DESIGN AND CONSTRUCTION OF 4.27M (LAO) ROWING TRANSPORT BOAT (PUNT) FOR INLAND WATER BODIES.

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ABSTRACT

Flat bottom boat (Rowing Punt) 4.27M length overall (LOA) was designed and constructed using plywood and fibre glass materials. The boat posses features like easy construction stability and high capacity to carry load. Other features include least cost light weight, shallow draft of 9cm easy maneuverability. The light displacement (weight empty) is 96.6kg which is similar to local boat of same size. The capacity of the boat 544kg (8 person) and total cost of production was N41, 150.00 which is not beyond the reach of an average fisherman. The Rowing Punt easily propelled by oaring which makes it adequate for fishing activities on shallow water bodies. Such easily maneuvered craft can also be used for recreation which include, sport fishing, and boating.

INTRODUCTION

A rowing punt is referred to as any small flat-bottom boat with a square-cut bow, regardless of purpose, building materials or method of propulsion. (Rivington 1983)

According to NRC (1988) a fishing boat can be defined as a floating plat-form used to transport the crew, gear and cargo to and from the fishing ground and to support the crew equipments and fishing operations.

The local fishermen on the Jebba Lake make use of wooden boat and dugout canoes for fishing activities. These crafts do not last long before it begins to leak; the wood used in constructing the craft begins to deteriorate due to decay by fungi and damages by insect. The joints of the boat are always fastened with only nails leaving holes and spaces for leakages which have led to low productivity. Time and effort used in bailing out water could have being channeled into fishing activities on the water body. The fisher man would not have the courage to go far into the water body due to the fact that the craft is leaking fewer loads would be carried. Poorly constructed could tear apart on the water body leading to losses of life.

Considering the dangers of using a poorly constructed traditional fishing boat, there is need for a replacement. That prompted the design and construction of a 14ft Rowing Punt that is affordable and can withstand the effect of turbulent water body like Jebba Lake (Omorodion 1983). The construction materials were sourced locally, price is not beyond the reach of the local fishermen. The builders of this 14ft Rowing Punt noted the deficiency of the traditional boat, worked and improved on it.

At the end of construction, a boat free from leakages because the wood of the boat was coated with a mixture of chemicals which includes crystic resin, accelerator and catalyst so that the wood would be water-proof and free from fungi attack.

OBJECTIVES

The objectives of this project work are:

1. To design and construct a modern fishing boat that can replace the traditional fishing boats.
2. To produce a boat that is safe, cheap, affordable and acceptable to the local fishermen.

3. To increase fish production through artisanal fisheries.

MATERIALS AND METHODS

Design

The designing of the craft was made possible with the aid of usual drawing instruments.
Painting materials used are include brushes, oil paint (red and blue) and thinner
The designing of a boat begins from the mind, observations and development of ideas. It is best developed by translating mental picture into free hand sketch made with soft pencils Love (1979).
Therefore the data obtained from the freehand sketch of the boat was used to produce a scale drawing (1:18.97) and the required design lines were put in place using drawing instrument. In order to achieve accurate design of 14ft rowing punt (boat) the design guidelines according to Abubakar (2007) quoting Chapelle (1956) this stated beam=length/5, depth=1/2 beam and draft=length/10 or 20 were adopted.

Construction

The construction materials included 3pieces of 12.7mm thickness of plywood, 3pieces 304.8x25.4mm of hardwood, full length of binding wire, nails fastening glue, filler, saw-dust and chemicals (crystic resin, catalyst and accelerator) Carpentry tools and machines were also used.
The cutting pattern was measured, drawn and marked out on three sheets of plywood placed together on the floor with their breadths touching the other. Hand jig saw was used to cut the plywood along the marked lines in order to get the side strips, transom, bow and bottom strip. Three (3) frames were constructed labeled A, B and C using hardwood.
The side stripes were formed by fastening 2 strips to get a full side strip with the help of a nail, glue and plywood of 6.35mm thickness. The two full side strips were joined to the transom and bow using binding wire. The three (3) frames labeled A, B and C was fixed into the strip so as to give shape and support.

