

RESEARCH PROJECT

Applicant : Agni Sesaria Mochtar

Proposed course : Doctoral Program in Asia, Africa, and the Mediterranean

1. Project Title

A typological study of lashed-lugged, plank-built boats and vernacular boat building practices in Indonesia

2. Scientific-disciplinary sector

Archaeology, Maritime Archaeology

3. Project Abstract

The study of the traditional Southeast Asian lashed-lugs boat building construction was predominantly based on non-archaeological data, such as historical archives and ethnography. It was not until around 1980s that archaeologists started contributing to the discussions. For the following three decades, the results from archaeological research slowly contributed to general theories of this boatbuilding tradition. Only in the last decade, previous findings were intensively re-examined, and the results have improved the knowledge about the watercraft-building tradition. However, there are still gaps in the knowledge of the process and traditions involved and further research is needed for a more comprehensive description about the lashed-lug boat building tradition.

From around twenty sites of lashed-lugged watercraft remains found in Southeast Asia Islands, more than half of them are in Indonesia. This number is likely to increase with more findings from within the last decade that have yet to be published. Unfortunately, the knowledge of most of them is fragmentary, and only a couple of these watercrafts have been studied in detail.

This project aims to investigate the latest findings of the lashed-lug boat remains and to re-examine previous findings to formulate a hypothesis of a typology of the lashed-lugged watercraft in Indonesia. The primary method of collecting data for this project will be the observation of the boat remains, both directly – through survey and excavation where feasible, and indirectly – by consulting previous research reports and publications. The archaeological data will be combined with other data, including those found in inscriptions, historical archives, and ethnographic reports, to gain as much information about the function and the boat components and the construction phases that are likely missing from the archaeological data. The classification of collected data useful to formulate a typology of the lashed-lug watercrafts will be based primarily on the similarities and dissimilarities of the components of boats, as well as the temporal dimension of the boat remains. This project also seeks to investigate the influential factors of why the changes happened, taking in consideration spatial and temporal aspects of the data.

By the end of this project, the applicant expects to provide a comprehensive, yet in-depth, resume of the lashed-lugged, plank-built boats in Indonesia and Southeast Asia, a comparative narrative about the archaeological data and the surviving traditional boat building practices in Indonesia, as well as hypothetical reconstruction of some of the vessels. All the three are to be utilized to formulate the typology of the lashed-lug boat.

4. State of the Art

In the last couple of decades, scholars have been actively debating on the emergence of maritime activity within Indonesia's insular waters. While some argue that the first sea-crossing activity dated to 45,000 - 65,000 years ago, when people from Indonesia archipelago reached Australia (Balme, 2013; O'Connell & Allen, 2004), other argue that it was further back to around 100,000 years ago, when people crossed the sea from Flores to Sulawesi, seen from the similar stone tools' attribute found on both places (van den Bergh et al., 2016). Both groups propose that people have had invented some forms of watercraft to make the crossings, but neither had given a further explanation of said watercraft. A more widely accepted theory about the dawn of maritime activity di Indonesia, and the surrounding area, is of the Austronesian migration (Bellwood, 2001). The Taiwan-originated people are believed to be the ones that introduced the technology of plank-built boat building to the Southeast Asian ancestors (Horridge, 1995; Simanjuntak, 2020). However, the discussion of this technology does barely exist. It is argued that the technology brought by the Austronesians was later developed in Southeast Asia islands, especially in the Philippines and in Indonesia (Mahdi, 1999) and became the lashed-lug tradition. It is also suggested that this type of vessel was utilized by the Austronesian to disperse to as far as Madagascar (Manguin, 2016).

The study of the lashed-lugged boats was previously mainly based on ethnographic and historical data. In 1980s, the archaeologists started the examination of boat remains, but the archaeological data was rather utilised as a confirmation of what have been known from the two other data. However, Manguin's works are exemplary in terms of investigating this boat building tradition from various fragmentary boat remains. He summarises the common attributes of the tradition, and even proposes an early classification based on the evolution on the use of plank fastenings (Manguin, 2009, 2016).

