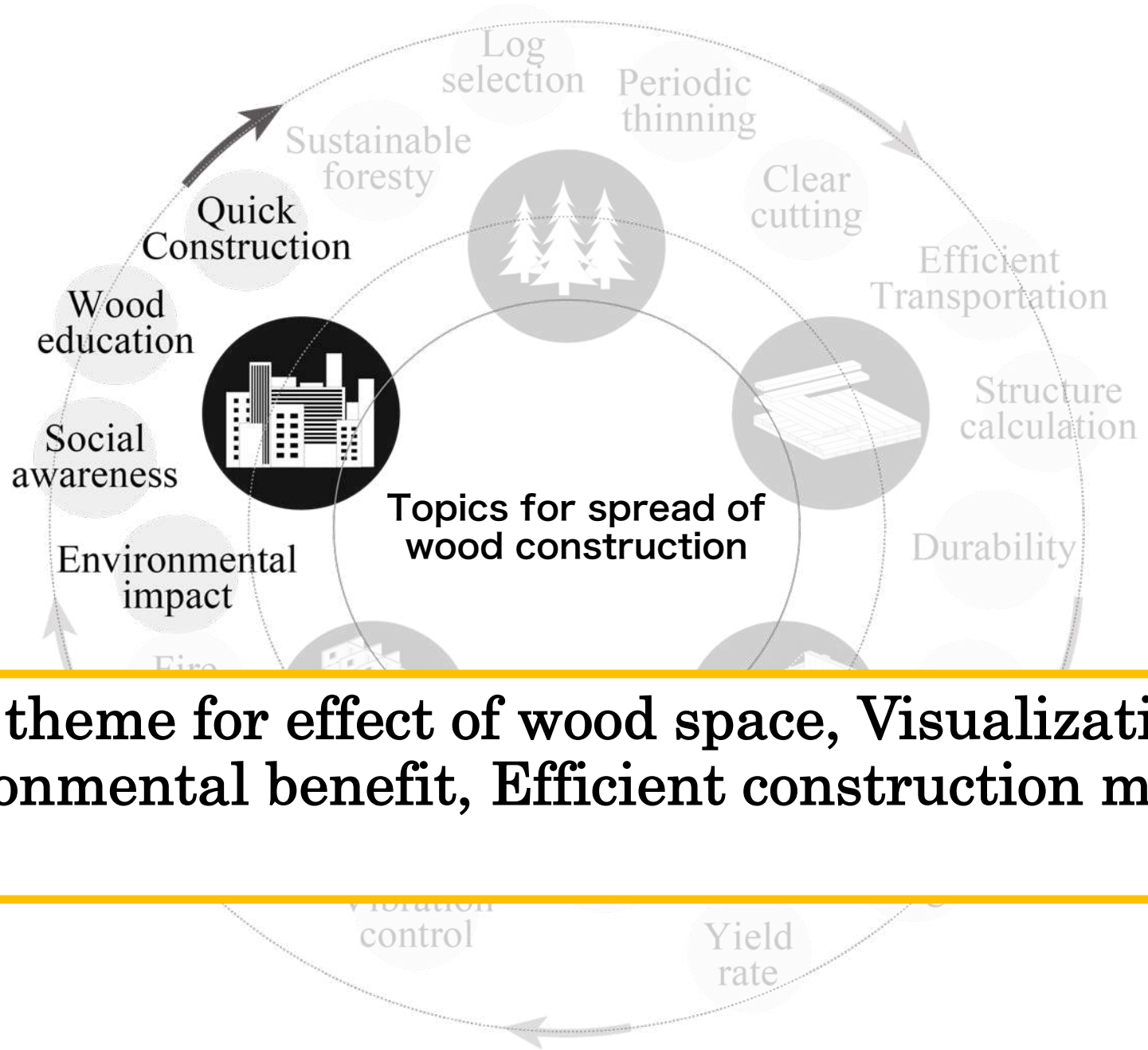


# Key factor for spread of wood construction

**Open format of CAD and CAM, Fire design for initial firefighting**

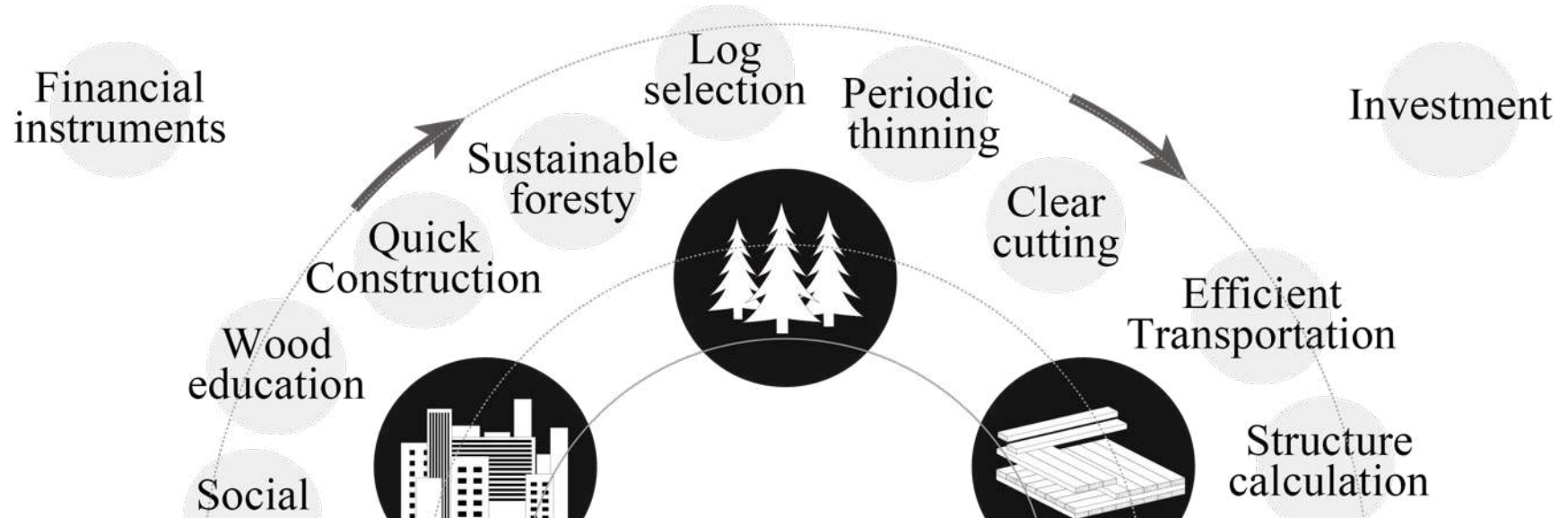


# Key factor for spread of wood construction

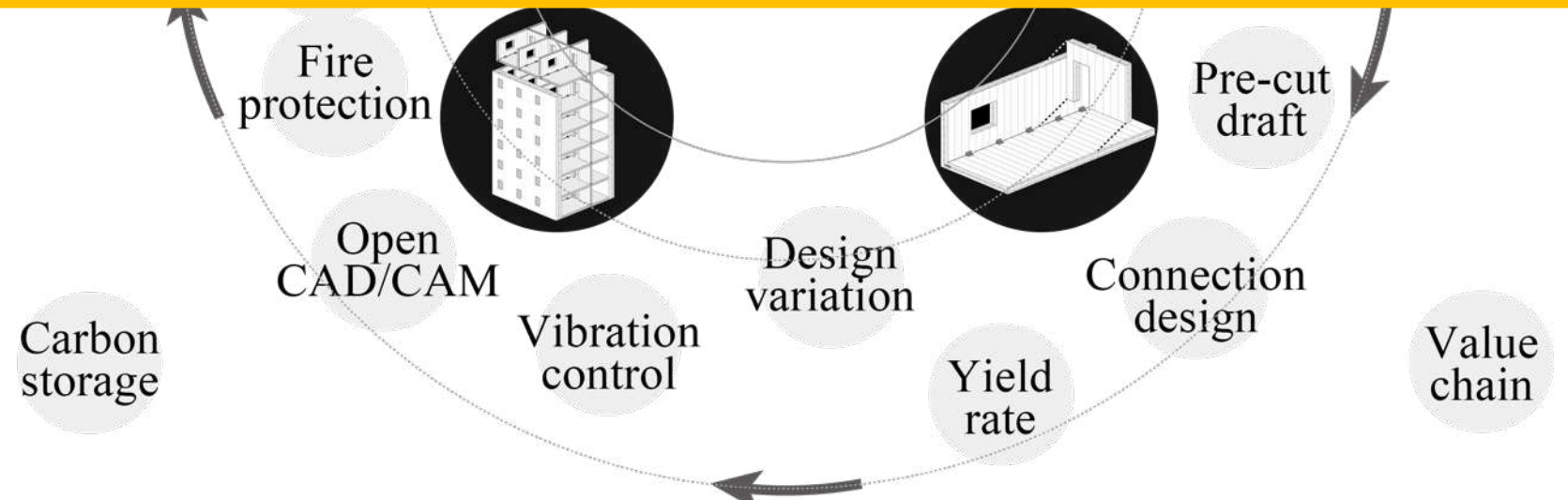


**New theme for effect of wood space, Visualization of environmental benefit, Efficient construction method**

# Diagram of Wood construction industry/ 木造業界の見取り図



**A lot of common topics for research and practical collaboration!**



# Summary

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1. Improve **cost competitiveness** by **standardization** and large-scale production of wood products
2. **Law rationalization** of **fire regulations** and **restriction on interior finish** by evidence such as experiments and practices
3. **Visualization** of **positive effect** and **benefit** of wood construction and wood utilization

Activities to keep up the trend of wood construction!!

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**Kiitos! / Thank you!**

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