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Conserving Thailand's Wooden Built Heritage: Developments, Approaches, and Current Challenges

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ABSTRACT

This study investigated the developments and current status of stakeholders involved in preserving wooden heritage in Thailand, specifically from the government, private sectors, and academia. The methodologies consisted of documentary analyses, in-depth interviews, and on-site observations of wooden conservation sites.

The findings revealed three periods in the development of wooden built heritage: government-led building registration, the evolution of conservation approaches by various stakeholders including private and academic entities, and a collaborative phase emphasizing intangible aspects such as craftsmanship. The study examined current wooden conservation approaches, expanding from traditional methods applied in registered buildings to contemporary and flexible conservation approaches in non-registered buildings. In the non-registered building type within the private sector, there was a need to assess multidimensional aspects beyond cultural values. The results also highlighted several challenges in the preservation of wooden built heritage in Thai context. Firstly, there was the issue of wood resource management. Secondly, the challenge arose in conservation mechanisms such as analyzing drawings, conducting proper surveys, and maintaining carpenter skills. Lastly, the challenge was also encountered in the maintenance of wooden built heritage.

The study recommended conservation support for the private sector, addressing their lack of regulatory protection. Firstly, it proposed the implementation of flexible policies or regulations that are specifically designed for wooden heritage. Secondly, the study suggested establishing supportive information platforms dedicated to wood-related knowledge. Lastly, it emphasized the importance of raising public awareness in preserving wooden built heritage.

Keywords: wooden architecture, heritage, flexible conservation, stakeholder, Thailand

INTRODUCTION

Wooden architectural heritage in Thailand faces many challenges such as climate, budget constraints, and regulations, yet it also contends with the rapid growth of urbanization and other factors (Tansukanun, 2015). Limited resources and budget allocations often hinder comprehensive restoration and maintenance efforts. Consequently, there has been a growing interest and awareness in the conservation of wooden architecture in recent years.

Efforts by the government, academic institutions, and local communities are being made to promote the preservation and revitalization of historic wooden structures. For instance, in 2019, carpentry training courses were initiated by various stakeholders to develop the necessary skills for individuals interested in this field (The United Nations Educational, Scientific and Cultural Organization [UNESCO], 2019). This aligns with international initiatives; for example, Asia-Pacific Cultural Centre for UNESCO Nara (ACCU Nara) was announcing the annual group wood training course for young professionals in 2023 (ACCU, 2023).

The Act on Ancient Monuments, Antiques, Objects of Art, and National Museums (1934) primarily focuses on preserving archaeological sites, monuments, and historic buildings in Thailand. The historical abundance of forests has played a crucial role in the construction of heritage sites, which were often constructed from wood. In 1989, the Thai government implemented the prohibition of deforestation activities on privately owned land. This policy resulted in a decline in domestic timber production and a growing dependence on imported wood and alternative materials. Cutting trees on private land was only officially accepted in 2019. These complex situations encourage an exploration of the current status and future considerations regarding the sustainable conservation of wooden architectural heritage.

Integrating the management of wooden built heritage requires a comprehensive approach that encompasses multiple levels, both nationally and internationally. The paper aims to shed light on the progress and challenges of conserving wooden architectural heritage in Thailand. The ultimate goal of the study was to provide recommendations for the sustainable conservation and development of Thailand's wooden built heritage.

Objectives and Significance

The objectives of this study were to examine the developments and existing conditions related to the preservation of wooden heritage in Thailand, with a focus on the governmental, private sector, and educational realms. The research aimed to provide insights into the progress and challenges associated with conserving wooden architectural heritage in Thailand. The findings highlight specific areas where policymakers can direct their efforts to enhance the conservation of wooden heritage in the nation.

LITERATURE REVIEW

General Principles of Wooden Built Conservation

From a global perspective, the conservation approach has been expanding from monuments to various types of architecture such as historic buildings, vernacular architecture, and cultural landscape. At the beginning, The Athens Charter emphasized the preservation of the historic or artistic character of monuments (International Council on Monuments and Site [ICOMOS], 1933). The Venice Charter with a broader scope extended beyond individual architectural works to include settings, which underscored the importance of considering not only the works of art themselves but also their historical evidence (ICOMOS, 1964). The scope of conservation also concerns cultural value in vernacular architecture (ICOMOS, 1999) and the intangible dimension (UNESCO, 2003). Several documents emphasize the importance of respecting diverse cultural backgrounds (ICOMOS, 1994) and wooden built heritage from different regions (ICOMOS, 2017). The conservation gradually links with the circular economy (Huuhka & Vestergaard, 2020).

The conservation of historic timber structures starts in the forest, and should be focused on the

sustainable use of forest resources, including craftsmanship (Larsen & Marstein, 2016).

The significance of large-diameter timber and wood quality in Japan is a matter of concern (Mulligan & Lippit, 2014). In Indonesia, specifically in Sumatra, the tropical hardwood required to build or restore typical longhouses is becoming increasingly difficult to find, as they predict that the primary forest is likely to disappear completely by 2030 (Vellinga, 2021). Similarly, Nepal has faced challenges with a shortage of wood in conservation efforts (Shrestha, 2017).