FINISHING

The mixture of glue and fine saw dust was used to prepare a paste which was used to seam the angles formed at which the bottom strips touches the side strips keel, transom and bow so as to prevent leakages. This process is known as seaming
Fiber mat was placed along all the joints on the boat and a mixture of resin, catalyst and accelerator was soaked by the fiber mat in other to keep the joints water tight both interior and exterior of the boat. After it dried, rough edges were smoothed off with a disc-grinder. Exterior joints were coated with potty (mixture of cellulose filler, resin, catalyst, and accelerator). It was left for few hours for proper drying rough edges were made smooth and made even with the surface of the boat. Finally it was painted with oil paint, until the surface of the boat got covered properly.

DETERMINATION OF SPECIFICATIONS

The light displacement (weight empty) was determined by measuring weight of the punt after construction with a spring weighing balance
Displacement was determined using
D=LD+DW, (Teale, 1981).
Where D= Displacement
LD= Light displacement and
DW= Dead weight

COST ESTIMATE

The cost of the rowing punt was calculated based on cost of construction materials and labor.

TESTING THE BOAT

Upon the completion of the boat, it was conveyed to the Kigera reservoir for testing. The boat was placed on the water, it was allowed to float empty while the draft was recorded. The stability was observed and leakages were checked if there was any.

The capacity was tested until the carrying capacity was reached, maximum of 8 persons.

RESULTS AND DISCUSSION

The specification of the boat shows that the breadth overall (BOA) is 1.46m which is approximately 38% of the length overall (4.27m), while the depth is 0.43m about 30% of the breadth overall (BOA). These specifications are within the range of design guidelines according to Abubakar (2007). The construction led to the production of a boat that has both fore and aft transom.

The boat is light (96.6kg) relative to its size. The light weight gives the punt increased dead weight, as it flows at a shallow draft leaving greater part of the hull above the water line as freeboard, which means more load could be carried.

Three pieces of plywood were used to construct the boat leaving no wastage of materials.

The cost of construction was N41,150.00, which is affordable when compared to the local canoe of same sizes based on the national survey of fishing crafts (NIFFR, 2002).

The boat was easily maneuvered when propelled by oaring as it floated at a shallow draft; this makes the boat adequate for use on shallow water bodies such as pond and reservoirs.

Such easily maneuvered craft can also be used for recreation which include, sport fishing, and boating.

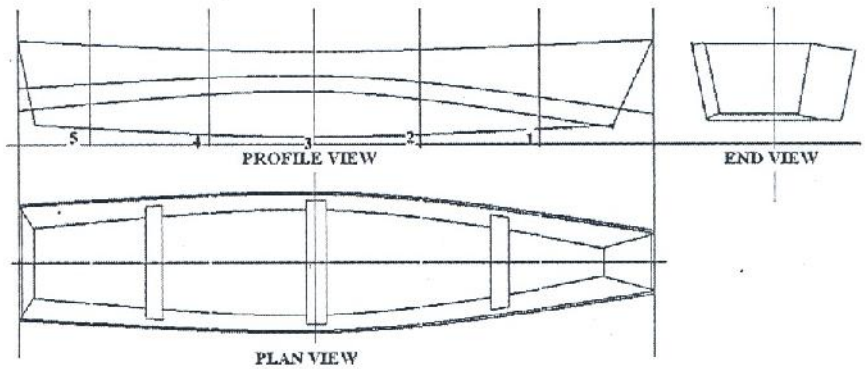

FIGURE 1: BOAT DESIGN SKETCH

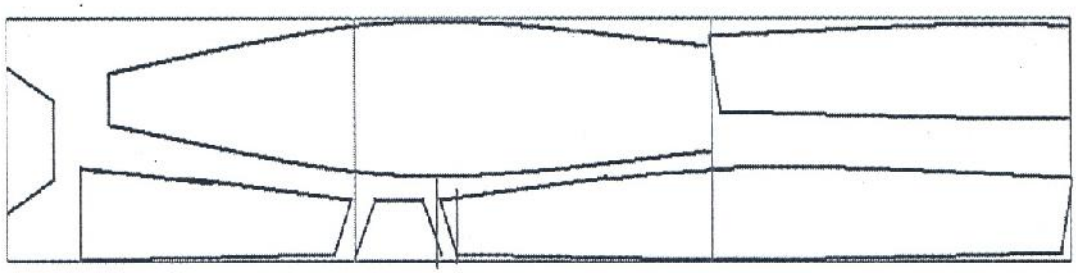

FIGURE 2: DESIGN LAYOUT

Table 1: Design data(cm)

