Mokit Prototype Design Indonesian Traditional House (Series 1: Joglo House)

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Abstract

Many factors affect the existence of the current Joglo house. One of them is the lack of public understanding of the function of space and the architectural form of the Joglo house. Lack of understanding is a factor causing shifting cultural values. Therefore, this study aims to build this understanding by designing a product model of the Joglo House raft (mokit) as an interactive learning medium about building structures. A qualitative method is used with a design thinking process (design mindset) to achieve the research objectives. Design thinking consists of 5 stages: first, data collection (empathy); at this stage, interviews, observations, and surveys are carried out on students, architecture, and interior lecturers. Second, the definition stage is to determine the requirements and needs of the research. Third, the idea stage develops ideas and various alternative designs in the Mokit design by conducting FGD and brainstorming. Fourth, the prototype stage or making prototypes, and finally, the test or trial stage. However, this research is limited to the prototyping process, so that the final result of the research is a prototype of the Joglo traditional house mokit.

I. Introduction

Migration from rural to urban areas is an economic phenomenon (S. Nugroho, 2017). Since 1980-2010 there has been an increase in migration flows between regions in Indonesia. Migration has resulted in some uninhabited traditional houses being neglected and gradually damaged. For example, in the Minangkabau traditional house, most of the people of West Sumatra have a tradition of migration, or they call it "merantau." Now the generation that should inhabit the traditional house lives and settles in another area. Noviarti added that the existence of the Minangkabau traditional house is very worrying because sometimes the house is not inhabited by the owner because they live elsewhere. When he returned from overseas, the traditional house was damaged and required much money to repair (Noviarti, 2013). In addition to the high cost of revitalizing traditional houses, it is not easy to obtain materials or wood. The lack of public understanding of the function of space and the architectural form of traditional houses is also a factor causing the shift in cultural values (R.A Umah, 2018). The lack of public understanding will impact changes in the form, structure, and even function of the architecture of traditional Indonesian houses.

Preservation efforts need to be made to maintain Indonesian cultural heritage, especially traditional houses. Through the tamanmini.com website (Taman Mini Indonesia Indah, 2021), there are 33 building platforms or traditional local architecture. In addition, conservation efforts are also carried out by local governments by building or revitalizing traditional houses in their areas to serve as tourist attractions, such as Panggung House in

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Belitung Regency. Some areas still maintain their customs, such as the Tongkonan House in Tana Toraja Regency, South Sulawesi.

On the other hand, there are more and more houses with a more modern minimalist concept. With a relatively low price and relatively easy maintenance costs, people finally prefer this modern house. As a result, traditional houses as a place to live will be ruled out. So that one day, if there is no education to the younger generation about traditional houses, traditional Indonesian houses will be forgotten. Studying traditional houses is limited to the structure and function of buildings, but traditional houses can also be used as a medium for developing the character and culture of the nation with local wisdom (D.C. Malahati, 2019). Therefore, researchers as educators want to preserve traditional houses by educating the younger generation using fun interactive learning media. According to research published by Alvara in 2020, Gen Z or younger millennials born in 1998-2010 are very suitable for an entertainment approach (H.Ali, 2020). In addition, this generation is also very close to the game world, and they spend hours just playing games (B.Pane, 2017).

The learning media designed is in the form of a building type mokit (raft model). A model raft is a series of models or imitations of an object that has a scale. The building type Mokit has a shape related to the building, commonly called a mockup (G.Syahroni, 2016). The learning media in the form of mokits was chosen because mokits provide the experience of doing simulations. According to the cone theory of Edgar Dale's experience, simulations have a percentage of 90% of the results of students' memory and understanding achievement (J.Jackson, 2016). According to Simorangkir (2018) media is a learning aid that can act as a channel for information directly or indirectly in the learning process. One of the media expected to be able to create effective historical learning is the one based on digital technology (Afwan, 2020). Thus, the learning media in the form of mokits is expected to make it easier for users to understand and remember the traditional house construction system than learning media in reading books or videos that have been widely used so far. This shows that the forum has not been able to effectively and optimally function and role as media development and professional development (Ramlan, 2020).

