Design of Mobile Application Auction for Ornamental Fish to Increase Farmer Sales Transactions in Indonesia

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Abstract—This article focuses on designing a mobile application for ornamental fish auction transactions for fish cultivators in order to increase their sales. This mobile app was created using a prototyping methodology and a four step process. The first is communication, the second is Quick plan and design, the third is construction prototyping, which develops a tender application, and the last stage is development delivery and feedback. Data validation is carried out for users such as farmers, bidders, or buyers in developing the application. The results of this paper propose a mobile auction application that provides auction information and bidding by bidders and sellers. The results show that the application is validated and declared usable and feasible to conduct auctions and bids as needed. This application can increase sales and improve the economic life of ornamental fish farmers in Indonesia.

Keywords—Mobile application; auction; ornamental fish; prototyping model

I. Introduction

The Covid-19 epidemic has not prevented ornamental fish cultivators from countrywide production of ornamental fish products. Freshwater fish, sea fish, and shrimp are included in the category of decorative fish commodities. The expected harvest of this sector commodity is 450 thousand tons between April and June 2020, according to statistics from the Ministry of Maritime Affairs and Fisheries (KKP). Many places, including Aceh, Bengkulu, North Sumatra, South Sumatra, Lampung, Riau Islands, Bangka Belitung Islands, Central Java, East Java, West Java, Bali, West Nusa Tenggara, South Sulawesi, West Sulawesi, Central Sulawesi, Kalimantan, and Maluku, are involved in the harvest [1]. The production of 1.8 billion heads of ornamental fish has been set as the 2020 goal by the Government of the Republic of Indonesia through the KKP. Ornamental fish, as is well known, are one of the trustworthy sources of foreign exchange to promote national economic growth [2], [3]. As its production potential rises, Indonesia is struggling with a major issue, particularly marketing. However, because the information acquired differs from that held by actors in the ornamental fish industry, the government also encounters challenges when making decisions. A more significant sales process is required in many ways with larger manufacturing data. Online auctions are one possibility for utilizing technology to assist farmers in selling.

Online auctions have been conducted since the turn of the century on many websites, including ebay [4]. Online auctions enable participants or customers to sell and bid on goods using internet services [5], [6], [7]. Users may easily connect to one service thanks to this auction without being restricted by location or time by giving thorough descriptions of the goods[4], [8], [9], [10], [11]. The online auction system also makes sure that the information about the commodities auctioned by the auctioneer is safer. Additionally, the price paid will match the auctioneer's desired price. Additionally, it allows the bidder to decide whether to purchase by making an acceptable offer; if the offer is accepted, the bidder wins the item. Additionally, buyers might locate value products that are more appropriate, less expensive, and comfier. Additionally, consumers realize the benefits of using an online auction system to purchase things at lower costs, in a more comfortable environment, and with less financial risk [12], [13]. Because pricing will match the number of bids from customers, online auctions hugely impact selling prices. Users of the online auction system gain advantages from each of these.

This study aims to create a mobile application that functions as an online auction. This system was created using prototyping, allowing simple system adaptation to user needs. Users of the online auction system can access it anytime and anywhere. This system also makes it easy to carry out business transactions according to the agreed price, allowing buyers to easily access information about the commodity to be auctioned.

II. Literature Review

Auctions were originally introduced in ancient Greece. The auction is conducted using a declining pricing method, which starts with the highest price and goes lower to find the lowest bid. Its development is getting faster from auctions in various countries. Auctions are specifically used to sell goods with sellers setting a base price and the following rules a bidder can bid and compete with each other to be able to win bids [14].

Online auctions are services for selling or bidding on goods between auction participants or consumers and sellers via the internet [8]. This auction process is carried out with bidders able to bid, which is acceptable and increases as the

number of bidders' bids. With this online system, auctions can be carried out without geographical, time, or physical meeting restrictions [8].

Internet auctions were created to facilitate market transactions to change how sellers and buyers do business globally [8], [10], [15]. Online use with internet capabilities offers great convenience in providing information about prices, shops, and products being auctioned. Another advantage is that it offers sellers and bidders a unique way of buying and selling transactions happening in real-time.

III. METHODOLOGY

In this study, a mobile application prototype for Indonesian ornamental fish auctions was created using a prototyping methodology.

