Contemporary Boatbuilding Traditions in South Sulawesi

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Abstract. Indonesia is a very rich country in terms of maritime heritage, both under-water and ethnographic. The historical relevance of the islands in the global maritime trade network is recognised worldwide, so as the particularity of boat construction and navigation techniques. Contemporary wooden boat-building activities and traditional sailing still survive in various Indonesian regions. After a first visit to the island of Sulawesi, in 2018, the authors identified a case study particular significant to enhance the study of the In-donesian maritime heritage: the boatyards of South Sulawesi, Tana Beru and Bira. These boatyards were inscribed in 2017 on the UNESCO repre-sentative list of the Intangible Cultural Heritage of Humanity. Vessels con-structed in these boatyards are generically called pinisi, a common name at-tributed to large passenger and cargo boats propelled by sail and engine, which were traditionally associated to the schooners. Boatbuilding con-struction techniques and ship design in Indonesia are constantly changing, therefore, it is getting more and more important to deepen our knowledge into the complexity of people nautical and maritime skills and activities and to record hull shape and construction characteristics of the boats they pro-duce. Several small boatyards are also widespread in Sulawesi, here, a vari-ety of small-size wooden boats are built. The ongoing research carried out by a team of the Università "L'Orientale" and Universitas Indonesia, con-sists in the use of the ethnographic method, considering together social, lin-guistic, material culture aspects, and maritime traits and manifestations of societies involved in boatbuilding and maritime activities. Hull shapes and construction characteristics are recorded using the 3D photogrammetry, the resulting 3D models are used to extrapolate two-dimensional visions of na-val lines and construction drawings useful as long standing record of a changing tradition, comprehensible to boatbuilders, nautical architects and engineers, and useful for possibile future reconstructions. So far, very few and limited studies have been conducted on the communities involved in the construction of wooden boats in this region, nautical terminology has never been systematically recorded and existing boats have rarely been surveyed in detail. Understanding the social and linguistic background of people living and working in the Sulawesi boatyards, and of those involved in the life of the boatyards, is crucial to reconnect past to present practices of building boats, to understand changes in traditions and the economic im-plications related to transitions in building techniques and vice versa. Local wisdom related to maritime knowledge and boat construction, as well as their detailed terminology is also captured through the recording of oral sto-ries, rituals and practices.

Keywords. Indonesia, Sulawesi, traditional boatbuilding, ethnography, 3D photogrammetry

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1. Introduction

The project of studying contemporary boatbuilding in Sulawesi has as aim that of outlining the social background of the boatyards in different areas of Sulawesi, to provide a linguistic record of the vocabulary connected to the different parts of boats, rigging, maneuvering, and the crew, as well as sailing techniques, knowledge of maritime practices and environment, recording of oral traditions and local wisdom related to maritime life of people in the region; to understand boatbuilding and sailing techniques in the past and in the present; to provide a graphic record of boats architecture for the different types of boats in use in the past and in the present.

The project is carried out by a small team of professors and students with different skills and backgrounds. Chiara Zazzaro is professor of maritime archaeology and conducts maritime ethnographic research in the western Indian Ocean, Antonia Soriente is professor of Indonesian language and has conducted a number of ethnolinguistic research all over the country, Maurizio Borriello is a boat builder who is currently conducting a PhD on the innovative applications of Indonesian boatbuilding methods, Giuseppe Ferraioli is a master student who conducts research on traditional boatyards in the northern part of Sulawesi. Antonia Soriente lead the ethnolinguistic study of the vocabulary connected to boat and nautical related activities, Maurizio Borriello and Giuseppe Ferraioli conducted ethnographic interviews to boatbuilders, contractors, sailors and any other people connected to the boatyards, the maritime life in the nearby area; together with them, Chiara Zazzaro lead the surveying of the boats. The team also includes professors and scholars from Universitas Indonesia: for the linguistic aspects, Nazaruddin, and for the study of traditional boats, Supratikno Rahardjo.

A preliminary pilot-study on the field has been conducted in March 2018. Interviews have been conducted using notebooks, photo, audio and video recording. The construction sequences for the different types of boats was recorded using photo and video. The different types of boats were recorded with 3D photogrammetry survey, using a camera, in order to provide a permanent virtual record of the boats in three dimensions from which to extrapolate two-dimensional visions of naval lines and construction drawings, comprehensible to boatbuilders, nautical architects and engineers, and useful for possible future reconstructions.