II. Review of Literature

After conducting a literature review of previous studies, it was found that the design of a traditional Indonesian traditional house mokit product had never been done. However, some researchers have made traditional houses the object of designing educational games, including the research conducted by Benni Pane (B.Pane, 2017) entitled Design of Indonesian Cultural Educational Game Applications. In this study, researchers created an educational game application using Macromedia Director MX 2004, an interactive educational tool for children. One of the objects of cultural recognition that was raised was the traditional house.

Research by Remo Prabowo (2015) with the title Introduction to Traditional Indonesian Houses Based on Augmented Reality by Using KTP as a Marker is also one of the studies that use traditional Indonesian traditional houses as objects. In this study, researchers have the same goal, namely the introduction of traditional Indonesian traditional houses, but application-based with Augmented Reality technology. With this application, users will get information about traditional Indonesian houses using only a smartphone camera and an ID card as a marker to access the application.

In her research, Putri Ludvyah Ekawati (2015) is similar in designing educational games to introduce Indonesian cultural diversity. This android game consists of 34 types of games according to 34 provinces in Indonesia with a target user age of 8-11 years of elementary school children. The objects used are traditional Indonesian traditional houses,

traditional clothes, traditional food and drinks, traditional weapons, musical instruments, to unique crafts.

The research with the title Design of Educational Game Adventure of Indonesian Traditional Houses written by Dwi Novri Hardiansyah (2012) is also one of the many studies that aim to introduce traditional Indonesian houses through interactive games. This game is designed to provide cultural education media with a target user of elementary school-age children.

Judging from the objectives and objects of previous studies that have been described above, they have the same goal and mission, namely to create interactive learning media to introduce Indonesian culture, especially traditional houses. However, from some of the studies above, there are different media with different target users. In addition, if most of the previous researchers chose the target users were children, it is different with this study which instead chose the target users from teenagers to adults, especially students majoring in Architecture and Interior. Previous researchers have never used the mokit media (raft model) to show the originality of the research that researchers will carry out. Mokit is made as a simulation tool in the introduction of traditional Indonesian traditional house structures that function as learning support. Mokit is a raft model consisting of several components that make up a traditional house (in this case, a joglo house) separated from one another. Students can recognize the detailed form of each component of the joglo house structure and its connection details. Through this mokit, students will be invited to construct a Joglo house step by step to understand the name and shape of the structure and understand the process of constructing the building.

III. Research Methods

This research uses a qualitative method with a design thinking process so that the resulting mokit is easier to understand by users and as an innovative solution. Design thinking consists of 5 stages: empathy, definition, idea, prototype, and test (Dam, 2021). However, this research is limited to the prototyping process. The test process will be continued in further research.

Empathy or Data Collection
The data collection process was carried out in several stages: studying literacy about joglo houses sourced from books and research. The next stage was the writer distributing questionnaires, followed by FGD and interviews with experts from the Joglo house.

