A regional management approach to sustainable forest development: Integration of economic growth and environmental conservation in Hinohara village, Tokyo

Hiroaki Itakura [1]*

[1] Advanced Institute of Industrial Technology
*Corresponding author: Hiroaki Itakura, itakura-hiroaki@aiit.ac.jp

Abstract This study analyzes the integration process of conflicting values - sustainability and economic growth - from a regional management perspective. Through a detailed case study of Hinohara Village in Tokyo, we examine how regional management approaches can effectively coordinate diverse stakeholders, including local governments, traditional forestry businesses, new entrepreneurs, and community members. The research methodology combines longitudinal analysis of Japanese forestry policies with empirical investigation of contemporary regional management practices. Our findings demonstrate that effective regional management can: (1) facilitate collaboration between traditional forestry knowledge holders and innovative business ventures; (2) coordinate stakeholder interests in developing new revenue streams through carbon offset programs and biomass energy initiatives; and (3) create value chains that connect local timber resources with high-end markets through traditional construction methods. The study reveals how regional management serves as a crucial framework for addressing structural challenges such as aging population, infrastructure limitations, and regulatory constraints. Based on these findings, we propose a comprehensive regional management model that emphasizes adaptive governance, stakeholder engagement, and value creation through local resource utilization. This model provides practical insights for regional managers and policymakers seeking to achieve sustainable local development while balancing environmental conservation with economic growth.

Keywords regional management; stakeholder coordination; sustainable development; forestry revitalization; value chain development

1 Introduction

From the perspective of regional management, this research analyzes the integration process of conflicting values between sustainability and economic growth in regional businesses. We examine the decision-making process through collaboration among diverse stakeholders, including local governments, businesses, residents, civic organizations, and external forces (outsiders). Through case studies such as Hinohara Village in Tokyo, we aim to clarify specific measures and their effects in achieving both environmental conservation and economic development, and to develop a regional management model for sustainable regional development

2 Economic Growth and Sustainability

Advanced nations have long achieved economic development by seeking resources and labor from developing countries (peripheral nations) - a process known as "economic externalization." However, this development model is now at a major turning point. As former peripheral countries have achieved remarkable economic development, securing cheap resources and labor has become increasingly difficult. The rapid industrialization of Asian countries, including China and India, has significantly changed the global economic structure. These countries are no longer mere sources of re- sources and low-wage labor but have emerged as powerful economic actors.

Even more serious is the environmental impact. Environmental problems caused by human economic activities, such as climate change, loss of biodiversity, and marine pollution, are no longer issues confined to specific regions but have become global crises. In particular, the large-scale movement of people and goods associated with global supply chains causes enormous CO_2 emissions. This significantly contradicts the di- rection aimed for by the United Nations Sustainable Development Goals (SDGs).

The SDGs suggest the importance of bringing production and consumption sites as close together as possible. They also emphasize the significance of local economic activities, such as reducing environmental impact from transportation and prioritizing regional sustainability. This indicates that developing sustainable business models utilizing local resources will be key to future economic development.

Under these circumstances, regional businesses are discovering new possibilities. The main advantage of regional businesses lies in reducing environmental impact through shortened transportation distances and promoting circular use of local resources. Additionally, creating economic circulation within regions and generating employment while retaining talent directly contributes to regional economic revitalization.

Furthermore, regional businesses create social value through strengthening communities and preserving traditional culture and technologies. They also contribute to improving economic resilience by strengthening supply chains and building crisis-resistant economic structures.

Regional business is not merely a geographical constraint on economic activity but an opportunity to create new value. The possibilities are diverse, including: development of products and services leveraging regional characteristics, innovation

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through fusion of traditional and modern technologies and differentiation through addition of environmental value establishment of uniqueness through co-creation with com- munities

The economic development model dependent on externalization is no longer sustainable. The deepening environmental crisis and changes in global economic structure demand the construction of a new development model. Regional business holds potential as a promising solution to this challenge. It's not simply a "return to local" but rather the construction of a new economic model combining sustainability, efficiency, and innovation.

Now is the time to maximize regional resources and possibilities to achieve sustainable economic development. It is also a challenge to pursue true prosperity while maintaining harmony with the environment. While this transition won't be easy, it's an unavoidable path. The development of regional business will surely be a solid step toward a sustainable future.

