Swahili Ships in Oceanic Perspective

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The study of a ship at any point in time is a snapshot. Whether it involves an old shipwreck or a newly built ship, the technology used is all contemporary to the people who built it. However, when reviewing the construction elements by themselves, they seem to have originated in different traditions and ideas in different points in time. All these elements put together shape the final result which can be studied.

A recent study of shipbuilding on Zanzibar revealed the building process and the result to be very similar to technology used in other parts of the Western Indian Ocean. This is obviously a repetitive theme, as the sewn ships of the past were built in a region-wide method as well. Can the conclusion of this observation be that shipbuilding technology spreads over the Indian Ocean in waves? Is it possible to locate a point of origin? Why, how and when does technology spread? Is it transferred together with other aspects of a society, like social aspects, religion or language?

This paper will review evidence that might provide some of the answers by examining the object that provides the oceanic connection: the ship. In doing so, this is possibly not only an examination of transference of a technology, but also an insight into how a dynamic ‘maritime society’ functions and interacts.

Sewn ships

To identify a similarity or parallel in shipbuilding technology, we must examine the elements of the study. Obviously, not all ships look the same throughout the region, the triangular sail excluded perhaps. It is not their appearance and what can be seen on a superficial level. It is the very essence of how they are built and for this a closer examination is required. We will start by reviewing the initial centre of this study: East Africa.

The large, sea-going vessels of the Swahili Coast used to be so-called ‘stitched’ or ‘sewn’ ships, like in many regions of the Indian Ocean. Their hull was made out of planks that were sewn together with coconut coir. One type of ship was called a mtepe (in Swahili meaning ‘sailboat’). It is now extinct and little evidence of its existence remains. The oldest proof of the use of this ship comes from a graffito on the wall of a ruined house in the hinterland of Malindi and was provisionally dated to the 15th or 16th century. It had a square sail, whereas the present-day ships, the dhows, all have lateen (triangular) sails.

In the course of the 19th century evidence about several types of ships emerge. James Emery, the governor of Mombasa in the period from 1824 to 1826,(1) was the first to keep count of ships leaving and entering the port. In 1824 more than 250 ships entered Mombasa harbour. Of these 55 were of a type called mtepe and more than a hundred were daus.
Fig. 1 View of the model from the bow.

Fig. 2. Stem-to-keel connection (front side of the hull) on the mtepe model shows the stitching method.

Fig. 3. Drawing of the stem-to-stern connection of a sanbuq. (Yajima 1976).

Fig. 4. Sewing the hull planking of an odam. (Varadarajan 1998).

Fig. 5. Hull of a masula, seen from the front. (Kentley 2003)
Indian and Arab vessels were present as well: 69 beden, 45 baghala, and one pattamar. Indigenous ships therefore seemed to make out more than half of the vessels in that particular year. It also indicates that the African community basically used two types for trading that could be distinguished from each other: the mtepe and the dau. Emery did not state what these ships looked like and might have generalised the types, while the locals recognized several more.

Other 19th century travellers did also take notice. The Frenchman Guillain published his travels in 1856,(2) along with some drawings of beached and sailing ships he encountered in the years 1846 to 1848. Among those was a drawing of a mtepe and one of a dau. The mtepe has a strange curved bow with a very raked stem. A few vertical lines across the strakes on the hull seem to suggest the ship was sewn. The drawing of the dau holds more details, such as a
rudder moved with ropes, a sternpost that is placed on top of the keel and a thatched roof. Both vessels appear to be double-ended.(3)

The mtepe disappeared early in the 20th century, its last appearance being no later than the 1920s.(4) The reasons for this remain somewhat unclear, but apparently they were no longer viable as other ships were cheaper to build and easier to maintain. The last sewn dau was wrecked on the coast of Somalia in 1933.(5) Eventually, the growing popularity of more modern ships made with nails made all sewn ships redundant.