a. Literacy
At this stage, the author conducted a literacy study to obtain standard data for the size of the joglo house. Literacy studies were carried out on three books that became the standard for making joglo houses, namely a book entitled Joglo, Javanese Traditional House Architecture (Ismunandar, 1986), Petungan: Size System in Javanese Architecture [15], and Javanese Traditional House (Hamzuri, 1985). From the two books, the authors get data on standard sizes and the joglo house's standards. The data then becomes the primary reference in making the following process.
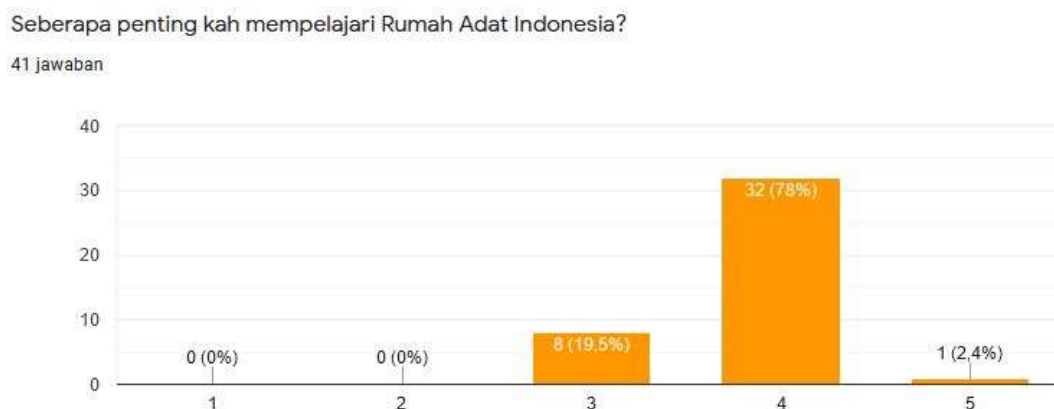
b. Questionnaire
In the next stage, the author makes observations by distributing questionnaires to students majoring in Architecture and Interior Design who take courses related to Traditional Traditional Houses and lecturers who teach courses. A total of 41 people have become respondents to a questionnaire distributed in several Interior Design and Architecture study

programs. As many as 51.3% of student respondents, 25.6% work as lecturers who teach in Interior Design or Architecture study programs, and 23.1% of respondents outside of students and lecturers but are interested in traditional Indonesian houses and their preservation.
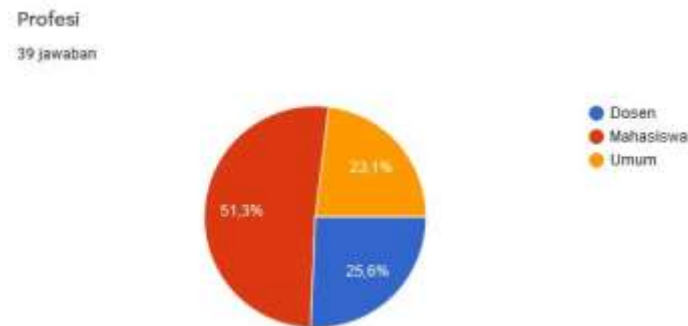
Figure 1. Diagram of the Results of the Questionnaire

The questionnaire results showed that 70.7% of respondents stated that the learning materials for traditional Indonesian houses obtained or delivered had not used interactive learning media. 29.3% stated that they had obtained the material using interactive media, but the interactive media used were animated videos and excursions or direct field visits. None of the respondents have ever used most media (raft model) either when receiving materials or providing materials for traditional Indonesian traditional houses. In the following question, 78% of respondents stated that studying traditional houses is very important to preserve traditional houses. 19.5% of respondents stated that it was pretty essential, and no respondent stated that it was not essential to study traditional houses.

Figure 2. Diagram of the Results of the Questionnaire

Some of the questions in the questionnaire also asked questions related to the product design process, including questions about the correct scale and material in the manufacture of most products. A total of 8 respondents answered that the appropriate scale used in the product was a scale of 1:10, eight others answered a scale of 1:20, and the rest were very diverse from a scale of 1:50 to 1:100. Then as many as 71.05% of respondents answered wood material more suitable in making Joglo house kits, and 86.84% of respondents answered that the brown color of the wood is the more appropriate color to use in making this Joglo House Mokit.

c. Interview

Interviews were conducted to strengthen literacy data and conduct a direct survey of the joglo house. The author interviewed joglo house experts, namely the perpetrators of joglo house makers and joglo house conservationists. Interviews were conducted directly at the studio for making a joglo house, namely Songo Studio, Yogyakarta.


