Mechanical Oars to Promote the Lancang Kuning Boat in the Riau Archipelago

Rumzi Samin[1], Khodijah[2], Anton Hekso Yunianto[3]
{rumzisamin@umrah.ac.id[1]}

[1,2,3]Raja Ali Haji Maritime University

Abstract. The Lancang Kuning boat is one of 10 traditional boats in Indonesia., In some areas, the traditional boat shape still exists today but the Lancang Kuning boat is no longerfound in the Riau Archipelago Malay community. For this reason, it is necessary to trace back the history of theLancang Kuning boat. The design of the propulsion system on the traditional Lancang Kuning boat usesa combination of non-mechanical and mechanical propulsion systems. The mechanical rowing of the traditional Lancang Kuning boat has 18 oars, consisting of 9 pairs of oars. from the left side and 9 oars from the right side. The mechanical paddle of the traditional lancang kuning boat is driven by human power.replaced by an electric motor forthe propulsion of this boat. The resultingboat still looks traditional but can reach a faster speed. This updated design of the Lancang Kuning would make the boat suitable for tourism activities and competition activities in the Riau Islands Province.

Keywords: Rowing Mechanic, Lancang Kuning Boat, Riau Archipelago

1 Introduction

The Lancang Boat can be categorized into two groups, namely the General Lancang and the Raja Lancang better known as the Lancang Kuning. The Lancang Kuning boat is 10 traditional boats in Indonesia, in some areas the traditional boat shape still exists today but the Lancang Kuning boat is not found in the Malay community of Bintan, Riau Islands[1]. The Lancang Kuning boat has become local wisdom for the Bintan Malay community in the past, present, and future[2]. The Lancang Kuning boat is a symbol of greatness, glory, power, and heroism. It is used as one of the main elements in traditional medicine ceremonies (Belia and Lancha) and included in folklore, folk songs, and folk dances[3]. Stories about the Lancang Kuning can be heard through the song Lancang Kuning, the song Laksamana Raja di Laut (Iyet Bustami) and the 1962 Malaysian film Lancang Kuning[2]

The Lancang Kuning boat is widely used as a symbol in the Riau Islands Province, including the Riau Islands Provincial Government logo, the Raja Ali Haji Maritime University logo, the Bintan Regency logo, the Malay Customary Institution logo, the Karimun Regency logo, and the Natuna Regency logo. [4,5]

At Sei Carang, Tanjungpinang,a wreck of a Lancang Kuning boat was found. Known as Panglima Hitam Lancang Kuning, the boat is buried in the sand one to two meters deep and about 30 meters from the shore. The wreck is at least 23.40 meters long and 7-7.5 meters

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wide. It no longer has a top and both ends are tapered.Findings from boatwrecks help revealthe technological aspects of boat construction[6]. In addition to water transportation as a means of boating and trade, aspects of the evolution of boatbuilding techniques also need to be well informed. This archaeological data is expected to help fill in for the lack of written data about the history of water transportation technology.

The discovery of the Riau-Pekanbaru version of the lancang kuning sailing boats was inspired by sailing boats popular during the heyday of the Palalawan Kingdom (Muh. Takbir S. 2015) only on patent registration 24 March 2015 CID201500016 (in progress); Lancang Kuning Batik Boat COO2011050014 (noted); COO200902159 (recorded), Majapahit traditional sailboat COO199900271 (recorded); Phinisi Boat COO200201304 (noted); everything is made of wood. In this invention, the type of wood used for the pegs was Sepang /sappan wood (Caesalpinia Sappan), while ivory was thought to be bungur wood (Lagerstroemia spp.). The end of the boat seems to use ironwood/belian or unclean (Eusideroxylon zwageri).There are several simple patent issuances at DJKI, including:

The material composition of the rowing boat is a hybrid composite of glass fiber and hemp[7], The paddle is reinforced with E-Glass and jute fiber which has been coated with several layers of chopped strand mat and jute fiber for maximum physical and mechanical strength. Rowing boat products (status in progress P00201906350), Boat with electric propulsion: The present invention relates to a boat with electric propulsion and a mains voltage source[8], provides power for the electric propulsion, and with an auxiliary voltage source which provides (status given P00201502815).