Evidence of how the mtepe looked and was made comes from models, photographs and eye-witness accounts. Unfortunately no wreck has ever been found, except for some planks of the hull forming a ceiling in the Fort Jesus Museum in Mombasa. For the subject of the study here, however, we need only a fraction of information on the mtepe: the part of the ship that has similarities with other ships in the Indian Ocean, notably the manner in which the parts of the hull are connected with a particular type of stitch work. An example is given on a mtepe model in the Science Museum in London.(6)

The hull of the mtepe was made flush, with the planking joined edge-to-edge.(7) The junction between two hull planks had cross-stitching on the inside, with a caulking strip sewn in at the same time. On the outside the stitches were merely vertical windings. The planking was also secured by an obliquely driven-in tree-nail from the outside. The connection of the stem to the keel showed the cross-stitching and the caulking on the outside, as additional strength and water-tightness were required.

In Arab countries sewn ships are still made in some places. Their ships have been described from as early as two millennia ago in the Periplus of the Erithrean Sea, as they were famous for their trading all over the Red Sea and the western Indian Ocean. This unique work is a guidebook meant for ships and captains going to the western Indian Ocean written by a Greek merchant from Alexandria in about 60 AD. It describes ports, distances between them, commodities found and even the weather from the Red Sea ports of Egypt sailing onward to India and Africa past Arabia. According to this anonymous Greek the Arabs where peaceful traders, to be found all over the shores of the African continent as far south as the town of Rhapta, near Zanzibar.(8) Evidently they sailed in boats made of planks of imported teak from India sewn together by palm fibre rope and built in Omana (Persia).(9)

An example of Arab sewn ships is given in a study of a sanbuq,(10) a ship type which used to be common in Yemen. It was known to be one of the few ships of the western Indian Ocean to be fitted out with a square sail in relatively recent times. A vessel of 8 to 12 meters in length, used for sardine fishing, of which hull, mast, ropes and rudder were all made from products of the coconut tree.(11) The sanbuq was flush built like the African mtepe, the planks connected with lashings with obliquely driven-in treenails securing a tight fit.

To make an unbiased statement about the use of technology throughout the Western Indian Ocean, ship building in India must be examined as well. India forms an important piece of the Indian Ocean cultural puzzle. Its geographically more or less central position made it a transitional harbour in the past for commodities as well as cultural and technological aspects. The sub-continents’ coastlines borders the Arabian Sea in the west and the Bay of Bengal in the east. When not a final destination, India and Sri Lanka were always stop-overs for ships travelling the Indian Ocean from east to west or vice-versa, as far as China.(12) Within the scope of this paper it is not possible to discuss the role of India in the western Indian Ocean littoral in detail, but an attempt to discuss briefly the involvement of the ship-building traditions of
the subcontinent will nonetheless be made here.

The tradition of sewing ship was upheld on the west coast of India until the early 1960s, but can still be observed on the Laccadive islands. One of the Laccadives’ traditional ships, the *odam*, was observed in 1959 at Bombay by Hawkins who observed the seams on the inside covered with compacted coir wadding, and on the outside every stitch was vertically recessed into the planking. That particular ship was then 45 years old.

Traditionally ships in the Laccadive islands were only built for sailing to the mainland. Laccadive men had to do this at least once, otherwise they were not allowed marry. The contemporary *odam* seems to have decreased in size, but it is still built by the same method. The frames later added have hollowed spaces to accommodate the roping. Remarkably, the holes through the hull were not pegged, but made watertight by stuffing them with more coir.

Another example of an Indian sewn ship is the *masula*, as shown in figure 5, found in south-east India. This ship types’ provenance can be traced back as far as the 17th century. At the very least this proves the sewing of ships has a long tradition on the Indian sub-continent as well.

**Nailed ships**

Having defined the first parallel in ship building technology in the western Indian Ocean, the second is more complicated and more technical. For at least the larger part of the 20th century, if not longer, the dhow has been the dominant ship type. Defining a ‘dhow’ is very difficult as there are many types of dhow, but mainly it is a wooden sailing ship with a lateen sail and a forward raking mast.