Our first interest was to know more about Indonesian types of boats and technique of construction from antiquity to now, as they are very different from those employed in the Mediterranean and in the Western Indian Ocean. These differences consist particularly in the way boatbuilders conceive their boats and in the construction procedures adopted by them. In Indonesia, traditional wooden construction procedures are usually shell first, as opposed to skeleton first — a sequence of construction in use in the Mediterranean since the late antiquity, early medieval period. The first elements to be put in place are the longitudinal elements and subsequently the transversal elements of the carpentry, such as frames and floor timbers, this means that the way Indonesian boatbuilders conceive the construction of their boats is longitudinal rather than transversal as in the contemporary Mediterranean way of construction. Another interesting aspect of ancient and contemporary Indonesian boats construction is the plank fastening system consisting in the use of dowels driven into the planks seam, as well as the use of bark inserted in the seam to waterproof the hull. Other differences concern the use of outriggers, different system of rigging and the steering system consisting, in some cases, in the use of quarter rudders.

Concerning typology of boats, it is difficult to inventory each individual type and to trace their historical development, as well as the various boatbuilding traditions and technologies employed in a such large country as Indonesia. Adrian Horridge, who recorded Indonesian traditional boats in the 1980s, points out: "prahus change from decade to decade and their owners have no drawings, models, or written records".

A scent of the richness and variety of traditional wooden boats in Indonesia can be achieved visiting local museums. The Maritime Museum of Jakarta was unfortunately recently affected by a fire and an important part of the boat collection went burnt and is now lost. Various boat models are still present in the exhibition but unfortunately for most of them it is not clear the provenance and the terminology connected to each type of boat. The National Museum host few models and full scale boats, while the Makassar Museum host an interesting collection of boat models representative of the Sulawesi region. In this case captions and boat names are clearly indicated next to the models.

Historical evidence of Indonesian boats is rare, both in terms of underwater remains of shipwreck and iconography. The 9th century AD Buddhist temple of Borobudur bears a unique evidence of earliest representation of Indonesian boats. A series of eleven relief panels distributed in the temple, show how complex and particular was the construction of local boats already in the 9th century. These representations are also rich of naturalistic details on the marine environmental conditions (waves, clouds etc..) and marine fauna, more often depicted as fantastic animals (Van Erp 1923).

2. The Bira and Tanah Beru boatyards

Fieldwork research focused on the Sulawesi region, and particularly on its southern part, whose capital is Makassar, historically famous for the maritime trade. Contemporary active boatyards are located in Bira and Tanah Beru, in the district of Bulukumba, in the southernmost province of Sulawesi. The two villages develop following the coast line and are divided by a promontory.

The boatyards of Bira and Tanah Beru have been included in 2017 on the UNESCO representative list of the Intangible Cultural Heritage of Humanity. Despite the recent nomination, it seems that there is still a lot to know about this tradition and a lot to do in terms of research on the society involved in boatbuilding, on the architectural plans and the use of boats, and economic implications.

Bira is a small village and has only two working shipyards (**Figure 1**) while Tanah Beru is bigger and present dozens of shipyards. The area seems to be prosperous: some shipyards are provided with modern tools, and a couple of newly built resorts in Bira flanks the shacks of the fishermen.

The large vessels built in the area are called generically "*pinisi*", and are considered among the most widespread Indonesian traditional vessels. Their construction developed in South Sulawesi since the 18th century, since then, the area is famous for its boatbuilding skilled work (Horridge, 1979). The *pinisi* is a traditional Indonesian sailing ship with two masts, the hull is characterised by upraised stern and prow decks, the sails rigging system has been compared to that of the schooner, the Dutch sailing ship. Today, local interviewed people gave the name of *pinisi* to both cargo and fishing boats moored in the Jakarta marine of Sunda Kelapa and to sailing boat built in a "traditional" fashion, used for tourism transportation (**Figure 2**).

Despite the boats built in Bira and Tana Beru entered in the Representative List of the Intangible Cultural Heritage of Humanity of the UNESCO, they are far from being an immutable tradition: since the 1970's traditional boats start to have engines. The introduction of this new element, together with the introduction of the "*pinisi*" in the international market as luxury or touristic yacht, changed considerably hull shape and the overall aspect of these boats, which are constantly adapted to the demand of the buyers.

Most of the large boats built today in Bira and Tanah Beru have little in common with the shape of the traditional *pinisi*, they are usually built using a construction plan and the procedures of construction are a continue negotiation among traditional practices and new methods and materials. An example is the caulking system: walking through the seashore of Tanah Beru we also noticed the unusual use of polystyrene instead of bark in the seams.

Concerning the interviews, during the first visit, Giuseppe Ferraioli was able to talk to six people; four in Tanah Beru and two in Bira. Two were contractors, one was an old retired sailor and three old boatbuilders (see Table 1). The contractor is a recent role involved in the construction of boats in the region: a contractor is not directly involved in the building process, he is a sort of manager organising the team of boatbuilders, in charge of the acquisition of the materials and of dealing with the buyer. The contractors also arrange the transaction with a legal contract.