Figure 3. *Photo of the Interview Process with Mr. Anjar*

IV. Discussion

4.1 Focus Group Discussion (FGD)

FGD Held online by inviting academics who focus on traditional Javanese houses. FGD is the last stage as a data consolidation process at the data search stage after the previous processes have been carried out. It has obtained mature data that is ready to be processed towards the next stage.
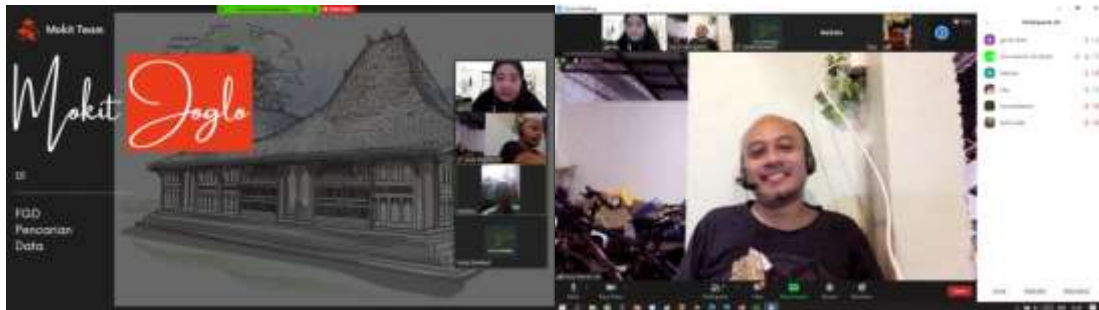
Figure 4. *FGD Process Picture*

a. Definition

Next is the definition stage. At this stage, the author conducts an analysis based on the results of the previous stages and performs a synthesis to define the requirements needed by users, namely students.

The results of the analysis from the previous stage resulted in several conclusions. Education about traditional houses has not been provided with interactive learning media, especially mokits. In this case, students and lecturers need interactive learning media that can facilitate the learning process of traditional houses. Users realize that studying traditional houses is very important as one of the conservation efforts. Interactive learning media is essential to be presented in the learning process to increase student interest in studying traditional houses and is expected to present a more pleasant learning atmosphere.

b. Idea

After obtaining the requirements, the researcher arrived at the idea stage, at this stage, several stages of brainstorming and sketching were carried out. This stage aims to bring up as many creative ideas as possible until several alternative ideas appear that answer the problem statement. The next stage is the manufacture of 3D modeling blueprints used as material for making prototypes.

1. Brainstorming

At this stage, the writer brainstorms to get ideas in product design efforts. Initial brainstorming found the background and purpose of making Mokit Rumah Joglo. Mokit Joglo House is an alternative solution that the author wants to offer in the unattractiveness of learning materials for traditional Indonesian houses, especially Joglo houses. Learning is considered essential to preserve cultural heritage, but the learning materials do not attract students' interest.
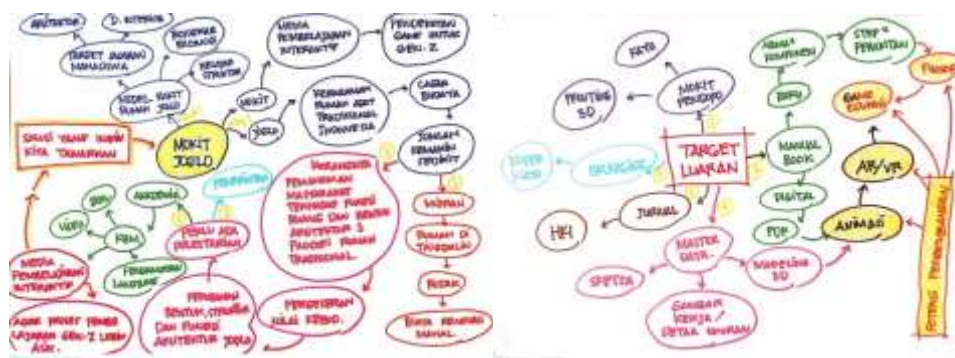

Figure 5. *Brainstorming Schematic Drawing*

Then proceed with the second brainstorming to produce output targets and further research plans. The research is expected to produce several outcomes, including a prototype of a Joglo house made of wood according to the original house material. Scientific publications through journals and IPR submissions are the following output targets. These three outcomes are the targets of this research. Further research can be done by designing packaging designs, developing interactive manual books with the addition of Augmented Reality technology to make game applications.