In the last decade, scholars have produced quality descriptions on a number of lashed-lugs boat, such as Punjulharjo (Mochtar, 2018), Cirebon (Liebner, 2014), Butuan (Lacsina, 2016), and Chau Tan (Nishino et al., 2017). All boats were found with many hull planks still attached, aside from Chau Tan, which was disassembled by the locals. The research provides a more in-depth explanation about the lashed-lug vessels, and shows the commonalities found in each boat, and emphasizes the particularities. The vessels were plank-built with the distinguished lugs carved out on the inner planks, where the frames were lashed on to by vegetal ropes. Instead of a stem and a sternpost, the lashed-lug boats used a wing end on each extremity, where the hull planks met to shape the bow and the stern. However, many types of lug shape were recorded as well as different shapes of wing end. There were also different patterns of the plank assembly to form a hull. While the differences have been addressed, they have yet to be closely studied. Meanwhile, there are also new findings within the last five years that have been reported. The reports show the documentation of disarticulated hull planks, such as in Bukit Bongal (Purnawibowo & Restiyadi, 2020), and Tanjung Renggung (Adhityatama & Sulistyarto, 2018), as well as of intact hull, such as in Lambur (Sadzali, 2019). They have yet to be further analysed to better understand the lashed-lug boat building technology.

5. Bibliography

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6. Project Description

PhD in Asia, Africa, and the Mediterranean, Curriculum: Archaeology

Introduction

The lashed-lug tradition is one of the traditional boat building traditions in Southeast Asia that was commonly practiced between the third and the sixteenth century C.E. (Lacsina, 2016), with the oldest boat remains was found in Pontian site, Malaysia. Sites with lashed-lug boat remains have been found in Indonesia, Malaysia, Thailand, Philippine, Vietnam, and even outside of Southeast Asia, in Hongkong (Manguin, 2016, 2019). From nearly twenty sites found to date, over a half are in Indonesia. Boat remains in Indonesia were unearthed on coastal area or a bit further inland, on the riverbank, as well as from underwater sites. The former, however, by far outnumbers the later, with only three sunken boats recorded to date. Interestingly, all the sites are located on the west part of the Indonesian archipelago (Sumatera and Java), where this tradition is no longer in practice, while the latest ethnography documentation mentions that people in East Nusa Tenggara, on the other side of the archipelago, still built their boat in similar tradition. New sites from Sumatera also have been reported, but no in-depth study has been done on them.

The common attributes of the vessels belong to the lashed-lug tradition include the protruding lugs inside of the hull planks, where the frames are lashed on to them using ropes made from vegetal fibres, usually from the *Arenga pinnata*, or sugar palm plant. The hull planks are fastened without any metal nails, but only using dowels/treenails and/or lashing. The backbone of the boat is a keel plank, except in the Cirebon wreck, which indicates a true keel is present (Liebner, 2014). Another attribute is the use of a wing end, a piece of timber that is placed on top of both end of the keel planks and shaped to accommodate the hull planks to form the bow and the stern of the vessel.

Previous research mentioned variation in terms of shape of the lugs, even in one vessel, shape of wing end, assembly technique of the hull planks, and timber species used for different components of the boat. However, the reason behind this variation is still scarcely discussed and when discussed, it is still in the micro scale, within one boat or one site. The previous research recommends that more re-examination on the existing sites and more studies on new sites should be conducted to gain more insights, because there is still a lot of missing information about the lashed-lug tradition.

Aim and questions

This project aims to broaden the analysis scope of the construction of the lashed-lug boat building tradition by conducting a thorough research on the archaeological evidence of lashed-lug boats and using historical and ethnographic data to aid the analysis, to propose a typology of the boat building tradition. The research attempts to answer these research questions:

1. How do the new sites of lashed-lug boat contribute the information about the construction of the boat building tradition?
2. Can similarities and dissimilarities be identified from previous and new archaeological evidence of lashed-lug boats to build a base for classification?
3. Can influencing factors of the technological changes be identified with the aid from historical and ethnography data?

Methods

Data collection

The data collection for this project will be done using the following methods:

1. Archaeological data
 - a. Revisit the new sites
The term 'new sites' covers the latest findings of lashed-lug boats within the last five years. Observation will be done through survey and/or excavation. The new sites include, but not limited to, Bukit Bongal in North Sumatera, Lambur in Jambi, and Teluk Cengal in South Sumatera. The visit to these places is considered important to record the context of findings, as well as the details of the boat remains that seem missing in the report from previous projects. During survey/excavation, samples of timber and rope (if available) will be taken for radiocarbon dating and species identification.