Traditional electric boat: Traditional electric boats are dedicated to traditional boats and are used by small communities for fishing[9], (status in progress P28201705926).Vessels with high-voltage systems: The present invention relates to vessels having electric propulsion[10], in which the electric propulsion comprises of an electric motor and an electric accumulator, i.e. connected (status is given P00201502808).

Boat propulsion can be classified into two groups, namely non-mechanical boat propulsion and mechanical boats propulsion. The non-mechanical movers are Paddle and Sail. Meanwhile, the mechanical equipment of boats has undergone many developments, including Fixed Pitch Propeller (FPP), Ducted Propeller, Controllable Pitch Propeller, Paddle Wheels, and Azimuth Podded Propulsion System. In this study, two boat propulsion systems will be used on the Lancang Kuning boat.This research was conducted to design a mechanical paddle as a propulsion for the traditional Lancang Kuning boat.The research target is 2020-2024 at level 7 so that the title of Research on Rowing Mechanics for Lancang Kuning Traditional Boat Propulsion is by the RIP compiled for 2020-2024.

This research aims to create an industrial prototype-oriented. From several aspects encountered in the field, the researchers will conduct a series of studies to conduct research. Literature that supports the basic principles of technology from tools both from journal documents and patents. Some supporting literature in the form of research and study results in 2017. Report on the Excavation of the Lancang Kuning Boat, Medan: Archaeological Agency of Sumatra. plus the book Tennas Efendy 2008. The story of Lancang Kuning in Bukit Batu, Pekanbaru: Dekdikbud and the 2013 book Getting to Know Lancang Kuning, Pekanbaru: Riau Malay Traditional Institute. Local wisdom of the boating industry of the Malay community of Bintan, Riau Islands, Rumzi Samin, and Khodijah, Umrah Press.

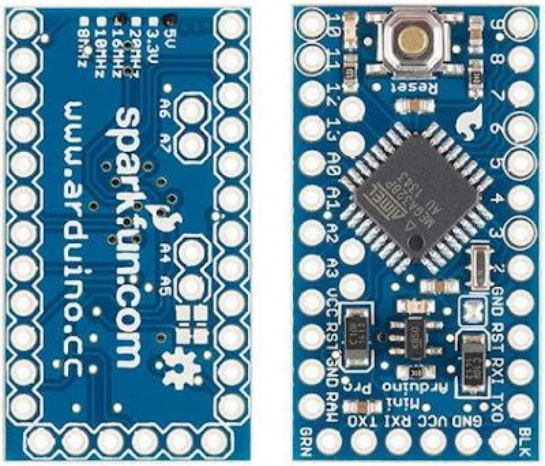

Fig. 1. Arduino Mini Board

The Arduino Pro mini controller system using Arduino is a minimum open-source microcontroller system that is widely used to build electronics projects[11]. The Arduino platform contains two pieces of hardware in the form of a board and software or IDE (Integrated Development Environment) that runs on a computer. The software is used to write and load programs onto the Arduino board. The Arduino Pro Mini is a circuit board from the Arduino family which includes the Atmega328P and Atmega168 microcontroller chips. The Arduino Pro Mini was created and specially designed by Sparkfun Electronics to create projects that require small circuit boards so it is perfect for projects that have little space forthe circuit. An Arduino pro mini will be installed on the mechanical paddle on the Lancang Kuning boat, so it can be controlled remotely.