3 History of Japanese Forestry and Timber Self-Sufficiency Rate

3.1 Overview

Japan is a verdant country with forests covering approximately 70% of its land area. With this abundant forest resource background, forestry once flourished as one of Japan's important industries. From the post-war reconstruction period through the high economic growth period, Japan's timber demand rapidly expanded, and domestic forestry increased production to meet this demand.

As of 1960, Japan's timber self-sufficiency rate was high, with 87.0% of total timber demand being met by domestic materials. During this period, Japanese forestry was booming, and forestry was a major livelihood in many mountain villages. However, the increase in timber demand accompanying rapid economic growth proceeded at a pace exceeding the supply capacity of domestic forest resources.

To fill this supply-demand gap, the Japanese government promoted timber import liberalization. In 1961, the "Emergency Measures for Timber Price Stabilization" was decided, and timber imports were expanded. Furthermore, throughout the 1960s, the import liberalization of logs, lumber, and plywood was implemented in stages. This resulted in the influx of large quantities of cheap imported timber into the Japanese market.

The increase in imported timber rapidly decreased Japan's timber self-sufficiency rate. After 1969, the supply of imported timber exceeded domestic timber, and by 1973, the timber self-sufficiency rate had fallen to 35.9%. Furthermore, by 1996, the self-sufficiency rate dropped to 20.0%.

This decline in timber self-sufficiency had serious implications for domestic forestry. Due to competition with cheap imported timber, domestic timber prices fell, and forestry management profitability deteriorated. As a result, many forest owners abandoned forestry, and forest maintenance became neglected. The number of artificial forests without proper operations such as thinning increased, raising concerns about the decline in the multifaceted functions of forests.

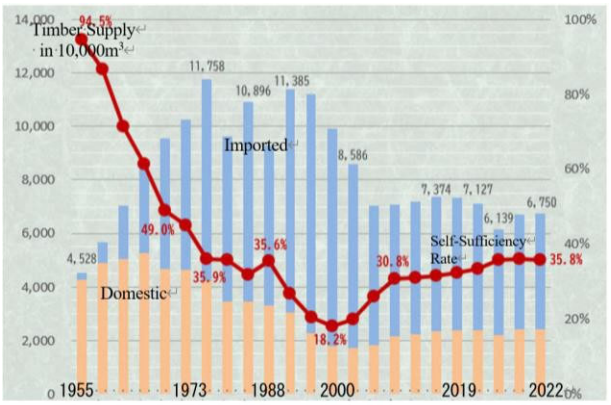

Fig. 1 Trends in Japan's Timber Self-Sufficiency Rate[2]

3.2 Forest Deterioration

Domestic forestry gradually lost its competitiveness when faced with price competition from imported timber. With falling timber prices, forest owners were left with almost no profit after deducting harvesting costs from the sale of standing trees. This led to a dramatic decrease in forestry workers, and many mountain villages experienced depopulation.

An even more serious problem was that the decline of forestry led to forest deterioration. With insufficient income from timber sales, it became difficult to secure the costs necessary for forest maintenance such as thinning. As a result, the number of forests without proper management increased, leading to higher risks of landslides and a decline in the forests' multifaceted functions.

3.3 Structural Changes in the Timber Industry

Japan's traditional timber industry was predominantly characterized by small-scale sawmills and wood processing facilities scattered throughout regions, utilizing local forest resources. These small-scale factories produced various wood products according to local demand, though they had limitations in drying technology and processing precision.

However, with the liberalization of timber imports, large-scale wood processing factories were established, particularly in coastal areas. These factories had equipment capable of efficiently processing large quantities of imported timber and

could produce large volumes of quality-stable wood products by introducing advanced drying technologies and precise processing techniques.

Progress in Standardization: The construction industry began demanding standardized wood products for improved construction efficiency and quality stability. Standards such as Japanese Industrial Standards (JIS) and Japanese Agricultural Standards (JAS) were established, and demand for products meeting these standards increased. Large-scale imported timber processing factories developed systems capable of consistently supplying products conforming to these standards.

