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The Design and Evaluation of CAD Custom Batik User Interface

Nova Suparmanto [a,*], Anna Maria Sri Asih [a], Andi Sudiarso [a], P Insap Santoso [b]

[a] *Department of Mechanical and Industrial Engineering, Faculty of Engineering, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia*
[b] *Department of Electrical Engineering and Information Technology, Faculty of Engineering, Universitas Gadjah Mada, Yogyakarta, 55281, Indonesia*

*Corresponding author: *novasuparmanto@mail.ugm.ac.id*

***Abstract*—The popularity of batik reflects consumer demands for purchasing fulfillment. Digital technology can bring several advantages and new opportunities to the custom batik design process. Computer-Aided Design (CAD) is a popular digital tool used. This paper will provide the new User Interface (UI) design of CAD custom design batik, namely Batik 4.0. It's software developed to provide services, such as pattern customization in various sizes, batik character input system, pricing, and production time estimation utilized by the batik industry in Indonesia that can be directly forwarded to the manufacturing process. Research in UI design for CAD batik has not been studied, and this paper will fill the significant gap and upgrade the usability. This evaluation will test the usability of the test, employing the performance matrix and RTA towards UI that already exists. Improvement was made with a wireframe using human-computer interaction (HCI) and usability testing data. User-centered design (UCD) focuses on the role of the user in the process of system development as the wireframe design method. This research shows UI wireframe design for several types of users. In making the UI wireframe design, a usability evaluation was performed again. The evaluation result shows that the new user prototypes have fewer errors and exceed the usability value compared to the previous one. The new design is more user-friendly and can be used as a reference for the future development and improvement of CAD custom batik.**

***Keywords*—CAD custom batik; usability; user interface; human-computer interaction; user-centered design**

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I. INTRODUCTION

The demand for custom products or made-to-order (MTO) according to certain specifications is increasing, including in the batik industry in Indonesia. Research by Rahadi et al. [1] stated that the batik demand has evolved from traditional to modern fashion [2]. According to Asmal et al. [3], there is a respondent tendency for batik with the combination of contemporary and original values of batik itself. Shaharuddin et al. [4] reviewed the design and stylization of the batik design with the use of digital approaches. Pujiastuti et al. [5] suggested that batik entrepreneurs produce batik that caters to consumers' preferences.

CAD custom batik software using an input system has been proven to ease designing customized batik in various characters. The process of making the batik pattern becomes more efficient and minimizes production costs. According to research literature, there are several issues regarding the benefits of custom CAD batik. Some of them are that interface design has not met the user's expectations, and the process from designing to manufacturing needs to go through an integrated ordering process concordant with the customer's specifications. Thus, a buy-and-sell feature is required to make it practical.