Additionally, the Control System is an electronic component in the form of a motor that has a feedback system to provide information on the actual rotational position of the motor which is forwarded to the microcontroller control circuit. Servo motors are widely used as actuators that require precise motor rotation positions[12]. If an ordinary DC motor can only control the speed and direction of rotation, it is different from a servo motor, which is the addition of parameters that can be controlled based on the angle/degree. The main components that make up the servo motor include the DC motor, gear ratio, potentiometer, and servo controller as shown below:

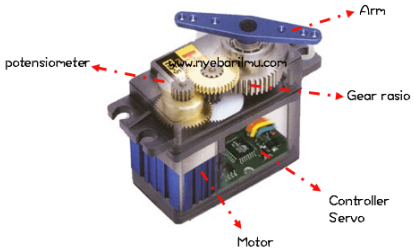

Fig. 2. Servo Motors

2 Research Method

An experimental approach was used where the factorial design is part of a modified form of the true experimental design[13]. Modifications made are by observing the possibility of moderator variables affecting the independent variable (treatment) on the dependent variable (results).The materials that will be used to support the manufacture of the Lancang Kuning boat are as follows:

Table 1. Materials of The Lancang Kuning Boat

No	Type	Materials and Tools	Quantity
1	Hardware (LancangKuningBoat Shape)	Jackfruit Tree Trunk	3 trees
		plywood 0.3 mm	1 piece
		Stick 1 cm	3 pcs
		Wood veriest	1 tin
		glue G (lem setan) superglue	10 pcs
		Sandpaper120	5 pcs
		Sandpaper240	5 pcs
		Parachute Cloth	1 meter
		Crankcase Knife	1 pcs
		Crankcase Blade	1 box
2	Software (Electronic system and control)	JSTconnector2 pin	1 pcs
		Lever Shifter	1 Pcs
		PCB	1 Pcs
		NRF	1 Pcs
		Arduino Promini	1 Psc
		Battery Holder186550	2 Pcs
		Capasitor	1 pcs
		On-Off switch	1 Pcs
		Buttons (White, Yellow, Green, and Blue)	4 Pcs
		Dynamo Motor	2 Pcs
		Servo 25 kg	2 Pcs

