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Submission date: 04-Feb-2023 11:58PM (UTC-0500)
Submission ID: 2006472762
File name: the_Ba_Go_type_payang_fishing_boat_in_majene_south_sulawesi.pdf (347.47K)
Word count: 1223
Character count: 6013

Torani, Jurnal Ilmu Kelautan dan Perikanan Vol.13 No.2 (82-86) Juni 2003

Study on the Ba'go type payang fishing boat in majene, south sulawesi

Mahfud Palo

1) Faculty of Marine Science and Fisheries Unhas, Makassar.

Abstract :

The use of ba'go type payang boat in Majene , South Sulawesi , decreased continuously for yet unknown reasons . This decrease could be due to lack of good technical aspects or competition with a different type of payang boat . A case study was conducted to examine some technical aspects of ba'go type payang boats operated in three different places in Majene , South Sulawesi . Technical parameters analyzed included principal dimensions , stability , fineness coefficients , and material as well as engine selections . Results indicated that ratios among the principal dimensions of ba'go boats were L / B = 4.04-4.48 , L / D = 10.50-12.73 and B / D = 2.60-2.97 . Coefficient of fineness were Cb = 0.41-0.51 , Cp = 0.58-0.63 , Cm = 0.64 0.88 , and Cw = 0.61-0.73 . The position of KG , KB and GM from the keel were 0.23-0.45 , 0.26-0.39 and 0.60-0.80 , respectively . The loading capacity ranged from 5.30 to 6.02 gross tonnage (GT) , whereas the size of engines used was 23-27 horse power (HP).

INTRODUCTION

Small scale (traditional) fishery is the primary component (± 98 %) of the Indonesian fishing industry . Lubis (1982) and Pasaribu et al . (1984) reported that this fishing business was the target of marine fishery development and modernization . The construction of motorized wooden boat has shown a significant development in the past several years . However , some aspects of the boat still need to be improved , especially the traditional one . The traditional boat building emphasizes more on the artistic and commercial rather than on the technical aspects . In fact , technical aspects determine maneuverability and seaworthiness of the boat . A fishing boat is expected to have a good maneuverability during searching fish school as well as in operating fishing gears (Ayodhyoa , 1972) . Fishing with payang must be supported by good stability of boat used since setting and hauling of payang net take place on one side of the boat . As a consequence , cumulative weights originated from the net , catch and crews will be centered on this side (Palo , 1984) . The number of ba'go type payang boat in Majene , South Sulawesi , has decreased continuously in the past several years . This type of wooden boat is built traditionally , and therefore , lacking depth consideration regarding design and construction as normally done in large shipyards . The reason for this decrease is not clear yet , but it could be due to competition with payang boat of a different type. This, however, needs a further study. The present study was aimed on analyzing technical aspects of the ba'go payang boat.

METHOD

The method used in this study was a case one . Samples of ba'go payang boat were taken from three different fishing ports (one boat per fishing port) in Majene . Materials used in the study were roll - meter , long ruler , strand , weight , water pass , and writing tools . Data obtained from measuring the boat parameters were tabulated , and the parameters analyzed included (Fyson , 1985 ; Nomura and Yamazaki , 1975) :

a. Ratios of the principal dimensions:
   L/B, L/D and B/D

b. Fineness coefficient:

$$Ch = \frac{V}{Lwl \times Bwl \times d} \qquad Cp = \frac{V}{A\sigma \times Lwl}$$

$$Cm = \frac{A\sigma}{Bwl \times d} \qquad Cw = \frac{Aw}{Lwl \times Bwl}$$

c. Gross tonnage (GT):
   $GT = L \times B \times D \times C \times 0.353$

d. Area section of each station (A):
   $A = h/3\ (Y_0 + 4\ Y_1 + 2\ Y_2 + \ldots\ldots + 2\ Y_{n-2} + 4\ Y_{n-1} + Y_n)$

e. Displacement volume (V):
   $V = h/3\ (A_0 + 4\ A_1 + 2\ A_2 + \ldots\ldots + 2\ A_{n-2} + 4\ A_{n-1} + A_n)$

f. Distance between keel and center of gravity G (KG):
   $KG = 1/3\ (2.5\ d - \Delta/Aw)$

g. Height of metacentre (GM):
   $GM = KM - KG \rightarrow KM = KB + BM$
   $KB = 0.55\ d$
   $BM = 0.08 \times Bwl^2/d$

where : L = length of the boat ; B = breadth ; D = depth ; C = wooden boat coefficient ; Lwl = length at water line ; Bwl = breadth at water line ; d = draft ; Ao = midship section area ; Aw = water plane area ; number of A = area section of each station ; Y = width of each station ; h = station interval ; and n station .

