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Research Paper

Designing a Fresh Water Generator Application using Adobe Animate

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Abstract

Fresh water is highly essential on a ship, not only to meet the crew's needs but also for supporting the ship's operations, such as cooling the main engine, and auxiliary machinery, and for cleaning other cargo loads (tank cleaning). Therefore, there is a need for auxiliary machinery capable of converting seawater into fresh water, which is known as a fresh water generator. The researchers chose this research topic due to the lack of understanding about the working system of a fresh water generator, and in the era of society 5.0, people are accustomed to coexisting with technology, as it facilitates various human affairs. Numerous simulation applications have emerged, such as Adobe Animate, which researchers currently use to design and develop a simulation application for the fresh water generator on computer hardware. The aim of this research is twofold: first, to explore how to create a simulation application for the fresh water generator based on Adobe Animate, and second, to understand the operational aspects of the simulation application. The researchers employed the Research and Development method, utilizing the Borg and Gall model, which comprises 10 research steps: preliminary research, information gathering, product design, design validation, product revision, product testing, product revision, product testing, product revision, and mass production. The outcome of this research, the Design, and Development of an Adobe Animate-based fresh water generator application, indicates that the process of creating a simulation application for the fresh water generator using Adobe Animate can be accomplished on all types of computers with the Microsoft Windows operating system. Furthermore, the operational aspects of this simulation application can be executed on computers running the Microsoft Windows operating system without the need for an internet connection.

Keywords *design and development, application, fresh water generator, simulation, adobe animate*

INTRODUCTION

Indonesia is a vast archipelagic country. With a marine territory four times larger than its land area, Indonesia's economy heavily relies on the maritime industry. One of the sea transportation means that significantly influences Indonesia's economy is the maritime vessel. Vessels are crucial transportation tools in Indonesia due to its maritime nature. They must be large enough to carry lifeboats. In English, vessels are referred to as "carrier vessels," meaning large-sized ships, while "boats" refer to smaller crafts or rafts. Maritime vessels also require sufficiently large ports to facilitate smooth entry and exit. The individuals operating the ships are called the "crew members" or "ship crew." According to Law No. 17 of 2008, crew members are individuals working or employed on board a vessel by the owner or operator to perform duties as specified in the certificate. Similar to people on land, crew members have basic needs, one of which is fresh water. Fresh water is essential on board not only to meet the crew's needs but also for supporting various

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ship operations, such as cooling the main engine, and auxiliary machinery, and cleaning other cargo tanks. Given the importance of fresh water on board, it is generally sourced from land. However, when ships undertake long voyages, it is impractical to carry a large amount of fresh water, as it can affect the cargo capacity and incur significant costs. Furthermore, it poses a considerable risk if the ship runs out of fresh water during an extended voyage. Hence, there is a need for auxiliary machinery capable of converting seawater into fresh water, known as the "fresh water generator." The fresh water generator operates by evaporating seawater through a process that occurs within the evaporator. This process utilizes the heat from the main engine's cooling water, causing the seawater to evaporate. The resulting seawater vapor is then cooled down by the condenser, which utilizes seawater from the fresh water pump. The temperature of the main engine's cooling water typically ranges from 79 to 84 degrees Celsius. To convert seawater into vapor at this temperature, the air pressure inside the fresh water generator must be reduced below atmospheric pressure, achieved by using an "ejector pump." The ejector pump is responsible for pumping seawater to be converted into fresh water, sucking in seawater with a high salt content, and creating a vacuum by lowering the air pressure. The ejector pump is an external device from the fresh water generator and is usually of the centrifugal type. During practical work on board the MV. Pan Bonita, the researchers found it challenging to understand the operation of the fresh water generator, despite the availability of learning materials such as manuals and YouTube videos. Therefore, the researchers became interested in developing a thesis entitled "Designing a Fresh Water Generator Application using Adobe Animate."

LITERATURE REVIEW

The Fresh Water Generator is a machine that functions to convert seawater into fresh water using the principle of utilizing a vacuum for the processes of evaporation and condensation. This research aims to determine the causes, impacts, and efforts occurring in the fresh water generator, to improve the production of fresh water on the ship's fresh water generator (Dandy, 2020). Design and Development of a Website-Based Learning Media Information System. This research discusses the tutoring process that was previously conducted offline, but due to the COVID-19 pandemic, teaching and learning activities had to be done online through Google Forms and sent using WhatsApp, which led to several challenges such as difficulties in checking assignments and the less effective learning process. Therefore, the researcher designed and developed a learning media system for tutoring, expected to assist teachers and students in the teaching and learning process (Novitasari et al., 2021). The rain sensor is a sensor that functions as a rainwater detector. In essence, when rainwater falls on the sensor board, its resistance changes - the more water, the smaller the resistance, and vice versa. This sensor can be applied to automatically cover the hatch on the ship when it detects rain. It can provide a warning, or additionally, it can be used to operate the hatch closure. Two types available in the market are FC37 and YL83. This research used the Research and Development method, which involves analyzing, designing, developing, programming, and testing a product (Samudra, 2022).

METHODOLOGY

Research Method

The research method used in this study is Research and Development using the Borg and Gall model. In this development research, a systematic and structured approach based on the 10 research steps proposed by Borg and Gall was implemented (Rohmaini et al., 2020), which includes:

1. Preliminary Research
   The first step in the Borg and Gall research method involves needs analysis, literature review, small-scale studies, and the standard report required.
   a. Needs analysis involves several criteria
   b. Literature review is conducted using various sources such as reference books and scientific journal articles, within the last five years.

c. A literature study is conducted to introduce and understand the product to be developed. Its purpose is to gather research findings and other relevant information related to the planned product development.
d. Small-scale research involves questions that cannot be answered solely through learning or professional texts. Therefore, researchers need to conduct small-scale research to gain a deeper understanding of various aspects of the product to be developed (Abdul Salam Hidayat et al., n.d.).