Decline in Domestic Timber Competitiveness: Domestic timber was placed at a competitive disadvantage against imported timber due to the following factors:

a) Transportation Costs: Due to Japan's geographical characteristics, transportation costs from mountain forests to processing facilities and consumption areas tended to be high. In contrast, imported timber could be transported in large quantities at low costs via sea transport, making it particularly advantageous for large-scale coastal factories.

b) Supply Stability: Domestic timber was susceptible to weather and terrain conditions, making stable supply difficult. In contrast, imported timber could be procured systematically from countries with large forest resources, ensuring higher supply stability.

c) Quality Uniformity: Domestic timber, produced under small-scale and dispersed production systems, was prone to quality variations. Meanwhile, imported timber processed in large-scale factories maintained quality uniformity through advanced drying and processing technologies.

In the 1975s, "precut" technology was developed to process wooden house components in factories in advance. Precut materials required high-precision lumber for reducing construction time and costs, which also gave quality-stable imported timber an advantage.

4 Current Status and Initiatives in Hinohara Village, Tokyo

4.1 Overview

Hinohara Village, the only village in Tokyo Prefecture excluding island areas, was once prosperous in forestry and lumber industries due to its mountainous location. However, like other regions in Japan, the number of forestry workers has drastically decreased. With over 50% of the population aged 65 or above, most forest land is now abandoned. Wildlife damage from bears and wild boars has also become a recent problem.

While potato cultivation and konjac manufacturing are carried out, production volumes are limited due to the small, mountainous agricultural areas.

Currently, tourism utilizing the magnificent natural features such as waterfalls and valleys is flourishing. Although the village has no railway access, its location just over an hour by car from central Tokyo and its uniqueness as "Tokyo's village" often attracts media attention. However, with only Tokyo Metropolitan Roads 33 and 205 as paved roads, which merge at the village entrance leading to central Tokyo, weekend traffic congestion diminishes residents' convenience, making them less enthusiastic about accepting tourists.

4.2 Revitalization of the Wood Industry

Japan aims to increase domestic timber demand and promote industries such as construction and furniture manufacturing using local timber rather than relying on imports. Particularly in mountainous regions, construction and infrastructure development using local timber can potentially generate economic benefits while enhancing regional brand value.

Examples of forestry revival initiatives in Hinohara Village include:

(1) Tanaka Forestry's Initiatives

The Tanaka family, now led by Soichi Tanaka as the 14th generation head, is a long-established family that expanded from charcoal making and sericulture to forestry. They have long focused on sustainable forest management, actively engaging in forestry by personally maintaining 40km of forest roads. They have also obtained LEAF, an international forest education qualification, and operate forestry cottages, actively promoting forestry education.

(2) Forest Ventures by New Residents

Tokyo Chainsaws is a forest venture started by Ryosuke Aoki, a new resident. While timber markets typically only distribute straight, knot-free trunk sections suitable for construction materials, leaving other parts in the mountains, they attempt to increase wood value through initiatives like "whole tree sales," which markets branches, bark, and top sections as unique wood characteristics. They also engage in projects promoting wood's appeal, such as the "Forest Delivery" work- shop for schools and kindergartens, and "Let's Make a Desk at Age 6," where parents and children create desks together.

Other innovative approaches by new residents, such as

Wood Box Co., Ltd., which manufactures and sells products using essential oils extracted from Hinohara timber, are bringing out new appeal in wood materials.

4.3 Utilization of Biomass Energy

Hinohara village promotes biomass power generation using thinned wood and forestry waste. This is expected to improve energy self-sufficiency rates and create local employment. Particularly in rural areas, this promotes economic circulation through local energy production and consumption.

Previously unused materials such as abandoned thinned wood and timber from forest maintenance and forest road construction are now being retrieved from mountains. Wood that was once left in the mountains is now effectively utilized as firewood material.

Hinohara Village has introduced a wood-fired boiler at the Kazuma no Yu hot spring center and a wood chip boiler at the Hinohara Yasuragi no Sato (welfare complex facility). At Yasuragi no Sato, heat generated from burning wood chips is used for hot water supply and air conditioning throughout the building. The village has also introduced pellet stoves and wood stoves in public facilities.

4.4 Ecotourism and Forest Recreation

By properly managing forests and maintaining forest roads, resources can be utilized as tourist attractions to draw visitors to the region. Particularly with growing interest in health and natural environments, forest bathing and ecotourism have the potential to bring new revenue sources to rural areas.