Accurate diagnosis plays a vital role in the evaluation of wooden building deterioration. However, the survey process may be limited by budget and time constraints in the private sector (Tienthavorn, 2023). Conserving wooden heritage entails three essential components: materials, tools, and methods. Together, these elements collectively embody what is known as "local wisdom" (Viengsima, 2022).

In Thailand, the Act on Ancient Monuments, Antiques, Objects of Art, and National Museums (1934) primarily centered on the preservation of archaeological sites, monuments and historic buildings. The listed wooden buildings mainly include temples and palaces such as the sermon hall at Wat Yai Suwannaram and Vimanmek palace. The responsibility for the listed buildings lies with the Fine Arts Department (FAD), ensuring that the majority of officially listed ancient monuments and buildings receive government care and maintenance. However, it does not include local houses, despite their cultural value. Temples underwent significant renovations during King Rama III's reign from around 1824, while palaces experienced a similar trend during King Rama IX's reign from around 1946. However, throughout the entire period, houses underwent fewer renovations in comparison (Makka, 2020).

In 1989, the Thai government enacted the prohibition of deforestation activities occurring on privately owned land, with the aim of safeguarding and preserving the natural resources of the country. This policy had a noteworthy impact on the wooden industry associated with local construction in Thailand, leading to a shift away from domestic timber production and a heightened reliance on imported wood and alternative materials. This resulted in a higher cost of wood. However, the forest area was reduced to 31.68% in 2019, falling short of the government's objective to maintain forest cover of more than 40% (Seub Nakhasathien Foundation, 2020). In the recent Forestry Act of 2019, the private sector has been granted permission to cut and utilize trees within their own areas, creating an opportunity for them to establish and cultivate their own sources of timber.

Stakeholder’s Roles in Wooden Built Heritage

Integrating the management of wooden-built heritage is vitally important and requires collaboration across various sectors. Four dimensions were mentioned; government, private sector, education, and society (Valdebenito et al., 2021). Additionally, stakeholders can be classified into two categories, internal and external, based on their impact. Internal indirect benefits from it (Góral, 2015).

In many countries, the government plays an important role in wooden architectural conservation. For instance, in the UK, there are listed buildings and conservation areas classified into different grades, including national levels and those of special interest. There are approximately 400,000 listed buildings (Historic England, 2023a), with 68,000 of them being timber-framed (Historic England in Insurance Choice, 2019). The Planning (Listed Buildings and Conservation Areas) Act 1990 demonstrates the importance of not only buildings, but the local distinct scene affecting the town, village or countryside (Historic England, 2021). Considering that the majority of heritage sites in the UK are privately owned, it is advisable to transfer them to public control. Any intervention, such as demolition, renovation, or extension, necessitates obtaining a listed building consent. This transfer enables proper repairs and effective monitoring of the buildings or sites, potentially with the assistance of grant financing (Historic England, 2023b).

In Japan, the Agency for Cultural Affairs is responsible for the protection of cultural properties (Agency for Cultural Affairs, 2018). There are various types of designated cultural

properties, which encompass a wide range of cultural and historical significance. Over 4,800 buildings hold Important Cultural Property status at a national level. Local administrations have designated 10,000 more as cultural properties, with a similar number listed as registered buildings. Overall, around 90% of these heritage buildings in Japan are constructed with wood. The Japanese Association for Conservation of Architectural Monuments (JACAM) is a national organization comprising conservation architects. At present, this organization is affiliated with more than 100 highly qualified specialists who hold certifications as conservation architects (JACAM, n.d.). Besides, USA and Malaysia also support the registration of sites at a local level (Pimonsathean, 2022).

The conservation movement began with a strong emphasis on material-based strategies, which were driven by experts in the field. As time passed, the movement shifted towards embracing value-based perspectives and increased community involvement. Nowadays, the emphasis is on a living heritage approach, where the community holds more power in the conservation process. This approach considers communities and sites as an inseparable entity, shifting the focus from preservation to continuity (Poulios, 2014). In certain cases, such as the Saint Paul Church in Thailand, a multi-stakeholder entity is at play. Residents have generously donated funds for the restoration of the buildings, and several private companies specializing in roof tiles, floor tiles, and paints have also contributed construction materials (Silapacharanan, 2016).

The work of Norwegian architect Kristian Bjerkne serves to illustrate the inherent diversity of value in the field of architecture, emphasizing that the importance of buildings transcends mere commemorative value. He introduces the notion of "present-day values," placing emphasis on their adjustment to contemporary living conditions. This observation underscores the interplay between theory and practice in the realm of architecture (Ahmer, 2020).

METHODOLOGY

The study employed qualitative research to explore conservation situations. Three data collection methods were utilized: literature reviews on the conservation of wooden architectural heritage, including the analysis of international conservation cases; on-site surveys to gather ground-level information; and semi-structured interviews. Purposive sampling was employed, and a total of 9 interviewees participated, with at least 3 individuals from each group: the government sector, the academic sector, and the private sector.

The interviewees from the government sector comprised individuals affiliated with the Fine Arts Department, encompassing both current and former members. They actively engaged in practical initiatives, and one among them has made contributions to publications focusing on the preservation of wooden heritage. Within the private sector, the interviewed architects specialize in wood architecture and conservation projects. In the academic sector, both full-time and part-time lecturers are involved, each dedicated to both working and lecturing on wood heritage content.