RESULT AND DISCUSSION

Traditionally made , ba'go payang boats are lacking proportionality with regard to their principal dimensions . Ayodhyoa (1972) reported that standard ability for seine boat of 5 GT (gross tonnage) capacity was : L / B = 4.89 , L / D = 11.58 , and B / D = 237. The ba'go boats have a large breadth (B) and a small depth (D) (Table 1) . Larger B and smaller D values result in a better stability and maneuverability , and easier net operation on the deck (Zulkifly , 1980)

Table 1. The principal dimension ratios of the *ba'go* type *payang* boat.

Boat No.	L/B	L/D	B/D
I	4.46	12.73	2.84
II	4.04	10.50	2.60
III	4.19	12.46	2.97

An inconsistency was also observed in the coefficient of fineness . The fineness coefficient values obtained from the three sample boats ranged from small to large (Table 2) ; these values were , however , still in the range of Fineness Coefficient Fishery Regulation Boat (Anonymous , 1974) , except for boat No. I and III , which has a larger Cm and smaller Cw than the standard values . A larger Cm value will give a larger storing room , while a smaller Cw value (within the range of Cb values) will improve speed of the boat . The latter speed is what the payang fishermen expected , since they need a relatively high speed when setting their nets , as well as to shorten sailing time to and from fishing ground .

Table 2. Fineness coefficient of the *ba'go* type *payang* boat.

Boat No.	*Cb*	*Cp*	*Cm*	*Cw*
I	0.50	0.61	0.82	0.62
II	0.41	0.63	0.64	0.73
III	0.51	0.58	0.88	0.61

The criteria for boat stability , especially initial stability , are largely determined by the distance of center of gravity (G) , center of buoyancy (B) , and metacentre (M) from the keel , i.e. , KG , KB and KM (Fyson , 1985) . Center of gravity (G) for boat No. I and III were low , and located below center of buoyancy (B) . In contrast , boat No. II has its G located above the position of B. Comparing with the position of metacentre (M) , both G and B for all boats located below the position of M resulting in positive values of righting moment arms (Table 3) . A positive moment arm will bring the boat back into its straight position when , due to external forces , a heel occurs (Anonymous , 1974 ; Nomura and Yamazaki , 1975 ; Alifsyah , 1980) . Istopo (1972) suggested that , in order to obtain good boat stability , the position of G must be as close to the keel as possible . The capacity of sample boats ranged from 5.30 to 6.02 GT . All boats were equipped with an engine of 23-27 HP , resulting in a GT : HP ratio of 1 : 4.5 . For payang boat , this ratio was too high since it does not need a big power to pull the net as the case for bottom trawler . Koesdi (1981) recommended a ratio between 2.5 and 4.0 , depending on the operational need of the boat . The payang fishermen chose to use big (high HP) engine to obtain high speed regardless of higher oil consumption.

Table 3. The KG, KB, KM, GM and BM values of the *ba'go* type *payang* boat.

Boat No.	KG	KB	KM	GM	BM
I	0.23	0.26	1.03	0.80	0.77
II	0.45	0.39	1.07	0.62	0.68
III	0.23	0.31	0.83	0.60	0.52

The use of different kind of woods for ba'go boat was determined by the function of each of the boat's structure. Three kinds of wood were used to build a ba'go boat, i.e. ulin (Eusideroxylon zwageri) for the keel, harpins and engine bed (seating), teak (Tectona grandis) for the hull, stem, stern, futtock and deck floor, and palapi (Heritiera spp.) for the superstructure. The woods chosen were good since these woods meet the recommended resistance and strength criteria for wooden boat building as suggested by Martawijaya and Kartasujana (1978), Ayodhyoa et al. (1983). and Husain et al. (1983). While both ulin and teak were grouped into class resistance (long-lasting) woods, ulin was classified as class strength I whereas teak was classified as class strength II. On the other hand, palapi was classified as class resistance II-IV and class strength I-IV.

CONCLUSION

The principal dimension ratios as well as fineness coefficients of the ba'go type of payang boat operated in Majene were within the range for those of small fishing boats. The stability criteria and the choice of wood materials were good. The engine (HP) used was, however, generally oversize.

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