2. Information Collection
The next step is to gather information after obtaining empirical data about existing potential and issues. This information collection process serves as a basis for planning a product that can address the identified problems (Abdul Salam Hidayat et al., n.d.).

3. Product Design
Through structured and careful product design, several steps are taken by referring to user needs, including:
a. Determining the hypothetical product design to be developed.
b. Identifying the research facilities and infrastructure required during the research and development process.
c. Defining the stages of implementing design tests in the field.
d. Specifying the roles of the parties involved in the research (Iqbal Assyauqi, 2020).

4. Product Trial
The product trial phase involves limited steps that must be passed, including conducting initial field tests for the product design.
a. The tests are limited in both design and parties involved.
b. Initial field tests are conducted repeatedly to obtain a suitable design, both in substance and methodology (Iqbal Assyauqi, 2020).

5. Product Revision
This step involves improving the model or design based on the results of the limited field trials. After the initial field tests, the initial product is refined. The approach used during this stage is predominantly qualitative, focusing on evaluating the process and making internal improvements (Iqbal Assyauqi, 2020).

6. Design Validation
This validation step involves broader product testing, including:
a. Testing the effectiveness of the product design.
b. Generally, effectiveness testing uses an experimental technique with repeated measures.
c. The result of the field test is an effective design, both in substance and methodology (Iqbal Assyauqi, 2020).

7. Product Revision
This is the second improvement stage after conducting a broader field trial compared to the previous one. By conducting a wider field trial, product refinement can be enhanced to ensure successful product development. The previous field trial was conducted with a control group to compare the results.

8. Product Trial
After testing and revising the product, the next step is to apply the new product or model on a larger scale. However, the product's use still follows the developments that occur. This is done so that if there are any shortcomings or obstacles, immediate improvements can be made to enhance the product's quality (Abdul Salam Hidayat et al., n.d.).

9. Product Revision

Product revision is carried out when deficiencies and weaknesses are revealed during the testing in a broader-scope institution. This stage represents the final revision to ensure optimal results before the new model is mass-produced (Abdul Salam Hidayat et al., n.d.).

10. Mass Production
    The results of research and development (R&D) are reported through scientific forums or mass media. Product distribution only occurs after undergoing quality control processes. The data analysis technique and steps in this research and development process are known as the research and development cycle, according to Borg and Gall, consisting of:
    a. Researching relevant research findings related to the product to be developed.
    b. Developing the product based on research findings.
    c. Field testing.
    d. Reducing deficiencies found during the field trial phase (Iqbal Assyauqi, 2020).

FINDINGS AND DISCUSSION

Based on the development and creation process of the Adobe Animate-based Fresh Water Generator application, the researcher can draw the following conclusions:

1. Creation of the Adobe Animate-based Fresh water Generator simulation application: In the application creation process, the researcher designed an initial layout based on the fresh water generator's manual book on MV. Pan Bonita. The first product testing was conducted with the application developer. After conducting the first product testing, the researcher validated the application with two lecturers from PIP Semarang and then continued with effectiveness testing on Taruna/I semester 4. This application development process requires a computer with Windows operating system and Adobe Animate installed on the device.

2. Operation of the Adobe Animate-based Fresh Water Generator simulation application: There are several steps to be considered for operating the fresh water generator simulation application, as follows:
    a. The application's main menu is the starting point, featuring a single "Open" button to access the subsequent menus. The initial menu is designed to prepare users for using the fresh water generator simulation application.
    b. After the main menu, users are presented with three menu options that display movements when the cursor touches each part of the menu. This interactive feature also allows users to learn and explore the fresh water generator more actively, which can increase users' confidence in operating the application and provide a deeper understanding of how the fresh water generator works.
        1). Understanding: This menu provides explanations about the fresh water generator's auxiliary equipment and its workings, based on information from the manual book on MV. Pan Bonita to ensure accuracy.
        2). System Operation: To provide more detailed explanations, the application includes a "System Operation" menu that contains tutorials on how the fresh water generator operates. It also explains each component present in the fresh water generator.
        3). Usage Guide: The researcher created this menu based on the fresh water generator's manual book. It includes the following sub-menus:
            a). Starting: This sub-menu explains how to start the fresh water generator, following the instructions according to the manual book.
            b). Stopping: The steps to shut down the fresh water generator are equally important as those to start it. Therefore, the researcher also added a sub-menu containing the process of shutting down the fresh water generator.

CONCLUSION AND FURTHER RESEARCH

1. The process of creating the Adobe Animate-based fresh water generator simulation application can be carried out by designing an initial layout based on the fresh water generator's manual book on MV. Pan Bonita. The first testing phase was done with the application developer,

resulting in several revisions and improvements to the product. Next, a design validation test was conducted with two lecturers from PIP Semarang, resulting in additional explanations for each component of the fresh water generator and the addition of voice-over. The third testing phase involved effectiveness testing with Taruna/i Teknika semester 4 of the Politeknik Ilmu Pelayaran Semarang, and the results indicated that Taruna/i of the Politeknik Ilmu Pelayaran Semarang found the fresh water generator simulation application helpful. For future application development, gather more information related to applications, and animations, and broaden the scope of the application to include multiple types of fresh water generators and ship manuals

2. The operation of the Adobe Animate-based fresh water generator simulation application can be initiated by downloading the application in the browser. Once downloaded, the application can be used offline on a computer with a Windows operating system. The application includes simulations of the fresh water generator's workings, which can be operated by following the steps outlined in the application's manual book. For future application operations, consider making it compatible with computer systems running Mac OS and Linux, and ensure that it can be run on mobile devices as well.

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