2. Sketching

After going through the brainstorming stage, then proceed with the sketching process. The sketching process begins with a manual sketch which is used as a guide for making 3D modeling. Describe each part of the joglo house with detailed site plans according to the agreed scale, namely the 1:20 scale. The initial part of making this measure plan is to determine the size of the pillars of the teacher. The size of the pillars of the teacher is the primary key that will affect the sizes of the other sections. At first, it used the standard pillar of the teacher, which was 20x20 cm (on a scale of 1:1). However, after being scaled to 1:20, what happens is that the detail size of the construction joints is tiny and prone to fracture. Finally, it was decided to increase the diameter of the pillar to 40x40 cm. The decision to use this size resulted from a literature review search which finally found that the 40x40 cm pillar size did exist. Particular nobles usually use the size. The decision to use this measure has also been through discussions in the data search FGD, which concluded that the measure could be used to study construction details. The critical measure is the role of the teacher as a benchmark or influencing the measures of other sections. After agreeing on the size of the

pillars of the teacher, the other parts of the joglo house follow the scale of the pillars of the teacher.
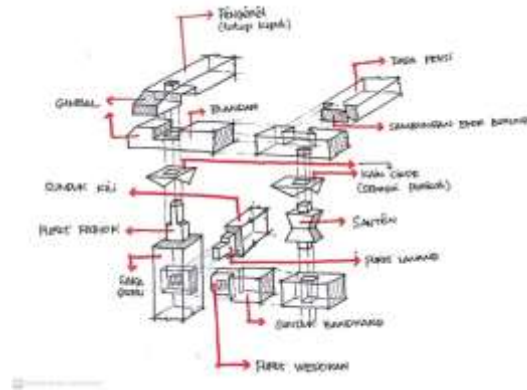

Figure 6. *Manual Sketch Drawing*

3. 3D Modeling

The results of the manual sketch then become a reference in making 3D modeling blueprints and making parallel 3D modeling with manual sketching. The manual sketch work has been completed 20% to be used as material to make 3D modeling. At this stage, the size and shape are still being adjusted. The size made in the manual sketch is the ideal size, but some adjustments are applied to 3D modeling. This process is a process before making a prototype using wood. However, the process is almost the same because it is in 3D form.
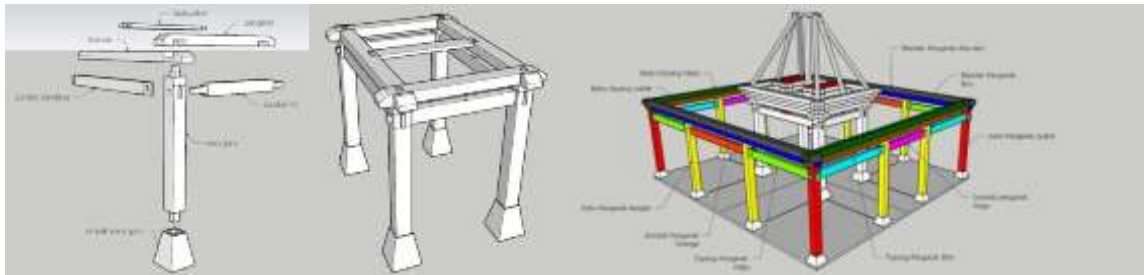
Figure 7. *3D Modeling*