Dhows have been sailing the Indian Ocean for centuries, but since the 1920s they are decreasing in numbers. Although this process seems to be slow, it is clear that they are being replaced by modern, motorised ships. However, as motorised vessels are not available to everyone, dhows are still seen and made. In a few places, like Nungwi on Zanzibar, dhow-building has a long tradition. In essentials the basis of ship building on Zanzibar is as follows:

After the keel is secured in place (A), the stem and sternposts (fashini in Swahili) can be fitted on. For this purpose scarves are made in the keel (B). The rake of the stem is 370° to 40°, the sternpost is about 70°. This varies according to the type of dhow. These parts are sculptured before hand and then fastened to the keel with nails (C). The three most important parts are now standing upright and are carefully lined-out in a straight centreline. Next, the lower part of the hull can be fitted on.

This first strake, the garboard strake, is called the *maliki* and basically defines the angle the lower hull has with the keel and the bulging of the ship (D). The rounding of the garboard is achieved by burning the planks smeared with oil and then bending them.

Next are the first frames or ribs. These have a sort of a fixed distance between them, dependent on the size of the ship and its purpose. Fishing vessels have fewer frames than cargo-vessels, because the latter ones need to be stronger to carry the heavier load. The fishing ships need to be lighter, so they will be faster and easier to handle. Several bottom frames are put in after the garboard strake is in place. These are not full frames yet, but only the floor parts. After they are put in the next strake can be adjusted above the garboard strake. As the ship is flush built, the strakes are without an overlap.

There are actually two kinds of frames (mataruma) in most Zanzibar ships: *masayali* and *baligamu*. The *baligamu* are fitted in first and consist of three parts: a floor frame which is U-
or V-shaped and starboard and portside futtocks. They are placed alternating inside the ship, but the *masayali* (half-frames) have to have a firm basis of strakes before they can be constructed.

There are several reasons for using two kinds of frames. First of all the irregularity of the branches demands a creative use of the available wood. This usage increases the chance they fit somewhere inside the ship’s hull. Second, it results in a more stable construction by first connecting the lower strakes to the keel (by means of the floors) and then connecting the upper strakes to the lower part of the ship (by means of the half-frames), thus creating an overlap. And third, it just seems to be an easy way to build a ship.

Next, two knee-pieces (*bitana*) are fitted in to strengthen the keel-to-stem connection fore and aft (F), and the transom planking is placed. (G) Two half frames are fitted on as a transom frame. (H) The knee-piece in front of the ship is extended to become a ‘second stem’ and the second strake is placed above the garboard. With the third strake the half frames can be connected to the hull (I) and the hull planking can be completed. (J) After this stage stringers and several transverse beams are placed within the hull for extra strength. Fore and aft decking and the mast-step make the hull into a nearly finished ship.

The way sailing ships are built in Zanzibar today is very similar to building methods in Arab countries. In figures 9 and 10 examples are given from respectively Kuwait and Pakistan. Specifically the way the keel is connected to the stem and stern posts (with scarves) and the frames are placed within the hull (in an alternating pattern), seem very similar to the East African dhow. Is this then an Arab influence? It is very difficult to establish.

For centuries people have been moving back and forth from one continent to another across the western Indian Ocean. Similarities in shipbuilding are probably the result of cross-fertilisation of techniques. Also, the alternating framing pattern is not confined to this region. It can be recognised all over the world in different periods as well. It seems this is just an ‘easy’ and logical method to build a ship. Other aspects are rather specific: as far as details in Arab ship construction can be traced back, which is at least to the 1910s, the Arabs seemed to have used building methods with several recurring aspects. In general the assembly sequence and building-practices are as follows:
1. The keel has rabbets for the garboard strakes on top.
2. After the keel, the stem and stern posts are erected and placed on top of the keel, usually connected with a hook scarf.
3. The garboard strake is placed in the rabbets on the keel, possibly bent into shape afterwards.
4. A keelson might be the next part to be added, to secure the garboards, although it is conceivable this was not a common practice.
5. After the garboard, other planks of the lower hull are added, along with a few templates or key-frames.
6. Further planking of the hull and fitting of frames in the interior is done simultaneously. The process can not be classified as either shell-first or skeleton-first.
7. Floor-frames are placed first, then half-frames in between and futtocks above the floors, fastening the hull-planking as construction progresses upwards.