The questions for the three groups addressed these main issues, albeit with slight variations in content: conservation principles, scope of work, the adaptation of local knowledge, work collaboration, and limitations. The methodology employed thematic analysis and constant comparison as techniques for data analysis. In the analytical process, it includes reading the data, searching for contextual meaning, conducting content comparison analysis, exploring data relationships, and validating findings through triangulation.

FINDINGS

The findings identified two areas: the first part revealed three periods of wooden heritage development, and the criteria for each period included considerations of conservation approaches, conservation methods, and relevant stakeholders. The second part focused on current situations, encompassing present approaches and challenges, within three sectors: government, private, and academic.

Part 1: Three Periods of Wooden Built Heritage Development In A Thai Context

Period 1: The period of the initiation of the building registration process by the government,1930s (circa B.E. 2470)

King Rama VI was concerned with the management of the preservation of ancient sites from around 1923 (Palakavong Na Ayudhya, 1994). The primary focus has been on preserving the physical aspects of cultural artifacts, with particular attention paid to monuments, antiques, objects, and archaeological sites that have significant historical value as national property. It was the government's responsibility to maintain and preserve listed archaeological sites or buildings, with the FAD being the main organization for these conservation projects. Permission from the Director-General was required for anyone seeking to repair or modify a listed building. During this period, the key document was the Act on Ancient Monuments, Antiques, Objects of Art and National Museums of 1934. Most of the emphasis was on historical value rather than other values. Many temples were renovated in this period such as Wat Ratchabophit and Wat Phra Kaew (Palakavong Na Ayudhya, 1994).

During those times, officially registered ancient monuments were constructed using various types of materials such as stone, brick, and concrete. For wooden built heritage, the tripitaka hall at Wat Absonsawan Worawihan, Bangkok, is one example of wooden built heritage officially registered in 1977 (Figure 1). As part of the FAD conservation process for this tripitaka hall, systematic surveys and documentation were conducted.

The approach and methods were aimed at conserving and restoring the Tripitaka Hall to its original state, emphasizing the conservation of high-quality craftsmanship (Fine Arts Department, 2022). Regarding unregistered archaeological sites having national value, it can be challenging for the government to actively monitor and protect all potential sites, especially in remote areas.

Figure 1

An Example of an Officially Registered Wooden Built Heritage: Tripitaka Hall at Wat Absonsawan Worawihan, Bangkok

Period 2: The period of development of conservation approaches and processes among various stakeholders, 1970s (circa B.E. 2520)

At a policy level, conservation efforts were integrated into the fourth national economic and social development plan (1977–1981). Additionally, during the 1982 Rattanakosin 200 Year Anniversary, numerous cultural events took place to commemorate the occasion. Furthermore, during this period, several private organizations emerged, such as the Society for the Conservation of National Treasure and Environment (SCONTE) in 1971. It is evident that various stakeholders were actively involved in developing their own conservation processes, even though the preservation of wooden built heritage might not have been prominently emphasized at that time.

In the 1970s-1080s, the FAD actively participated in comprehensive training that encompassed both theoretical and practical aspects of conservation. The primary objective of this training was to enhance and refine their conservation processes. FAD took care of both dead and living monuments. During this period, the responsibility for conservation expanded beyond the government due to limitations within the FAD. To carry out certain renovation projects, the government started outsourcing to private contractors (Government sector 1, personal communication, June 6, 2023).

One notable example is the restoration of buildings at Mrigadayavan Palace (Figure 2), located on the beachfront in Phetchaburi Province. The palace was originally constructed in 1923 during the reign of King Vajiravudh (Rama VI). Following its official registration as a historical site in 1981, the palace underwent renovation after remaining unused for 60 years. One of the key renovation tasks was sourcing high-quality teak wood (Tectona grandis Verbenaceae) for the restoration (Angsananont, 2023). The palace was designed as a two-story structure, with the ground floor made of concrete serving as the foundation, while the upper floor was constructed primarily with teak wood.

The principle aimed to conserve the historical and cultural value of the palace through minimal intervention, following international concepts, and encompassing the identification of cultural value, conservation planning, and monitoring. The criteria for deciding where to start restoration are determined by the urgency of the building deterioration situation. However, it involves not only the conservation concept but also the management of the systematic conservation process. The Mrigadayavan Palace Foundation was indeed established in 1993 as an organization dedicated to supporting the restoration project for the palace. The foundation played a crucial role in collaborating with private contractors and architects, allowing for greater flexibility in terms of both time and finances (Sakunjaroenpornchai & Viryasiri, 2018).

During the period spanning the 1970s to the 1990s, private architectural firms began to engage in conservation work. One notable firm in this field was Dearborn Street Design International Co., Ltd., which specialized in assisting private owners of old buildings. Additionally, there were other private firms, such as P.V.C. Likitkarnsrang, that undertook government projects, focusing on the preservation of high-culture sites like temples and palaces (Private sector 1, personal communication, June 26, 2023). P.V.C. Likitkarnsrang is primarily involved in the construction, reconstruction, and conservation of traditional Thai architecture. An exemplary project undertaken by this firm was the restoration of the Grand Palace (Wat Pra Kaew), which marked the 200th anniversary of the Rattanakosin Era.