A. Prototyping Methodology

In order to construct an auction application quickly and focus on stakeholders' needs, starting with the communication stage [16]. The prototyping technique is a necessary step. Investigating all application needs and stakeholder requirements is the goal of the communication phase. The second stage, Quick plan and design, is concerned with planning and modeling quickly to reflect design elements that end users utilize, such as the application's interface or appearance. Creating a prototype that meets the needs of stakeholders and the design is the third stage of the construction prototype. The last stage of development, delivery, and feedback, explains how the prototype is provided and assessed to stakeholders to provide feedback. This model's prototyping phase is depicted in Fig. 1.
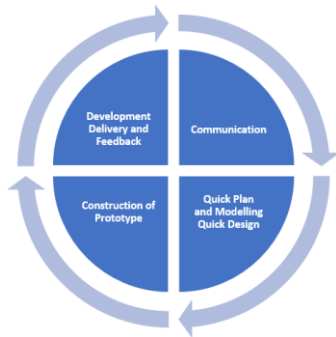

Fig. 1. Prototyping Methodology.

B. Architecture Application

This application architecture clearly explains how the application functions. This architecture illustrates how users and administrators can access the system through the application. The user can complete the auction transaction via a user interface. The database will be involved in the transaction process for the auction. The requested data and data processing, such as entering, editing, deleting, updating, and recording user bidding transactions, will be made available by the database. This Architecture application can be seen in Fig. 2.
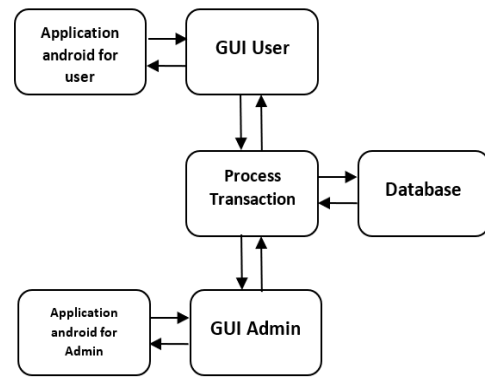

Fig. 2. Architecture Application.

C. Mobile Application Evaluation

The International Organization for Uniformity (ISO) evaluation of this mobile application system will give the same standardization between application development and industry needs in software quality measurement [17], [18], [19]. The 1991-first-developed ISO 9126 standard is being used in this investigation. This ISO standard is powerfully adaptable and can be applied to numerous systems. As shown in Fig. 3 are the six standards, and Table I describes the questions of the six standards used for evaluation.

TABLE I. EVALUATION VARIABLES AND INSTRUMENT OF ISO 9126

| **Functionality** |
| --- |
| Can software complete the tasks? Has the outcome met expectations? Will the system talk to other systems? Can the software prevent unauthorized access? |
| **Reliability** |
| Have the majority of the software flaws been fixed over time? Does the software have the ability to handle errors? Can the software be restarted and lost data recovered after a failure? |
| **Usability** |
| Does the user perfectly understand how to utilize the system? Can the user quickly learn how to utilize the system? Can the user operate the system easily? Is the UI appealing? |
| **Efficiency** |
| How rapidly does the system react? Does the system effectively use its resources? |
| **Maintainability** |
| Is it simple to diagnose faults? Can you easily modify the software? Can updates be made without the software ceasing to function? Easily testable software is this? |
| **Portability** |
| Is it possible to transfer the software to different settings? Easy installation of the software? Does the software follow portability requirements? Is the program capable of readily replacing other software? |
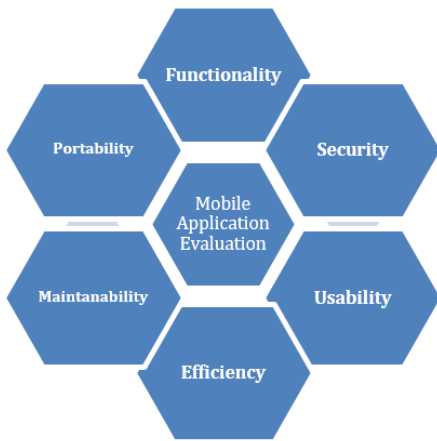
Fig. 3.   Six Characteristics of ISO 9126 as a Framework for Evaluating Software Quality.

IV. RESULT AND ANALYSIS

This section discusses the steps of prototyping methodologies for system development and the research findings. These stages include communication, rapid planning and design, prototype construction, development delivery, and feedback. The procedure for a case study on a prototype application is described in this section.