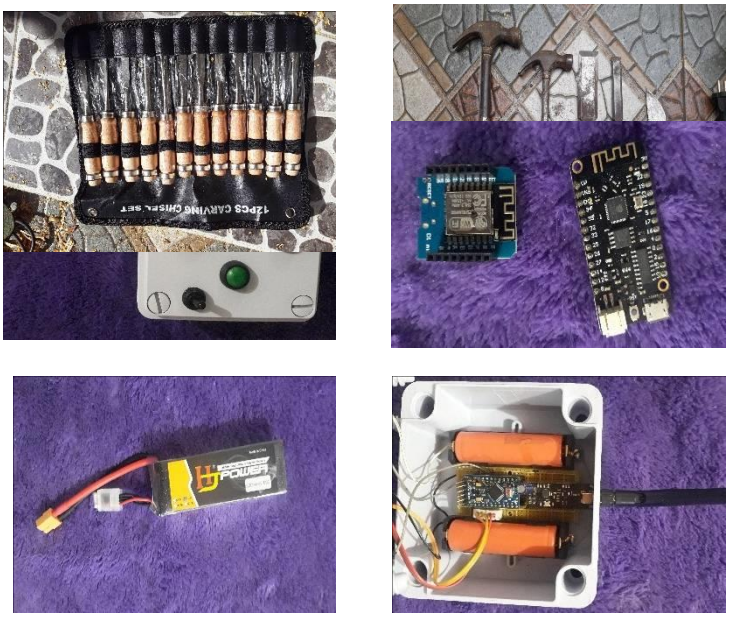

Fig. 3. Tools and Supporting Materials for the Lancang Kuning boat

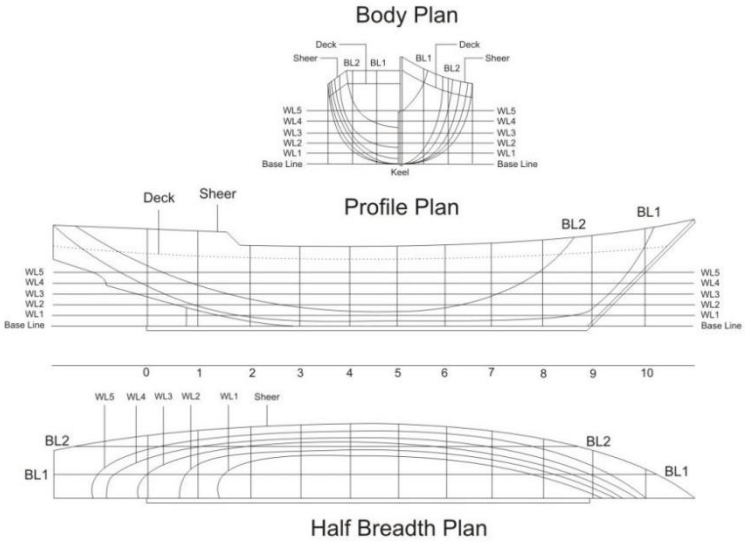

Fig. 4. Lancang Kuning boat design

Firstly, the basic principles of technology are researched and reported. The main dimensions of the Lancang Kuning Boat with a scale of 1:4,5 with the actual size of the boats as follows:

LWL	= 53 cm
B	= 16.5 cm
H	= 8.5 cm

Secondly, the formulation of the concept and/or application of the formulation includes Explain the materials and equipment to make the tool, then the materials that will be used to make the prototype of this sassy boats are Jackfruit sticks and presentation of tool designs (workflow charts, technical drawings, tool display forms, etc.) The following workflow can be seen in the chart below :

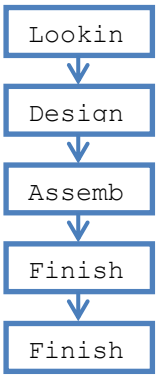

Fig. 5. Chart of The Research Process of Lancang Kuning Boat to Design Experiment

In Proof of concept functions and/or important characteristics analytically and experimentally, including Simulating the tool as a prototype version 1 on a laboratory scale to test the performance capabilities of the tool.

After the catamaran prototype is formed and the boat is ready to be tested in a pond, if deficiencies are still found, carry out repairs and prototype development to reach a final version that fits the concept. Researchers will validate components/subsystems in a laboratory environment by simulating tools on a laboratory scale to test the performance of tool components. If deficiencies are still found, make improvements and develop prototypes to achieve the final version that matches the concept.

Demonstration of system/subsystem models or prototypes in the relevant environment including finding out the actual operating environment conditions, identifying investment needs for equipment and manufacturing processes, and testing the performance of the Prototype technology system (machines/tools and systems) in the operating environment (which resides in the operating environment). outside the laboratory). Then obtain approval from the manufacturing department and receive laboratory test results for the Prototype performance test results aimed at comparing the Prototype performance test results in the laboratory with a simulated operational environment (which is actually outside the laboratory)

to achieve the same high accuracy/fidelity. Prototype performance test results as evidence of technical feasibility (engineering feasibility).

3 Results and Discussion

The basic principles of technology are researched and reported by the researcher explaining the assumptions and the basis of the tool to be made. The process of making the Lancang Kuning boats is as follows, namely looking for literature studies on mechanical systems and selecting jackfruit tree trunk materials, then cutting the jackfruit trees according to the designed pattern, then assembling the mechanical rowing system with other devices and installing mechanical oars on the Lancang Kuning Boat. The literature supports the basic principles of technology from tools, both from journal documents and patents. The literature includes Local wisdom of the boating industry of the Malay community of Bintan, Riau Islands, Rumzi Samin, and Khodijah, Umrah Press Publisher., Introduction to boat propulsion systems, Surabaya. ITS. The new finding in this study is that there is a difference between the tools that will be made and those that already exist so that the research becomes a differentiator from other research, namely the paddle which usually uses human power and is replaced by mechanical power. In formulating the concept and/or applying the formula, the researcher explains the materials and equipment for making tools Research Experiment. How to make a Lancang Kuning Boat is as follows :