In the realm of education, an example of a conservation initiative has been introduced. One illustrative instance is the initiative undertaken by Chulalongkorn University's Faculty of Architecture during the years 1995-1996. The introduction of the Thai architecture field into the curriculum aimed to preserve Thai architecture and local wisdom. While this initiative does not directly focus on wood architecture, it is indirectly connected, as wood plays a substantial role in Thai architecture.

Figure 2

An Example of a Wooden Building in the Mrigadayavan Palace Boundary, Phetchaburi

Period 3: The period of collaborating with diverse stakeholders and transitioning towards intangible dimensions of woodworking skills, 2010s (circa B.E. 2550)

The regulatory landscape on heritage management is also evolving. The regulations of the Office of the Prime Minister on the Development and Conservation of Rattanakosin and the Old Town reflect concerns about changes in Bangkok's old town and its cultural heritage, as the cultural process also relates to the quality of life (Peerapun et al., 2020). The Enhancement and Conservation of the National Environmental Quality Act indicates that buildings should consider environmental quality. Policies for living heritage, including historic towns, signal a strong commitment to embracing change and improving both the quality of life and the environment.

The major flood crisis that occurred in Ayutthaya in recent years resulted in the destruction of numerous heritage sites. In response, the UNESCO and FAD attempted to address the problems and helped alleviate the situations. Despite having a budget, they found that they faced challenges due to a shortage of skilled craftsmen, as well as a shortage of proper materials. As a result, there has been an increase in awareness of the intangible heritage dimension in recent years (Government sector 2, Personal communication, January 8, 2023). Consequently, FAD has arranged various short conservation courses and workshops focused on developing craftsmanship skills.

In 2019, various stakeholders such as UNESCO, FAD, and several academic sectors collaborated to launch a short training program for carpenters. Following the completion of the training program, the participants were received certificate. Then in 2020, the First National Heritage Carpentry Competition was held in Thailand with the aim of identifying and promoting the carpentry skills within the country. The event involved multiple stakeholders from various sectors, including the government, private industry, and academia. In 2023, the Carpentry Conservation Fair (CCF) was held at the Faculty of Architecture, Rajamangala University of Technology Thanyaburi (RMUTT) (Figure 3). This fair was organized by several stakeholders, including UNESCO, the Thailand Professional Qualification Institute (TPQI), the university, the private industry, and other relevant stakeholders. The CCF events encompassed a wide range of topics, including science and innovation in wood

materials, professional competency frameworks, and directions towards achieving high professional standards for the conservation of wooden heritage. These events and courses highlighted the shift in conservation approaches, encompassing both tangible and intangible aspects.

The principle during this period has involved accepting changes to the physical environment and embracing contemporary living conditions, as well as considering intangible heritage.There has been a movement of adaptive reuse or building reuse methods. The repurposing of an existing structure for a new use occurs when the original purpose no longer suits the needs of the new generation. For example, Tha Pare Road, a historical area in Chiang Mai, is undergoing a transformation. The renovated buildings in this area exhibit a broad range of architectural styles, with some adapted for commercial purposes (Laohaviraphap & Mahaek, 2023). In Bangkok, old wooden houses were reused alongside promoting local products to draw in Thai and foreign tourists. This sparked nostalgia, leading to repurposing many historical buildings for accommodation, museums, restaurants, and cafes (Boonprasong, 2021).

Moreover, the newly designed architecture effectively applies from local knowledge, making a significant contribution to the conservation of intangible cultural values. Architects and researchers are also exploring how traditional local housing can adapt while retaining its distinctive regional traits (Panin & Mokkhasmita, 2021). An example of this is the Baan Mae Nam house (Figure 4), which has been constructed using local tools and local craftsmanship. This new construction demonstrates that the adaptation and application of local knowledge for modern living conditions is essential. It highlights that conservation is not solely about preserving the original state but also emphasizes the increasing acceptance and emphasis on adapting and applying local knowledge for contemporary living conditions. In 2023, some wooden living heritage sites, such as Plai Nern Palace and So Heng Tai in Bangkok, gained recognition and are now listed as registered buildings. Both sites are currently inhabited residences (Announcement of the Fine Arts Department regarding the list of archaeological sites in the Bangkok area no.2, 2023).

Figure 3

Wood Workshop in Carpentry Conservation Fair (CCF) 2023

Figure 4

Building New Wooden Houses Serve as a Tangible Link to the Transmission of Local Techniques

The conservation process has become increasingly complex and dynamic over time. An outstanding example is the disassembly of the Chetawan Arboretum, a more than 100-year-old wooden registered building that has served as the forest office in Phrae Province.

The government dismantled the building without informing the local community, greatly dissatisfying the community members who were concerned about their local property. This case showed the local collaboration and the community's interest in preserving their heritage.

Part 2: Approaches and Current Challenges in Conserving Wooden Built Heritage in Thailand in Different Sectors

The Public Sector

In 2018, there were over 3,000 officially registered sites (Fine Arts Department, 2018), but there were no specific categories for materials like wood or concrete types. However, wood often plays a significant role in the composition of many historic sites in Thailand, particularly in elements like roof structures**.** Furthermore, there were over 5,000 historical sites awaiting registration (Office of Natural Resources and Environmental Policy and Planning, 2020)**.**

Beyond the historical site, wood is a typical element in the houses of old communities. The Office of Natural Resources and Environmental Policy and Planning (2018) documented 613 traditional communities, each varying in number and situation. To illustrate, Mae Kampong village in Chiang Mai has approximately 134 households. Mae Kampong serves as a case study, highlighting the community's ability to secure its place with minimal assistance from the government (Tienthavorn, 2019). Another illustration comes from Ban Pak Bang, an old community market in Sing Buri province that has approximately 300 households. Notably, the village has a dwindling population, and the wooden houses are deteriorating (Figure 5). The emergence of unregistered and local houses raises concerns, with some indicating that substantial losses could occur due to a lack of protective policies. Furthermore, fire security and regulations have not been significant concerns in Thailand.