A. Communication Stage

The requirements and stories of the users are identified at this early stage. Users of the application should be made aware of the needs identification process, which includes the sales that sequentially offer information on auctions and bids and ensure that various users can enjoy the same advantages, as shown in Table II.

TABLE II.   REQUIREMENTS

Requirements
The program must contain a page requesting each user's username and password.
The app should feature a primary menu where new users may register themselves and where various jobs will be displayed.
The main menu with a list of tasks should be present in the program.
For applications to hold an auction, a bidding website is required.
A checkout page is a must for the app.
An app's history page is required.

B. Quick Plan and Design Stage

This section discusses the use case, which deals with the various temporal circumstances of each prototyping working sprint. There are two parts to this stage. The first is the Quick Plan, which assesses the requirements for developing prototypes in accordance with user needs. Second, Modeling Quick Design creates design specifications based on a system's needs analysis. The Unified Modeling Language (UML) approach is used in this work.

1) Quick plan: Interviews with relevant users, primarily ornamental fish growers and purchasers generally, are conducted in order to analyze user needs. Furthermore, the

input, process, and output needs are translated from this analysis. Data such as seller and buyer profiles, auction data, history data, payment data, and product data are needed to analyze the input requirements. While the management of the input data is described in the process data. For the information to help users comprehend, the output data is finally in the form of information from the input data processing in the program.

2) Quick design: Analysis of the needs of users is that users can register with the application, users can bid from the bid list, users can log in to use the application, and users can make payments from winning results from bidding. Users can view the history of bids that have been created. Utilizing use case diagrams in UML, this analysis performs needs modeling, as shown in Fig. 4.
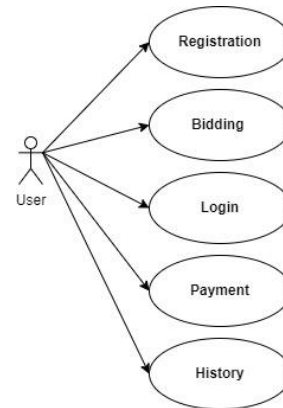

Fig. 4.   Usecase Diagram.

3) Construction of prototype: The effort to create the application starts at the prototype construction stage. In order to develop a prototype that actually meets user needs, the work is done in accordance with the information gleaned through the analysis of user needs outcomes. Execution of a design:

a) Design 1: Main Page of the application: A login page allows users to access their own accounts. When there are user users and administrator users, respectively (See Fig. 5(a)). And, to register with a new account in the application, first enter the user identity consisting of name, email address, password, phone number, country, address (see Figure 5b). This is shown in Fig. 6.
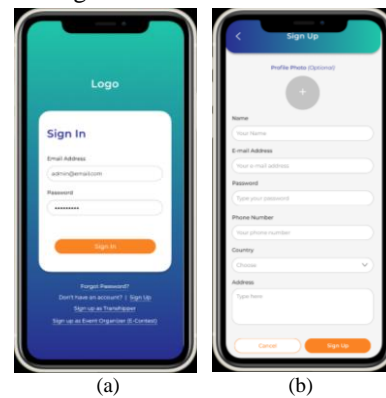

| (a) | (b) |

Fig. 5.   Main Page of the Application.

b) Design 2: User Main Page: Main page User user who owns store as auction maker. (a) Main Page The auction owner user in the application consists of a product menu, auction menu, delivery order menu, (b) Auction creation page, (c) View information on Auctions that have been made, (d) View list of auction winners, (e) Confirmation page to the auction winner, (f) Auction detail information list page, (g) Order history page has been made. This is shown in Fig. 6.

c) Design 3: The main page of users who bid on auctions: (a) User main page, which consists of profile menu, my bid, and history, (b) Settings page, which functions to set profile, currency, payment method, notification, and sign out, (c) My Profile page functions to update user's data, (d) My order auction page which displays auction product orders, (e) Order info page displays detailed information on unpaid auction orders, (f) Order info page displays information on auction product orders with the shipping address inputted, (g) page order info provides information that payments have not been made, (h) Checkout page displays information on choosing the payment method, (i) Order info page displays information on payment confirmation, (j) Summary page displays all auction orders that have been paid for and are ready to ship. (k) History page that displays the history of auction orders. This is shown in Fig. 7.