a. Look for wooden sticks from jackfruit, as jackfruit sticks have a natural yellow color so they are perfect for the lancang kuning boat color. selection of jackfruit tree trunks with the desired diameter
b. The process of forming patterns on tree trunks; After the jackfruit tree trunk is selected, then we draw a pattern according to the shape of the boats we want.
c. The process of forming a hull model.

Furthermore, in the Device Design System, the researcher designs a device that consists of designing hardware, electronic devices, software, and the workings of related devices in this study with a presentation of tool design (workflow charts, technical drawings, tool display forms, etc.).Researchers describe the role and function of each component that will be part of the tool, including the first Jackfruit Tree Trunk is the wood from the jackfruit tree which was chosen because the wood is yellow and strong to make wooden boat patterns. On how the tool works in detail from beginning to end the mechanical paddle by moving the paddle back and forth with the Arduino Uno control and other components Arduino is a microcontroller, which is briefly the core of a chip in a computer and robotic device. Chips usually contain a processor core, memory, RAM, program memory, and a microcontroller.

Fig. 6. The Process of Implementing the Lancang Kuning Boat Designmodels or prototypes

Decontrol the mechanical paddle with an Arduino mini so that the mechanical paddle can be moved forward, backward, forward right, forward left until the boats can move. On the expected performance of the tool according to the concept. The design of the propulsion system on the Lancang Kuning Board combines a combination of non-mechanical and mechanical propulsion systems so that there will be 2 boats propulsion systems on the Lancang Kuning Board. Then in the proof of concept of functions and/or important characteristics analytically and experimentally, the researcher simulates the tool as a prototype version 1 on a laboratory scale to test the performance capabilities of the tool where the test is carried out in a pool of water so that it can be seen from the balance of the Lancang Kuning boat.

When there are still shortcomings, make improvements and develop prototypes to reach a final version that fits the concept. On the other hand, in testing there are still obstacles, it will be repeated in designing Lancang Kuning boat with mechanical paddles. In the validation of components/subsystems in a laboratory environment, researchers perform tool simulations on a laboratory scale to test the performance of tool components. If there are still shortcomings, make improvements and develop the prototype to reach a final version that fits the concept.

The researcher validates components/subsystems in the relevant environment, namely by conducting large-scale tool simulations in the relevant environment (which is actually outside the laboratory) to test the performance capabilities of the tool components. If there are still shortcomings, make improvements and develop the prototype to reach a final version that fits the concept. However, in testing there are still obstacles, it will be repeated in the design of the lancang kuning boat with mechanical paddles. Prototype performance test as proof of technical feasibility (engineering feasibility) as follows:

Fig. 7. Research Results of the Lancang Kuning Boat Experiment

Demonstration of models or prototypes of systems/subsystems in relevant environments to see real operating environmental conditions so as to identify investment requirements for equipment and manufacturing processes. In testing the performance of the Prototype technology system (machines/tools and systems) in the operating environment (which is actually outside the laboratory) so as to obtain approval from the manufacturing department and receive laboratory test results from the results of the Prototype performance test. Then compare the results of the Prototype performance test in the laboratory with the simulated operational environment (which is actually outside the laboratory) to achieve the same high accuracy/fidelity

4 Conclusion

The conclusion is a mechanical paddle that functions as boat propulsion with a mechanical system so that it can push the boats to move forward or backward. The mechanical paddle consists of several components that support the design of the device which consists of designing hardware, electronic devices, software so that it can be controlled remotely. Recommendations need to design theLancang Kuning Boat for the competition.

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