Figure 5

Ban Pak Bang Old Market Community, Sing Buri Province

> *"FAD prioritizes actions based on the urgency of a site's emergency, addressing deterioration rather than focusing on specific material types. The most critical emergencies are given precedence in the intervention process. Additionally, conservation practices in Thailand traditionally lacked documentation, as wood was abundant, and woodworking skills were widespread. Everybody could do woodworking skills. However, the current shift in circumstances, marked by a decline in woodworking skills and a reduction in wood availability, underscores the increasing importance of documentation in the conservation process. Concerns arise about the vulnerability of local houses, as they may face losses without adequate protection. In reality, both wood cultivation and skill acquisition are areas where development is possible. However, these processes take time"* (Government sector 3, personal communication, November 20, 2023).

In 2019, a collaboration among multiple stakeholders, including the Ministry of Labor, UNESCO, FAD, and SCG, facilitated training for "Thai Wood Architectural Conservationists," with a specific emphasis on renovating historical archaeological sites. The course was designed for carpenters and builders, but only 21 individuals successfully completed it (Matichon, 2019).

There are gaps between theories and practices due to the conservation mechanism in Thai context. The FAD works on building and site projects that have national values, leading to a systematic and step-by-step process: documenting, analyzing, and implementing. However, there are some issues with workload and the quality of carpenters that can impact the effectiveness of their work.

In Thailand, there are many archaeological sites that require careful maintenance. However, there is a shortage of skilled and knowledgeable workers available to take care of them. This poses a challenge in ensuring that all these sites receive the proper attention and upkeep they need. It is evident that the conservation practices have not fully adhered to the specified requirements outlined in the architectural drawings for renovation. Furthermore, the quality of the drawings is a matter of concern. It is recommended to improve the specifications in drawings by including comprehensive details regarding the specific types of wood species that should be used.

> *"In public work, there are still some errors from working drawing to implementation. Additionally, the quality of the carpenters involved in the project is a concern. This is why we are striving to develop training programs for carpenters to familiarize them with international conservation principles. In Thailand, there are numerous registered archaeological sites*

> *that require diligent maintenance. However, the available workforce responsible for their upkeep is limited in number"* (Government sector 2, personal communication, January 8, 2023).

The Private Sector

Regarding non-registered buildings, there is no need for a consent form. Such buildings tend to offer more flexibility in terms of renovation and adaptation. It appears that three key stakeholders have been considered: the owners, architects, and carpenters (Private sector 2, personal communication, May 24, 2023). However, both funds and consultants may be necessary for the house owners. The decision regarding whether to demolish or renovate a building is of utmost importance, as it requires careful consideration between the historical value and overall significance in relation to the costs and lifestyle involved in its restoration. However, it should be noted that some basic building regulations and rules may still not be flexible for old buildings.

In the private sector, evaluations need to be made from multiple dimensions, including budget considerations, lifestyle, and availability of materials. Moreover, it is worth noting that certain general building laws may not be suitable for addressing the specific needs and characteristics of old buildings.

> *"Personally, I have worked with many private owners, and the positive aspect of the private sector is that it is generally more flexible than the public sector in terms of the process. The main issue is often related to budget constraints"* (Private sector 3, personal communication, April 20, 2023).

Additionally, it is crucial to broaden the range of working drawings to encompass not only existing and renovation plans but also analytical drawings. The feedback from individuals currently working in the private sector, who have prior experience in senior government positions, underscores the need for the drawings to possess a higher level of detail for effective analysis. Having an understanding of material standards is crucial in order to know the correct way to undertake renovations. However, at present, there is a lack of a platform for providing this information to the public.

In addition to the quality of the wood resource, another significant concern is the establishment of forest plantations for sustainable wooden construction and conservation purposes. Considering the comparison with Thailand's past access to higher-quality timber, initiating forest plantations becomes crucial (Private sector 1, personal communication, June 26, 2023).

The Academic Sector

In the realm of academia, a noticeable transformation is occurring within the field of education regarding woodworking. Our understanding of woodworking has primarily come from the knowledge passed down through generations within families and the teachings imparted within temples. Children used to acquire woodworking skills, as well as essential life skills, from their families. Additionally, temples have historically served as centers for learning, with woodworking being one of the subjects emphasized. Consequently, knowledge is passed down from one generation to the next.

Despite the existence of current school systems and universities, there remains a lack of emphasis on the field of woodworking. It is essential to incorporate wood skills into the formal education system. Nevertheless, some universities have taken initiatives to recognize the significance of wood learning. A notable example is Rajamangala University of Technology Thanyaburi, which offers wood working workshops for students to have hands-on experience. Recently, this campus also hosted the Conservation Carpenter Fair 2023 (CCF), an event aimed at imparting knowledge and creating awareness among the public.