d) Communication stage: At this last stage, the finished application is given to the user to see whether the system is running well, and researchers get feedback from users through the evaluation of the application. This evaluation uses a forum group discussion for users. From the Mobile application evaluation results, the researcher decided to provide a solution, as seen in Table III.
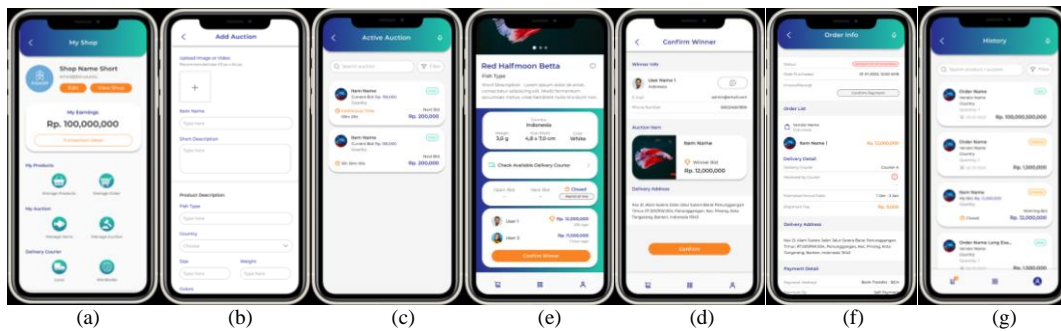

(a) (b) (c) (e) (d) (f) (g)

Fig. 6. The User Main Page.

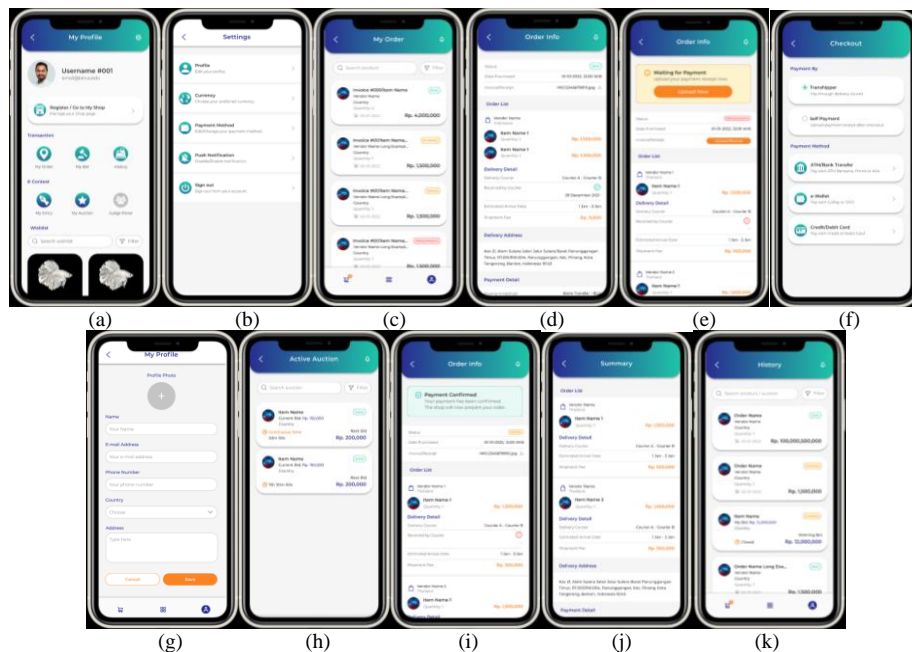(a) (b) (c) (d) (e) (f)

(g) (h) (i) (j) (k)

Fig. 7. The Main Page of Users who Bid on Auctions.