The Hinohara Tokyo Citizens' Forest features the Otaki Trail, which was certified as a "Forest Therapy Road" in March 2007, offering scientifically proven forest therapy experiences. With its advantageous location in Tokyo and scenic beauty including valleys and waterfalls, it has significant potential to attract many tourists.

5 Future Prospects

5.1 Promotion of Carbon Offset

There is growing interest in initiatives that evaluate forests' CO_2 absorption capacity as economic value and utilize it for corporate carbon offsetting. Companies can demonstrate concrete environmental commitments by purchasing carbon credits from forest conservation activities to offset greenhouse gas emissions from their business activities. This plays an important role in promoting corporate GX (Green Transformation) and can lead to improved evaluation from investors and consumers. While most current carbon credit trading involves overseas forests, contributing to domestic forest conservation could potentially lead to more direct enhancement of corporate value.

However, this approach faces significant challenges. Forest absorption credits are less utilized compared to reduction credits from energy conservation and renewable energy. This is due to the costs associated with continuous forest maintenance and monitoring, as well as complex procedures for forest owners. There are also issues with the effective utilization of carbon credit and forest environment tax systems at the local level. The forest environment tax is distributed based on forest area (50%), population (30%), and number of forestry workers (20%), creating mismatches between actual forest management needs and budget allocation. The concentration of budgets in urban areas with high populations, rather than depopulated areas with large forest coverage, deviates from the system's original purpose.

Furthermore, carbon credit trading faces transparency challenges. Previously dominated by private transactions, there have been issues with transaction smoothness and price transparency. The establishment of the J-Credit market on the Tokyo Stock Exchange in October 2023 is expected to address these challenges. However, some problems cannot be solved by market mechanisms alone. While carbon pricing tends to prioritize corporate and investor perspectives, system design must adequately consider the realities of local communities and forestry workers who actually manage the forests.

5.2 Creating Value for Domestic Timber Through Promotion of Traditional Construction Methods

Traditional wooden buildings that trace their lineage to shrines and temples are now virtually impossible to build as they don't conform to the Building Standards Act. This Act was originally legislation to regulate post-war temporary buildings. It allowed even less skilled craftsmen to meet certain safety standards through legal requirements. Skilled craftsmanship has become rare.

In traditional architecture, craftsmen would examine each tree available from the forest individually and consider appropriate uses for house construction. However, post-war mass housing production required uniformly processed timber from large factories, making imported timber more suitable due to its consistent quality and large-scale availability.

The main reason traditional construction methods don't comply with the Building Standards Act is that they don't anchor the foundation to concrete bases. However, this doesn't necessarily mean traditional methods are weak against earthquakes.

Buildings constructed using traditional methods often survive earthquakes by not being rigidly connected to the ground. The survival of shrines, temples, and five-story pagodas through numerous earthquakes demonstrates the excellence of traditional architecture.

While modern houses, though wooden, are composites of industrial products including concrete, metal, and plywood, traditional construction methods create houses using only wood, without even nails. Though durable, these buildings naturally decompose even when no longer used, aligning with SDGs principles.

With global deforestation becoming an issue and the "wood shock" occurring around 2021, timber supply and demand are tight. The current timber market approach, premised on large volumes of imports, needs review. Japanese timber's issues with distribution costs and quality uniformity can be resolved by using locally produced lumber in small-scale factories for traditional construction. This requires reviewing the Building Standards Act and would significantly contribute to reducing carbon dioxide emissions from cargo transport.

Houses built without a single nail have become luxury items in modern times. In Japan, Western-style houses are considered stylish, and even luxury homes often feature West- ern architecture, which isn't suited for cedar and cypress. However, Japanese gardens are popular among wealthy people overseas, with 70% of Nishikigoi (ornamental carp) from Nagaoka City, Niigata Prefecture, being exported. While traditional Japanese architecture is also popular, overseas Japanese-style buildings often seem somewhat "disappointing." Just as cedar and cypress don't quite fit Western-style architecture in Japan, overseas timber and construction techniques don't suit Japanese-style architecture. By marketing traditional Japanese architecture to wealthy overseas clients, Japan could potentially transform from a timber-importing country to an exporting one.