> *"In the past, children learned wood skills from their families and monks in the temples. Each family and locality had their own unique techniques and methods for working with wood, causing unique characteristics and specialties in different regions. However, there has been a noticeable shift towards a school-based approach in the present. The challenge now lies in transforming the current education system to effectively*

> *incorporate and teach wood skills"* (Academic sector 1, personal communication, January 13, 2023).

The survey process appears to receive inadequate consideration, yet accurate diagnosis is vital for effective conservation. Knowledge of conservation is crucial, as the inspector should have the necessary knowledge to determine what needs to be investigated, such as identifying the species of wood, determining the causes of cracking, and evaluating joint and connection failures. Learning about wood-built heritage in a holistic way is indeed necessary as it encompasses not only historical, cultural, and architectural significance but also ecological considerations. It goes beyond wood construction and delves into various related issues, such as forest plantation, material replacement, carbon credit, and ecological impact (Academic sector 2, personal communication, 29 December, 2022).

Apart from the academic aspect for study, the development of wood itself is also important, such as extending the lifespan of wood, especially since people lack skills in woodworking and have less time than in the past. Additionally, there is a significant consideration for the demand and supply dimension (Academic sector 3, personal communication, 12 January, 2023).

DISCUSSION

Wooden built heritage development and approaches

From the international conservation timeline, it can be observed that the boundaries of conservation have expanded from historic monuments to vernacular buildings and even to encompass the intangible dimension. The Burra Charter serves as one of the conservation documents that exemplifies the shift from a focus solely on historic monuments to places of cultural significance. Another notable milestone in this regard is the Nara Document (1994), which highlights the importance of cultural diversity in conservation efforts. This trend is also observed in Thailand (Table 1).

In Thailand, the government authority primarily focuses on registered buildings, but there is a simultaneous shift towards non-registered buildings within the private sector. Registered buildings often represent national values and frequently involve conservation projects for temples and palaces. However, it is important to recognize that many privately-owned residential buildings constructed with wood hold significant domestic value. This has led to an expansion of conservation efforts to include these ordinary residential buildings, predominantly owned by the private sector. Wood was a popular material for traditional Thai houses due to its availability and workability, resulting in its common use. Consequently, the private sector becomes a key stakeholder responsible for preserving their own living heritage.

The private sector has more freedom to choose and implement a variety of conservation methods, ranging from traditional to contemporary, due to the lack of government regulations on non-registered buildings. This is unlike the UK, where conservation efforts primarily target designated conservation areas and listed buildings, and the USA, where heritage preservation is commonly supported at the local level. However, this also brings both positive and negative aspects.

One positive aspect of non-registered buildings without government control is that the private sector can adapt its conservation efforts to its specific needs with greater flexibility, considering present-day value, as Kristian Bjerkne mentioned. Owners must consider factors such as time, lifestyle and budget. Another benefit is related to property rights. Registered buildings are protected by law and often have restrictions on modifications to preserve their heritage value.

However, a significant drawback of having no government control in conservation is the potential for cultural value loss caused by renovations and adaptations carried out without adequate knowledge or expertise. This issue is particularly crucial in the case of wooden houses, as improper dismantling without following proper preservation processes and documentation can make it extremely challenging to restore them to their original state.

Table 1

Showing Three Periods of Wooden Built Heritage Conservation Movements

Conservation processes and mechanisms					
	Thai context				International conservation movement
Period	Stakeholders in Thai Context			Types of property (mainly)	
	Government sector	Private sector	Academic sector		
1 1930s B.E. 2470	Building registration process initiated by the government (1934)			- Archaeological site, monuments, and buildings of national importance	- The Athens Charter (ICOMOS, 1933) - The Venice Charter (ICOMOS, 1964) - The NARA document (ICOMOS, 1994) - The Charter on the Built Vernacular Heritage (ICOMOS, 1999) - Convention for the Safeguarding of the Intangible Cultural Heritage (UNESCO, 2003) - The Burra Charter (2013 revised from 1979) (ICOMOS, 2013) - Principles for the Conservation of Wooden built Heritage (2017 revised from 1999) (ICOMOS, 2017)
2 1970s B.E. 2520	Government-private collaborations were initiated.	Private companies initiated their involvement in public and private projects	Conservation programs initiated in some universities.	- Archaeological site, monuments, and buildings of national importance - Buildings of local importance or vernacular buildings	
3 2010s B.E. 2550	The promotion of intangible dimensions and the initiation of collaborations among various stakeholders were encouraged.	There were various design applications at the local house scale, as well as the emergence of adaptive reuse trends.	Some universities aimed to integrate woodworking skills into the learning process.	- Archaeological site, monuments, and buildings of national importance - Buildings of local importance or vernacular buildings, - Intangible dimensions e.g. craftmanship, local knowledge and traditional tools	

In the Thai context, applying a traditional conservation approach to all stakeholders, particularly in the private sector, is not practical due to the varying conditions and uses of buildings. Unlike temples and palaces, buildings within the private sector can easily undergo changes in purpose and ownership from one generation to another. Non-registered building types present challenges such as estimating multidimensional values, identifying value, and making decisions regarding renovation or demolition. Renovation is influenced not only by cultural value but also by financial considerations. The private sector also faces limitations due to new requirements, budget constraints, and time constraints. Architects, in their efforts to meet both the owner's needs and conservation objectives, must employ a flexible and contemporary approach that departs from traditional methods.