Table 1. People interviewed in Bira and Tanah Beru during the pilot-study season in March 2018.

Name	Place	Age	Occupation	Date
Muchsin	Bira Beach		Contractor	07/03/18
Ilias	Bira		Sailor	07/03/18
Anjukas	Tanah Beru		Contractor	08/03/18
Wahab	Tanah Beru		Boatbuilder	08/03/18
Badulahi	Tanah Beru		Boatbuilder	08/03/18
Amboreaha	Tanah Beru		Boatbuilder	08/03/18

Interviewed people by Giuseppe Ferraioli, intended the boatbuilding as a way of living, something considered as natural and immutable. For them, the elders were doing this activity and younger people will always take their place. The boatbuilders asserted that their sons were able to build boats as well, and Muchsin, one of the contractors, had as well one young boy learning the work within the team he hired to build his boat. The transmission of this knowledge is mainly based on the oral tradition, Muchsin said: "I started cooking for the team, then I learned how to cut the wood, then I learned how to make the treenails. You watch, and then watch, and then watch again (the way the master works). Once you think you are ready, you can try a new task, helped by the master." Being a boatbuilder is not a permanent job that always ensure an income. Muchsin, and the old boatbuilders said that they did some other different jobs when they had no one committing boats to them.

No one fears the disappearance of their heritage although the transmission of the building techniques is not open to everybody. Becoming a boatbuilder is an opportunity reserved only to people from Bira and Tanah Beru. The old masters want the tradition to be carried on only by their own people. Everyone asserted that, but none gave a clear explanation why. It is possible to speculate that maybe the reasons are cultural and economics: boatbuilding is a distinctive trait of this community and this activity is the main resource of wealth in the area, so they are not willing to share it with others.

The identity of the people from Bira and Tanah Beru raises some questions: in the Sunda Kelapa harbour, in Jakarta, people interviewed were referring to the *pinisi* as the boat of the *bugis*, but interviewed people in Bira and Tanah Beru do not call themselves *bugis.* According to Mcuhsin *bugis* is a term used by people from other parts of Indonesia to refer to them, but they call themselves people of Bira and people of Tanah Beru, and they do not feel they belong to the *bugis* ethnicity.

2.1. Interviews: wood

Variations in the tradition occur in the wood used for the construction: the *kayu besi* (ironwood) is today more expensive than it used to be. It was available from Sulawesi's woods, but some boatbuilders are now buying it from Kalimantan (Borneo) because importing the wood from there is cheaper. Some boatbuilders in the shipyards in Tanah Beru also mentioned the *kayu basah* (wet wood), which is the way the people refers to the freshly cut ironwood. Buying all the wood required for a *pinisi* is an investment for the contractors, especially when the wood chosen is the ironwood. According to their stories, collected by Giuseppe Ferraioli, the ironwood once cut, needs to be stored for some months to "dry" in order to improve its quality. Today many boatbuilders are using the *kayu basah* because not everyone can afford to store the wood, considering that a portion of the *kayu basah* keel can reach 50-60 million rupias (ca. 3600 euros). Anjukas and Badulahi, one of the old boatbuilders, also stated that the use of the ironwood is now much way more spread than it used to be. He stated that in the past the boatbuilders used the so called "normal wood", the *kayu ulin* (*Eusideroxylon Zwageri*) or the *kayu bitti*, (*Vitex Cofassus*), a local wood with a lighter color. Muchsin, instead, said that he is not using only the ironwood, but another imported variety he called *kayu retik*, maybe a name he used for the *kayu resak* (*Vatica Pauciflora*), for the interiors.

2.2. Interviews: hull shape and propulsion

Boatbuilders interviewed by Giuseppe Ferraioli in March 2018, stated that their boatbuilding tradition is marked by a continuity: some elements remain loyal to the tradition, as the construction sequence of the boat. Muchsin stated that boats are made building the shell first, the traditional way it used to be built, but almost everyone agreed that in the last few decades many stylistic changes occurred in the traditional boat construction.

One of the changing occurred in the construction is the use of a construction plan. Anjukas and some workers met in the shipyard asserted that in the past boatbuilders used to build boats using the traditional shapes, based on their trained eye and their experience, but today the customers can order a boat giving their own construction plans. The result is boats that are hybrids: foreign shapes built using traditional construction techniques.

The sailing system today is considered marginal as it is mainly used only during touristic trips. All boats built today use the engine as propulsion system. Despite that, some people are still able to use the sail, and they do it for touristic purposes. According to the people interviewed, to become a sailor in a touristic boat is relatively easy and well paid.