Design coordinates	FP	1	2	3	AP
Keel/ Chine HA/B	0.0	0.5	0.2	0.5	0.8
Sheer HA/B	3.4	3.3	3.0	2.8	3.4
Sheer H/B	1.0	1.6	2.3	2.0	2.9
Chine H/B	0.3	1.0	1.8	1.3	1.1

Table 2: specification of the boat

Length overall (LOA)	4.27m
Breadth overall (BOA)	1.46m
Moulded depth 0.43m	
Draft	0.08m
Light displacement	96.6kg
Displacement	640.6kg
Deadweight	544kg
Scale	1:18.97

Table 3: scantling sizes and cost of production

Material	Size	Quantity	Unit	Amount
Plywood	12mm	3sht	2,800.00	8400.00
Hardwood	25X25mm	3No	1200.00	
Binding wire	2mmroll	2rl	100	200.00
Wire nail	Assorted	5lb	200.00	1000.00
Glue	1kg	3kg	400.00	1200.00
Gloss paint	gal.	3gl	2500.00	7500.00
Fibre glass mat kg	4kg	850	3400.00	
Resin and reagents	5kg	1500	7500.00	
Sanding disc	No	3no	250	750.00
labour cost				8,000.00
Total cost				**N41,150.00**

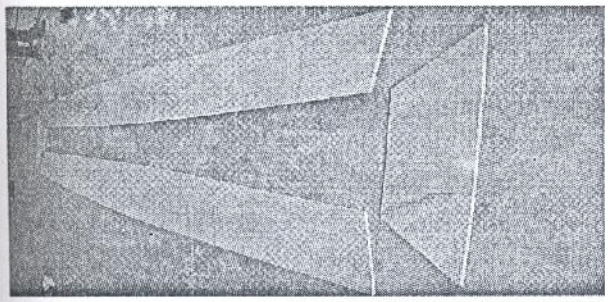

PLATE 1: THE CUTOUT STRIPS PLACED ON THE FLOOR

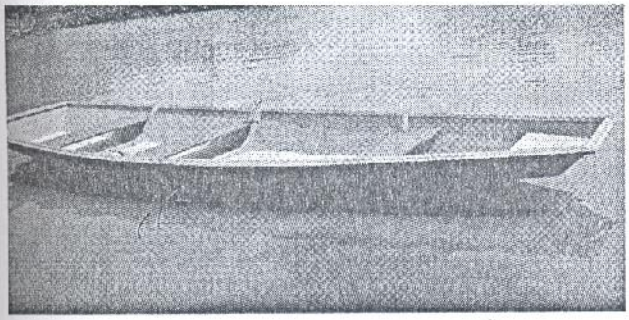

PLATE 2: SHOWS THE EMPTY BOAT ON WATER

CONCLUSION AND RECOMMENDATION

The rowing punt have light weight, it is cheap and easy to construct, ability to float on a shallow draft, adequate stability, easy maneuverability and the boat is protected from bio-deterioration and fungi action with the help preservatives, a mixture of crystic resin accelerator, catalyst. These important qualities are adequate for a craft needed for artisanal fishing activities on inland water bodies.

This craft is recommended for use on less turbulent water inland water bodies, hence it can be introduced to fishermen operating on calm water bodies as a replacement of the locally built canoes which are known for short lifespan, low capacities and leakages.

It is recommended that same technology be used to construct larger boat for use on bigger water bodies for transportation, fishing activities and for recreation and sports.

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