Typically, the conservation process from Burra Charter (2013) involves three stages: documentation, analysis, and action, which encompass a range of actions from preservation to reconstruction. However, this research suggests that in the case of non-registered buildings, an additional “initial stage” exists prior to the conservation process. This stage involves evaluating not only cultural values but also

various other values such as function, budget, and maintenance, all of which are crucial in the conservation process (Table 2). Consequently, owners need access to informative conservation guidelines to facilitate their decision-making process. While there is a potential risk of losing the original physical fabric during the adaptation of private houses, there is also an opportunity to preserve our woodworking skills for future generations.

Challenges and limitations

Stakeholders often encounter several common problems and limitations in wooden heritage conservation. These six issues are derived from different aspects of conservation, specifically focusing on wood resource management, conservation mechanisms, and maintenance methods (Table 3).

1. Wood resource management: Generally, high-quality wood is pricier due to rarity, durability, and market demand. In Thailand, deforestation has reduced the availability of old-age wood in natural forests like in situations faced in Indonesia and Nepal. As a result, the supply depends heavily on dismantling old buildings, often at a higher cost. Plantation wood is usually used locally due to its reasonable price. For instance, teak wood (Tectona grandis L.f. VERBENACEAE) is commonly harvested at approximately 30 years for local use. Promoting plantation trees for heritage conservation may be necessary, as they are a growable material that contributes to the economic use of resources.

2. Drawings and specification: Detailed analysis of the building's condition is necessary to create accurate drawings. These drawings should include detailed specifications regarding the specific type of wood employed in the project. Not only indicating general hardwood, but also specifying particular types such as Rosewood, which can be specified as Dalbergia oliveri Gamble ex Prain of the Leguminosae family. Moreover, the conservation plan should closely follow the drawings for accurate execution.

3. Surveys: The precision of the survey is closely linked to the accuracy of the conservation process as surveys provide valuable information to guide the restoration process. Surveys help identify potential threats, such as structural instability, and the record of people's interventions is vital for future renovations.

4. Material standards: Knowledge about material standards is crucial. Establishing a wood material consulting unit or knowledge platform for standards is important, as accessible information enables informed decision-making and fosters best practices in the field.

5. Carpentry skills: Carpenters play a vital role in maintaining and preserving our wooden cultural heritage for future generations. They can have different skill levels based on the complexity and intricacy of their work. Many heritage buildings and structures feature intricate woodwork and architectural details that require specialized carpentry skills for repair. In comparison, local houses with distinctive local values may need basic skills. If people practice some basic woodworking skills, as those in the past did, they can maintain these architectural properties, contributing to the passing down of local wooden knowledge.

6. Wooden building maintenance: While constructing a wooden building is a significant process, it is equally crucial to prioritize ongoing maintenance. Regular upkeep is essential to prevent further damage and ensure the longevity of wooden buildings. Another consideration is acquiring knowledge for maintenance. Establishing a maintenance schedule and checklist, which incorporates regular inspections, may be necessary.

Table 2

Different Conservation Approaches and Processes

	Different conservation approaches	
	Traditional approaches	Flexible approaches or contemporary conservation approaches
	Registered buildings (FAD)	Non-registered buildings (mainly in residential types or living heritage)
Pre-stage	-	Understand user requirements and assess multidimensional concerns.
1	Assess cultural significant	Assess and evaluate between cultural values and other values
2	Prepare management plan	Prepare management plan
3	Implement management plan and monitor	Implement management plan and monitor

Table 3

Current Challenges in Wooden Built Conservation

		Some common challenges in wooden built conservation	
Wood Resource management	1	Wood resource	- The age of wood and planning for the sustainable use of forests should be of concern.
Conservation mechanisms	2	Drawings and specification	- Analyzing drawings for conservation purposes should be conducted. - Detailed specifications concerning the specific type of wood used in the project should be included. - The execution should adhere to the drawings to ensure accuracy.
	3	Surveys	- A proper survey is crucial for ensuring accurate renovations, and the recorded information serves as a valuable guide for future renovations.
	4	Material standards	- Consider establishing a wood material consulting unit or a knowledge platform.
	5	Carpentry skills	- It is important to foster the development and transfer of carpentry skills to the next generation and recognize the diverse levels of woodworking, from basic to intricate craftsmanship.
Maintenance methods	6	Wooden building maintenance	- Ensuring proper maintenance is essential for maximizing the lifespan of wooden buildings.

CONCLUSION AND RECOMMENDATIONS

In conclusion, while the conservation of wooden heritage sites in Thailand aligns with international approaches, significant differences exist in the conservation process and the responsible stakeholders involved. Currently, the responsibility for registered building conservation projects lies predominantly with the FAD, encompassing more than 3,000 registered sites, wholly and partly made of wood, and facing a shortage of conservation carpenters. This research proposes shifting the focus towards the private sector, which holds the majority of local wooden heritage without adequate policy protection and support. There may be an urgent situation related to more than 613 traditional communities, possibly including some undocumented ones.