- b. Documentation of boat components
The recording of boat timbers and other possible components, such as rope or bamboo, will be done by measuring the object to produce detail drawings, and by taking photographs and videos of the object that will be processed to make 3D modelling.
 - c. Secondary sources
Information about other sites that have been studied before will be collected from a thorough review of research reports and publications, as well as drawings, photographs, and videos produced by previous projects. If there is missing data in the sources, a visit should be arranged where feasible.
2. Historical data
Historical data for this project consists of local written evidence and foreign archives and chronicles. Local written evidence that will be used includes inscriptions and manuscripts from the period when the lashed-lug boat building was in practice (c. 3rd to 16th century C.E.). Meanwhile, sources from foreigners who were engaged in maritime network in Indonesian and Southeast Asia waters include reports and notes written by the European, especially Dutch, and Chinese chronicles.
 3. Ethnography
Ethnographic data consists of boat building traditions that are still practiced in Indonesia. The observation is focused on boat building that is still using similar technique to the lashed-lug tradition. Research on selected shipyards will be conducted to record the process of boat building. Among these shipyards the sites to be preferred are on the east coast of Java (Pasuruan and, possibly, Banyuwangi) and in East Nusa Tenggara and Maluku.

Analysis

1. Radiocarbon dating
Timber and rope samples will be sent to laboratory for radiocarbon dating using AMS (Accelerator Mass Spectrometry). This technique is appropriate, considering the rarity of the data, because it only requires a small amount of sample for analysis.
2. Species identification
Another sample of timbers and ropes will be sent to laboratory to identify the species of the trees. Timber sample for this analysis consists of small cubes taken from various parts of the boat remains: keel plank, hull plank, frame, dowel, rudder, stringer, and other internal strengthening.
3. Boat reconstruction
Reconstruction of the boat remains, especially of those with many hull planks intact, will be done in 2D reconstruction by making ship lines and in 3D reconstruction by making photogrammetry.
4. Database formation
A robust database will be built using all collected data along with the results of radiocarbon dating and the reconstruction. The database includes detailed information such as dimension, hull components (keel plank, hull planks, wing end, lug, fastening, frame, stringer, stanchion, and other internal strengthening), spatial context (terrestrial, underwater), and associated artefacts (for example: cargo).
5. Boat classification
Classification is made in attempt to understand the connection between each feature presented in the database. Classification will be based on commonalities and particularities within the formal (shape, dimension) and temporal aspect of the feature.

Interpretation

The database will serve as a basis to make a comprehensive resume of what has been known so far about boat remains belonging to the lashed-lug tradition, found in Indonesia and Southeast Asia. A comparative approach to the historical and ethnographic data will be used to study several aspects that

are missing from the archaeological data, such as the boat functions and/or boat components (rigging, full shape of the hull). Furthermore, the comparison is expected to provide information about the society/system that supported this tradition, so several factors which encourage the continuity, or the decline, of some aspects within the tradition to today's boat building practices can be identified.

A typology of the lashed-lug tradition will be suggested by considering all information that has been gathered from previous steps, in hope to offer a reliable typology. The typology should not be based on only one aspect, for example plank fastening, but rather on more generic classification that is applicable in a wider spatial and temporal context.

7. Expected Results and Application Effects

This project studies the boat remains of the lashed-lugged, plank-built tradition and the vernacular boatbuilding practices in Indonesia. By analysing archaeological data with the complementary help of historical and ethnographic data, this project is expected to provide a comprehensive database of the lashed-lug boat findings to date in Indonesia, as well as those found in the Southeast Asia region. The database will contain analytical results and could serve as benchmark or reference for future research both in Indonesia and the broader region of Southeast Asia. This project will also explore traditional boatbuilding practices that are still active in Indonesia to provide the information of the continuity, and discontinuity, from the once common lashed-lug tradition to current boat building traditions. The information would also include possible factors that have encouraged such changes.

The results from this project will significantly contribute to the narrative of the Indonesian and Southeast Asian maritime history, that still has many gaps due to the lack of information from the study of physical evidence. Where the narrative has praised the region as one of the busiest maritime routes since the early centuries of the common era, it lacks the information of the watercraft technology which undeniably played an essential role in the formation of said route – and thus – the connectivity between people within the region and from other places. This project is expected to further the discussion of the traditional Southeast Asian boatbuilding, which to date is still progressing in a rather slow pace.

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