TABLE III.   REVIEWER COMMENTS AND SOLUTIONS FOR IMPROVING THE MOBILE APP

Comments from users	Solution
Content of Auction	
Incomplete organizing of the auction	To provide more thorough information, auction materials can be updated with fresh sources.
The instruction's scope supports the purpose	-
The auction documentation is simple to follow	-
New sources can be added to the materials used in auctions.	-
Access and Links	
The application does not provide a search feature.	The application is unable to find an object. It will be investigated more in the future.
Functionality	
The outcome is as expected.	This system can be more interactive
The interactivity access in the display is adequate.	
The program prevents illegal users from logging in.	-
Reliability	
The majority of the software's flaws may not have been fixed over time.	- The program is not set up to deal with the error
The application's ability to handle faults is uncertain.	- The application isn't built to deal with errors.
The application's ability to recover lost data after failure is uncertain.	- The software is not intended to recover lost data following a failure.
Usability	
The system's use is simple for the user to understand.	The user interface might use some improvement.
The system's user interface is simple to understand.	-
The user uses the system with little effort.	-
Efficiency	
The application has a quick response time.	The system is unable to use resources effectively.
Does the system make efficient use of its resources?	-
Maintainability	
Any signs do not show a defect application.	The software is difficult to modify because a skilled coder for multimedia was required.
It is uncertain whether the program can be changed easily.	Changes are performed, and the software is unable to continue operating.
Is it certain that the application will continue to work if changes are made?	Any signs do not show a defect application.
The program should be improved to detect errors in further study.	It is uncertain whether the program can be changed easily.
Portability	
The application cannot be loaded on an iPhone.	It will eventually be produced in an IOS version for iPhone users.
Installation of the software is simple.	
Not sure if the app can easily replace another piece of software?	

The project's completion with the provisions that were envisaged at the outset is the process's last stage. This phase explains how the functionality of the application's design and function has been correctly assessed in light of the proposal. The table will provide the traits and features from the previous stage and describe what first-time mobile app users do.

V. DISCUSSION

The development of this ornamental fish auction application has the following system: Every user who wants to participate in this auction system must register on the application. After registration, the user can log in to use the features in the application, among others, as a seller who makes auction information or as a user participating in auctions. After participating in the auction and winning, the user can see the list of winning auctions on the shopping list. Then make a payment by providing the identity of the address and selecting the sender service provided. After the payment is complete, the sale will process the delivery according to the delivery service chosen and the address of the auction winner. The auction winner can track the delivery process carried out by the seller so that it can create a sense of trust in the application or seller. After the auction recipient gets the auction product (ornamental fish) can confirm receipt on the application and provide feedback to the seller.

The development of this application has received a good response from users of the processes that occur in the system. This is because it has been by the needs required of the user.

In addition, the user provides a view of the need for continuous development from the application side, among others. First, the application can provide complete information content than the product being auctioned or other products that will be auctioned next in terms of application content. From the application access side, it is expected to provide reasonable access, for example, by providing a search feature. In terms of functionality, users hope to get a more interactive and faster system from each of the features provided. From reliability, users wish to reduce errors when accessing applications due to slow responses and can recover lost data. In terms of usability, the user is quite satisfied with the appearance but still needs to improve some application features. In terms of efficiency, the user needs efficiency from using data that is too large to reduce excessive internet usage. In terms of maintainability, the user hopes that the application user interface will not have too many defects, so it is necessary to develop an interface that is easier to use and can be accessed easily. In terms of portability, users find it very easy to install the devices used and hope that it can be developed with various devices so that it can be used more.

VI. CONCLUSION

The result of the application for ornamental fish auctions provides easy support for transactions for ornamental fish farmers and hobbyists. On the other hand, the application helps in processing a very wide range of transactions regardless of space and time because the application can be accessed anywhere and anytime by the user. The results received by the author are that the application platform can increase the income of ornamental fish farmers with a wide market reach and can foster consumer confidence to make transactions with clear data validation from the seller/auction maker.

In addition, the application is developed by giving priority to auctions only so that it can give focus to users to make transactions with the applicable auction procedures. This auction procedure is very easy to learn because it only bids on the auction information provided. If you win, it will be further informed to the winner of the sale that made the auction. Then, you must agree to take the next step to process the shipping address, and the payment has been completed through the auction process.

Moreover, in-depth research on the auction system, especially for ornamental fish, is very rare, so it provides opportunities for fish farmers to be more advanced in their transactions, get to know buyers, or get more income.

This research is developing by approaching the prototyping method, feeling the advantages at this stage. The stages carried out are appropriate, correct, and supportive in the development process to get applications that suit user needs. In addition, this stage can be seen clearly from application development to evaluation so that the application is appropriate in accordance with user needs. The development process can identify problems that are applied.

On the other hand, it should be noted that this prototype method has several limitations. It does not clearly explain the team members working on it, and the work is not scheduled in detail according to the originally planned time. So this note is estimated to be a top priority in development, so it needs to adjust the focus of the completion time of each application module later. Future work needs to be re-examined regarding adding features for efficient and effective payment methods with various banking services such as credit cards, various FinTechs, and enabling cryptocurrencies. And can also feature live-streaming auctions between sellers and buyers.

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