In the private sector, conservation goes beyond preserving original versions; it emphasizes embracing change, promoting wooden house construction, and navigating critical decisions between preservation and demolition. Essential support from the government and academic sectors is crucial to address limitations, including financial support and preparing people for conservation areas.

To create an ecosystem for the conservation of privately-owned wooden heritage, challenges can be addressed at both the policy and local levels (Figure 6). Policies play a crucial role in facilitating and driving this ecosystem, with a focus on mechanisms to support forest plantation and the development of wood skills. At the local level, the emphasis is on the implementation, renovation, and construction of wooden houses. Conservation architects or architects who are skilled in conservation projects seem to function as a consulting platform that fosters close connections with homeowners. This research proposed three suggestions:

Suggestion 1: Supportive policies and mechanism from government and academia

Support for this initiative involves creating policies and mechanisms from both the government and academia. The government can contribute by implementing tax incentives for the construction of wooden buildings, encouraging private owners to invest in wooden heritage conservation. On the academic front, institutions can provide valuable knowledge on wood species suitable for constructions and principles of conservation.

Suggestion 2: Private forest plantations engaging in production of materials.

Private forest plantations possess the potential to play a significant role in the creation of self-sufficient materials, promoting sustainability. Plantation forests situated on private lands provide homeowners and individuals with an opportunity to cultivate local materials, especially for wood buildings. The emphasis lies not only on environmental benefits but also on the economic advantages associated with material prices. This approach can positively impact the overall pricing of wood from the plantation.

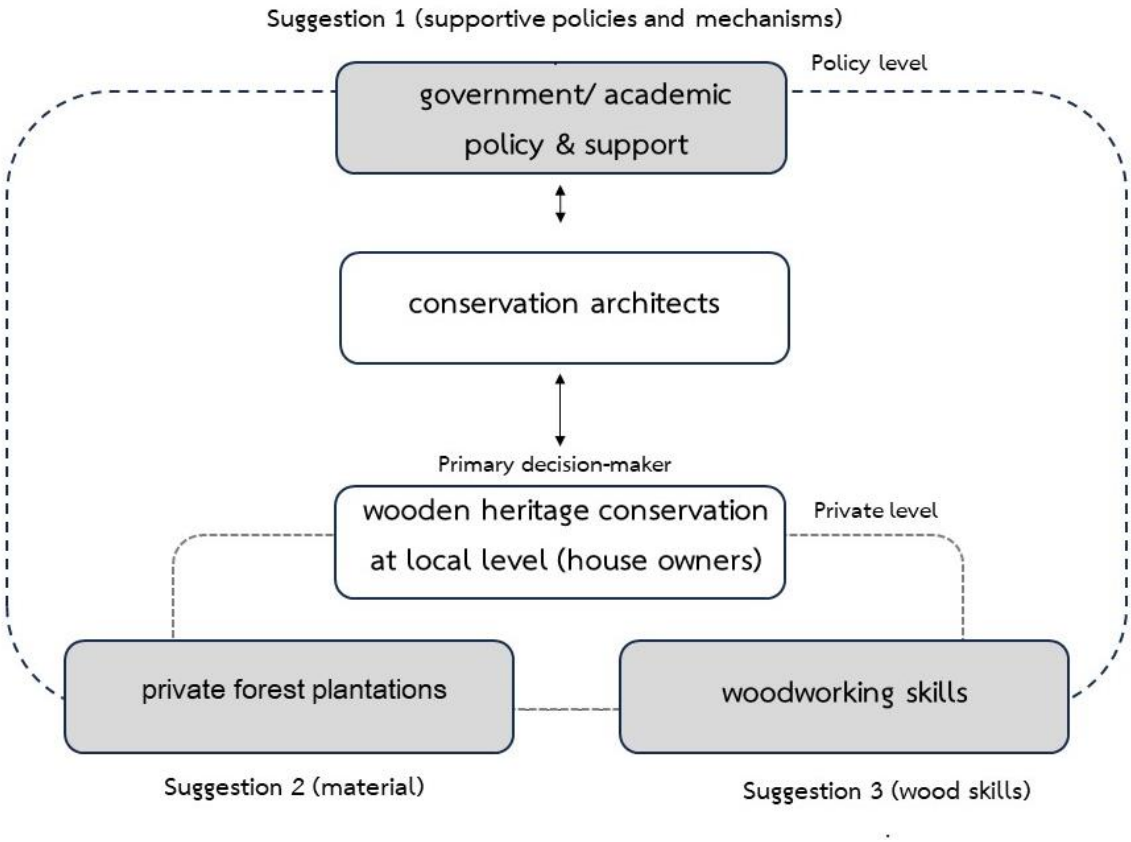
Suggestion 3: Promoting woodworking skills as life skills for everyday use

Promoting the practice and learning of woodworking skills can be facilitated through government and academic initiatives. Implementing training programs or actions to reintroduce woodworking skills to the public, reminiscent of practices from the past, would empower individuals to skillfully manage their homes using wood.

In future research endeavors, it is imperative to focus on formulating policy and supporting frameworks tailored for private wooden houses, raising standards in wooden conservation, and integrating local wood plantations into the development of architectural practices. Furthermore, exploring additional avenues to enhance sustainability in the use of wood and applying local knowledge to wood construction is crucial.

Figure 6

Conservation Framework for Private Wooden Built Heritage



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