2.3. Interviews: profit

Boatbuilding is mainly a way to live. “I was always able to give rice to my sons”, states Amboreha, one of the old boatbuilder. None of the interviewed people spoke specifically about his own profit, except Anjukas. Giuseppe Ferraioli interviewed him through indirect questions. Based on what he said, his profit for a medium-size boat is 350 million IDR (ca. 21000 euros), subtracting 100 million IDR (ca. 6000 euros) for the wood and 100-150 million IDR (ca. 6000-9000 euros) for the workers.

According to the contractors interviewed, building boats seems to be more profitable than it used to be: Muchsin, interviewed by Giuseppe Ferraioli, estimates he might gain around 100 million rupiahs (ca. 6000 euros) by selling his 25 meters boat. Some interviewed people also mentioned “white contractors”, e.g. foreigners which would speculate in this business. Both contractors spoke about their frequent business with foreign buyers in Raja Ampat (Papua) interested in buying boats for touristic purposes.

Anjukas gave some information about the costs of the wood: one cubit of wood used to cost 150.000 IDR (ca. 10 euros) 20 years ago, when he started to build boats, but now one cubit can reach 5 million IDR (ca. 750 euro). The cost of the wood for building a boat can reach hundreds of million rupiahs, very expensive for the Indonesian standards. For this reason, as the contractors interviewed stated, today the construction of a boat is regulated by legal contracts. Anjukas also added information about the specific way he is paid: after signing the contract, he is paid one third, an amount of money which is also used for buying building materials, then, another third is paid to him in the middle of the process of building, and the last third is paid at the end of the construction. While usually the workers are paid only at the end of the process. Anjukas complained that the workers want to be paid more than it used to be. When he started his business, from the beginning until the end of the construction of a boat, a worker used to cost him around 2 million IDR (ca. 120 euros); today a worker can ask until 60 million IDR (ca. 3600 euros). Anjukas also said that building a boat would take from 3 to 12 months, depending on the boat size and on the number of builders he will employ.

2.4. Boats recording

In Tanah Beru the team observed boats in construction of different size and aspect, mostly large boats built for international buyers.

In Bira, in addition to the large boats in construction, the team also observed and recorded, using 3D photogrammetry method, working boats of medium size (ca. 6 m) and small dugout canoes (ca. max 4 m), employed for fishing (**Figure 3**).

The pirogues are mostly double-ended dugout canoes, but some of them are also covered with fiberglass or are entirely made in fiberglass. Since most of them bears a thick layer of painting, sometimes it was difficult to detect the material from which they were made. The hull of these pirogues is usually richly decorated with colourful

paintings and writings, sometimes with the name of the boat but also with brands names, such as billabong (an Australian brand for surf products) or redbull (a soft drink brand).

All the pirogues are propelled by an outboard engine whose propeller extends from the central part of the pirogues to the stern, and only in few cases the engine is attached to a square stern. Some of the pirogues are also equipped with mast and sail, they all present outriggers made of bamboo trunks or plastic tubes connected to the hull by wooden branches; the ends of the bamboo trunks or tubes are often closed with pointing wooden elements towards the steam. The outrigger also includes a frame with a net on which are placed lines and ropes.

The rudder of the pirogues is usually dismantled and placed on a structure when the boat is not in use. Some pirogues present a small deck to the stern and one to the steam on top of which a T shaped structure can be placed, perhaps employed to sustain a covering. In one case a pirogue also presents a light for fishing.

One of the pirogues has an internal tripartition, the middle section presents small holes at the bottom, perhaps to allow the water to enter in order to keep the fish fresh.

Some of the pirogues which are not in use are covered with palm leaves to protect the wood.

Middle size boats (ca. 6 m) observed on the Bira beach, have an elongated hull shape and outriggers, are decked and roofed towards the stern, and are usually propelled by outboard or inboard engine.

3. Conclusions

The pilot-study conducted in South Sulawesi raised several issues concerning the constantly changing tradition of building boats in the region. On one side, boatyard activities in Bira and Tanah Beru maintain certain traditions — in the construction procedures, shell first, in the methods of assembly planks with dowels, and in the use of bark for waterproofing —, on the other side hull shape and overall aspect, particularly of large vessels, adapted to the demand of the buyers and to the necessities dictated by the international market as luxury or touristic yacht.

In this sense, the preservation of the cultural heritage of Bira and Tanah Beru boatyards — recently included in the UNESCO representative list of the Intangible Cultural Heritage of Humanity — is a complex issue which needs to be contextualised in a multidisciplinary study. Further investigations will consider more in detail boat typology and the social and linguistic background of people living and working in the area, in order to reconnect past to present practices of building boats, to understand changes in traditions and the economic implications related to the transitions in building techniques and vice versa.

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Figure 1. Boatyards in Bira (South Sulawesi).

Figure 2. Cargo vessel in Sunda Kelapa harbour (Jakarta).

Figure 3. Fishing pirogues with outrigger in Bira (South Sulawesi).