5.3 Forest Maintenance and Industrial Development Through Bamboo Utilization

One of the serious problems facing Japanese forests is the rapid expansion of bamboo forests. Bamboo, considered one of the fastest-growing plants in the world, has remarkable reproductive power. Through its rhizome-based reproduction method, it spreads to surrounding areas at an astonishing rate when left unmanaged. Traditionally, Japanese people utilized bamboo in various aspects of daily life, including fixtures, tableware, and crafts. However, with industrialization and the emergence of new materials, its use rapidly declined. In particular, bamboo's characteristics of hard fibers and difficult processing were deemed unsuitable for mass production, and traditional bamboo products gradually disappeared.

Neglected bamboo forests cause various environmental problems. Bamboo's rhizomes are relatively shallow and lack the deep flood control function of tree roots. Therefore, they increase the risk of landslides during heavy rains. Deterioration of groundwater quality is also a concern. This problem is no longer just an issue for mountainous areas. Dense bamboo forests are now appearing even in areas adjacent to residential areas.

However, in recent years, this bamboo, once considered a "nuisance," is gaining new attention as an environmentally friendly material. This is driven by growing concerns about environmental pollution from plastics. Bamboo's extremely rapid growth holds great potential as a sustainable resource. One particularly noteworthy initiative is "Modocell," developed by Amica Terra Co., Ltd. This innovative material is created by crushing bamboo into pellets and binding them with starch, serving as a plastic alternative. A notable practical feature is that it can be used with existing plastic manufacturing molds. It has already been implemented as straws and table- ware in restaurant chains like "Watami."

Furthermore, bamboo utilization is diverse. Development of tissue paper and paper products using bamboo chips is progressing. Bamboo fiber is known for its antibacterial and deodorizing properties, and its use in clothing and bedding is being considered. In construction materials, new products like bamboo laminated lumber are being developed, steadily expanding its applications. Disposable products, in particular, represent an ideal use that leverages bamboo's characteristics. While many plastic products persist in the environment despite being designed for single use, bamboo products are biodegradable and have low environmental impact. Additionally, bamboo's remarkable growth rate enables sustainable supply for disposable product materials.

Thus, bamboo, once considered a "problem child," is being reevaluated as a resource with potential to solve contemporary environmental issues. Bamboo utilization offers the possibility of simultaneously addressing both abandoned bamboo forest problems and environmental impact reduction.

However, several challenges remain in further developing these initiatives. These include establishing bamboo collection and transportation systems, improving processing technology, and stabilizing product quality. Additionally, consumer understanding and support for environmentally conscious products are essential for the widespread adoption of bamboo products.

6 Conclusion

Japan has been considered a resource-"poor" country and achieved economic development by externalizing resources, including food. However, regarding forest resources, which occupy 67% of the country's land area, there has been a continuous increase since the post-war period. Ironically, this increase is deeply connected to the decline of forestry. With the liberalization of timber imports, domestic timber lost its price competitiveness, resulting in inadequate forest management. However, these "neglected resources" may hold potential as Japan's new competitive advantage.

Particularly noteworthy are new forest utilization movements that combine tradition and innovation, as seen in Hinohara Village's case. Initiatives such as Tanaka Forestry's sustainable forest management and Tokyo Chainsaws' new value creation for timber suggest future directions. Additionally, the exploration of forests' multifaceted values beyond timber use, such as biomass energy utilization and forest therapy, is progressing.

Furthermore, new possibilities are emerging, including carbon offset promotion, reevaluation of traditional construction methods, and innovative bamboo utilization. Particularly as global environmental awareness and interest in SDGs increase, Japan's forest resources and traditional techniques may become strengths in the global market.

To ensure the success of these initiatives, policy support is needed, such as reviewing the Building Standards Act and improving carbon credit systems. Additionally, creating sustainable mechanisms that fully consider the circumstances of local communities and forestry workers is important.

The utilization of forest resources holds potential as a uniquely Japanese solution to the contemporary challenge of balancing environmental conservation with economic development. It's not merely resource development but an initiative to create new value while leveraging regional traditions and culture. Moving forward, we must further pursue these possibilities and connect them to concrete results.

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