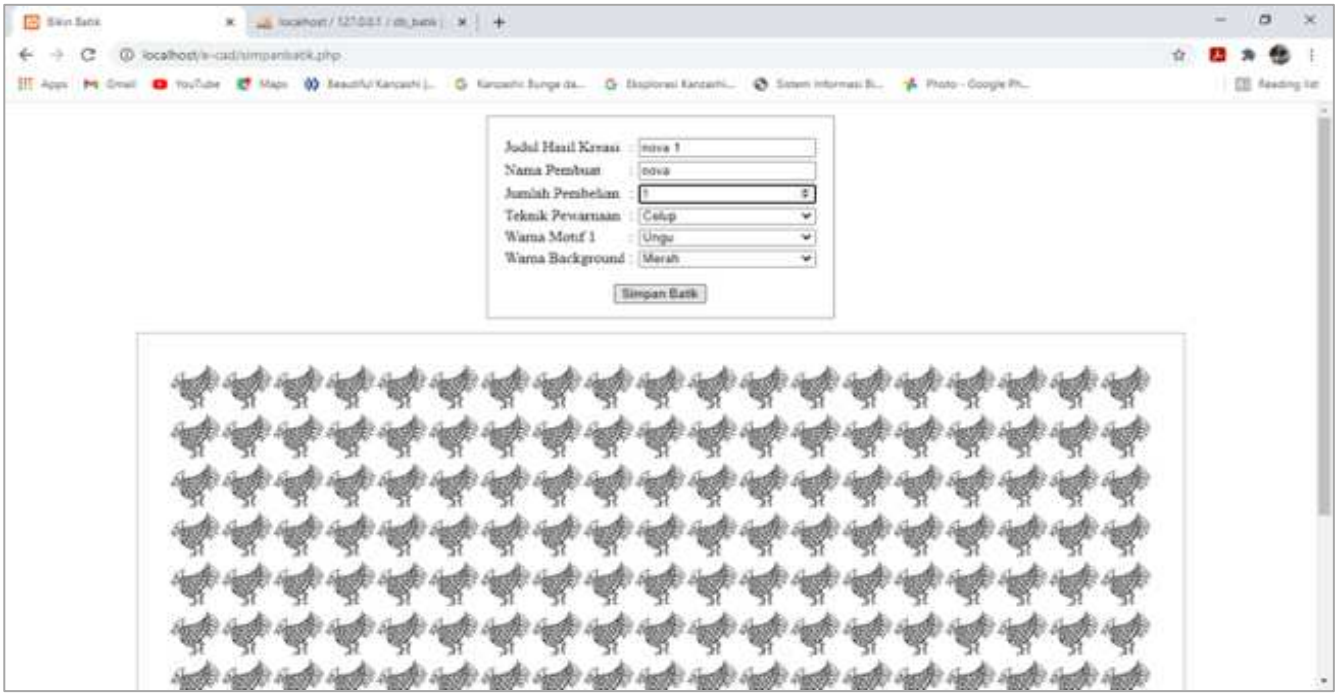
User Interface (UI) design has a significant role in business activity, including the batik industry. UI is how users interact with content to accomplish some goal [6]. The Batik 4.0 concept that has been developed consists of Human-Computer Interaction (HCI) and Human-Machine Interaction (HMI). HMI controls the CNC machine (Computer Numerical Control) of hand-drawn batik, whereas HCI controls the computer (processing and saving data).

Research of the development of CAD custom batik by Asmal et al. [3] and Munandar [7] made an algorithm capable of automatically determining cost and production time. Research for the usability of CAD custom batik has been done by Widiaty et al. [8], where customers can select their designs, models, and batik patterns. Endah et al. [9] conducted unit and usability testing to measure the functionality, performance, and design of website-based 3D motifs on Batik Semarangan apps. Prahasiwi et al. [10] used performance measurement and Heuristic Evaluation (HE) to examine the batik application that