Making this 3D modeling uses two applications, namely SketchUp and 3Ds Max. SketchUp is used for modeling, and 3Ds Max is used for rendering the JPEG image format. Modeling in SketchUp has two purposes. The first is as a blueprint image that will be used as a reference for making prototypes. The second purpose is as a rendering material that will be used for presentations and making assembly guides.
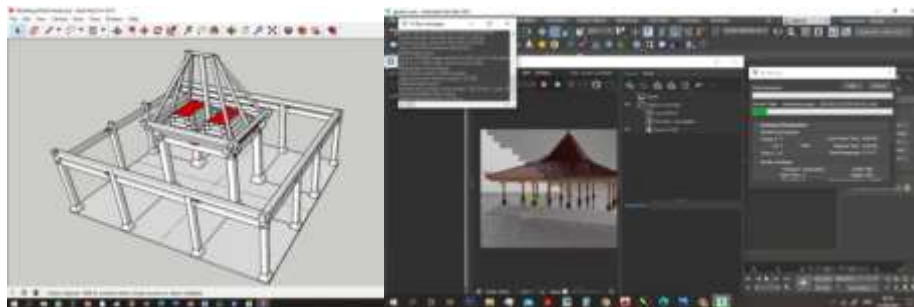
Figure 8. *Image of the Process of Making Modeling and Rendering*

Figure 9. *Image Rendering*

4.2 Prototype

      Prototyping is the next stage after 3D modeling. The prototyping stage is an experimental stage that still allows for some adjustments from the blueprints that have been made previously. In this process, there are several size adjustments and material experiments. The prototype is made of balsa wood, considering the soft and light character of this wood. The softwood character will make it easier to make prototypes by utilizing simple tools and working time effectiveness. Balsa wood is one of the woods that is light enough to be an effective alternative in reducing shipping weight. The wood texture is still quite visible, creating a natural impression of the original Joglo house building. However, the light and soft character make this prototype vulnerable to damage. Several experiments were carried out to strengthen this wood, especially in the connection details. Starting from mixed media to coating with resin materials have been tried, but the most effective result is to provide a versatile glue, namely G glue. Coating wood with this glue makes the wood fibers hard and not easily broken. The "umpak" uses a resin material printed and painted according to the stone's color.

Figure 10. *Photo Left G Glue, Middle and Right of the Prototyping Process*

      The prototype was made with a scale of 1:20 with several considerations by the results of discussions in the FGD process and interviews with resource persons. In addition, the small size but details are the points that make it very easy to use this product. Every part of the Joglo house is made to the details of the connection construction. With this mokit concept (raft model), the house can be disassembled for each part to educate the process of making a Joglo house and dismantling it.

Figure 11. *Mokit Assembly Process Photo*

The supporting media for this prototype are a manual book as an assembly guide and box packaging to package each part of the prototype. The packaging is made of pinewood with a colorful character that matches the color of the balsa wood on the Mokit prototype. The selection of pinewood with a matching color is also light in character, thereby reducing the shipping burden. The manual book is made by showing the sequence of the assembly process step by step with some text as a description of each component of the joglo house and other information. Some components are displayed using colors to simplify and clarify the components and the assembly process. Each component in the prototype has a code written at the bottom and will be listed in the manual book.

Figure 12. *Manual Book*

V. Conclusion

Mokit Products Traditional Indonesian Traditional House Series 1: The Joglo House is designed based on the problems that arise after empathy. The lack of interest in learning traditional Indonesian houses caused by engaging, interactive media became the problem. Brainstorming is done based on the problem to produce several alternative solutions, one of which is the design of this product. The creation of the mokit begins with a manual sketch process used to make 3D modeling. The process results are used as a reference and material for making prototypes of mokits to manual books. This design resulted in a prototype Mokit Joglo House with a scale of 1:20 made of balsa wood and resin on the base. Mokit is equipped with a manual book as an assembly guide and a medium for understanding the introduction of the parts of the Joglo house. All components of this mokit are packaged in a packaging box made from pine wood.

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