The methods described above are very similar to the methods depicted in figure 5. After establishing this fact and defining how and where similarities in Indian Ocean ships occur, can any of the other questions posed in the introduction be answered?
Synthesis

The first question related to the point of origin of a specific technology. Where did the stitching methods originate? Where did the dhow-building technology as described above originate? The similarities in the construction details as well as in the building-sequence are remarkable. Is it possible to retrace this technology to the past and to a common origin? After all, this technology could have originated in different regions independently, as it obviously did with for example the alternating framing pattern. Sewing ships is likewise not unique. This is also known from prehistoric Europe. It simply might be a logical solution to a common problem. Different people in different places, even in different times, find a similar solution to the same problem: ‘how do I make something that floats and meets my demands in the most economic way with the materials at hand?’

Having said that, the ship building technology in the western Indian Ocean does not seem to be an entirely independent development in the separate regions: East Africa, the Arab countries and India. Indeed, some aspects seem to have spread throughout the region. The most likely source would be the Arab countries. They have been trading across the ocean for millennia. Whether they were more so than the Indians or the Africans is debatable. However, since they were mentioned as early as the 1st century as traders, their case is the strongest. The only certainty seems to be the technology. It might be better to look at the available data, which means confinement to the 20th century. Arabs did not only trade with Africa, they also moved there. In the 19th century the sultan of Oman moved his sultanate to Zanzibar and many Omani settlers followed. This might have had a large impact on the local African economies. The impact on the ship building is still a rarely studied subject.

Of course, as a result of the movement of Arab sailors and traders, linguistic and religious influences have also spread. The Swahili have been Islamic for more than a millennium. The spread of language, along with the technology, is still to be fully investigated. The East African sailors and ship builders use many nautical terms in Swahili, but they incorporated some Arab ones as well. The spread of the technology, and some of the terminology that goes with it, might be explained by the likely assumption that the Swahili probably repaired Arab ships all the time. Therefore they must have been well acquainted with those methods of building.

Another question was why a ship building technology would be adopted. In case of the African builders it could be rephrased to the question if their own methods were not sufficient. It has been stated that the sewn ships of the past were very flexible and could easily be beached. This can be considered a good quality. Tradition may for some have been a binding factor. Also, it might have been cheaper not to use iron. So what is the advantage of the ‘Arab’ ship building method, assuming it was at some point in time adopted by the Swahili? What comes to mind first is demand. A change in the usage of ships may have made a change in technology necessary. Perhaps the ships needed to transport larger cargoes. In sewn ships this may have been impossible. The stitches were probably limited to a maximum amount of force, brought on by the weight of the enlarged hull parts and the cargo. Above certain dimensions the rope needs to be too thick to handle properly. Besides, the ‘Arab method’ probably was faster than the building of a sewn ship and required less maintenance. Undoubtedly there are other reasons to think of, but no definite answers.

One point of discussion could be whether the Swahili ever had nailed ships before the use the ‘Arab ship building method’. The use of nails in East Africa must have been known for a long time and there was never a shortage of iron. Only in India can it be stated for a fact that
the ship builders have used nails for centuries. And they may in turn have experienced influences from the Chinese.

One thing is clear: nailed ships and sewn ships were sailing the Western Indian Ocean together for centuries. It may never be possible to determine the origin of the technologies if no more ship wrecks are found. These are the essential missing links in completing the picture.

All these countries had contacts with each other and at some points in time they exchanged technology and ideas. The monsoon winds may have facilitated this unique distribution and transference of technology, whereas in other regions of the world it was not so obvious. The dhow, even though it is rather taken for granted, probably is part of something quite remarkable: an ocean-wide wooden shipbuilding technology.

Footnotes
3. Double-ended means without a transom or square stern.
7. This model in not on display, but in the museum’s storage facilities in Olympia. It has been in the collection since 1936, acquired by James Hornell.
8. Without the strakes (or hull planking) overlapping.