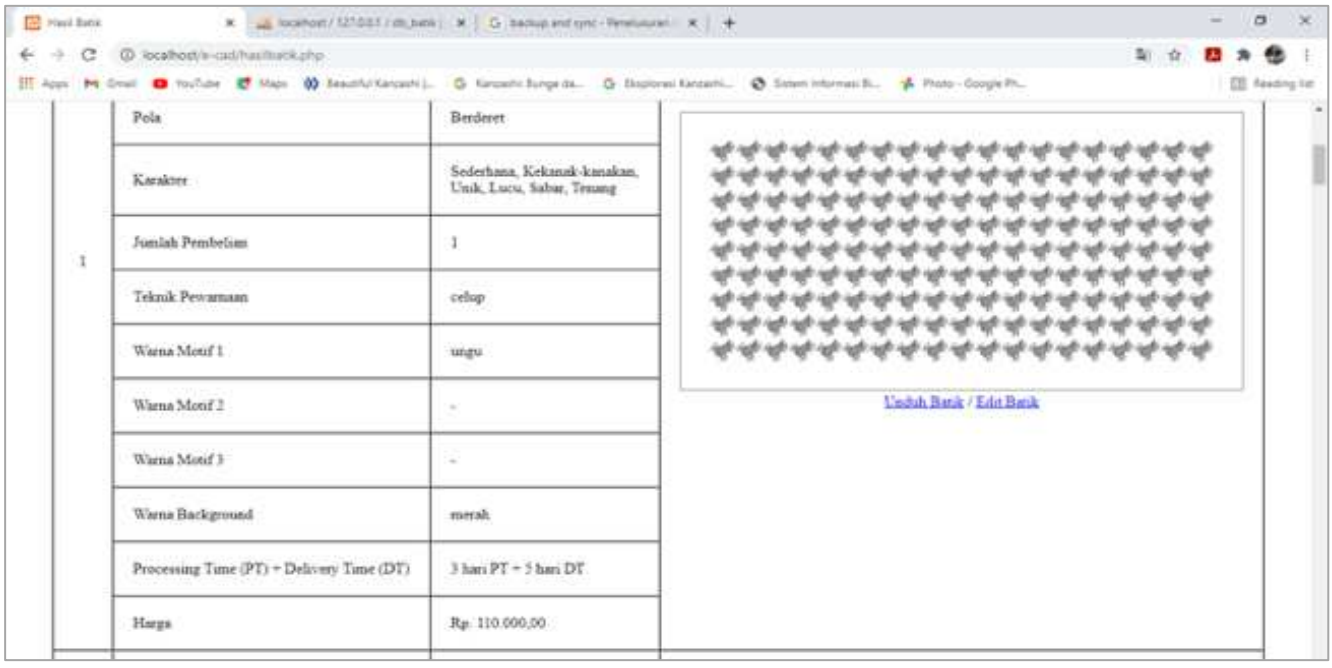
has been developed. Another research by Ali et al. [11] showed that users' performance and satisfaction with EZ Weather improved significantly, considering UCD methods, usability heuristics, and smartphone design rules in interface development.

Research by Suci et al. [12], Stagg et al. [13], Ali et al. [14], Ahmad et al. [15], Shrestha and Murano [16], Wook et al. [17], Ismail et al. [18], focuses on design and usability evaluation for information systems, online dictionary, health applications, and virtual museums. Referring to the research mentioned above, few publications are related to the usability evaluation of CAD custom design batik software. The writers of this paper are guaranteed the novelty of this paper. This journal was explicitly written to study HCI, particularly for UI design for several types of users of customized batik designs.

CAD custom design batik or Batik 4.0 is software developed by providing batik services, such as pattern customization in various sizes, batik character input system, pricing, and production time estimation. Research of existing design of CAD custom batik software in hand-written batik with CNC machine by Munandar [7] in Figure 1., stated that it's still needed for further development in motif and pattern, buy and sell feature, payment, order tracking, and improvement in aesthetical matter for UI.



(a) The process of saving batik designs



(b) The process of saving batik designs

Fig. 1 (a-b) Existing Design of CAD Custom Batik

Human-Computer Interaction (HCI) is a multidisciplinary field of study focusing on designing, evaluating, and implementing interactive computer systems to be used easily by humans [19]. The design principle of UI for CAD custom batik refers to Nielsen's 10 General Principles for Interaction Design [20], also the theory of Shneiderman's Golden Rules [21], and Mandel [22]: positioning the user in control, minimizing user memory capacity, and making a consistent interface.

Interface is a product's component that the user uses to carry out operations. There, the user, device, and application communicate [23]. The term usability is often used in the field of HCI. According to ISO 9241–11:2018 [24], usability is related to interaction with a system, product, or service. Usability is a more comprehensive concept than general, such as "ease-of-use" or "user friendliness." Nielsen [25] stated that usability is an attribute of quality, which indicates how easily an interface is used. Determining the issues, problems, and disruptions of the user while interacting with the system usability evaluation is one of remarkable things.

It can also be defined as a method used to increase the friendliness of the UI during the designing process. Cato [26] argued that usability can do anything the user wants, not what they need to do. According to Rubin & Chisnell, usability comes from the word *usable*, which means it can be used easily by the customers. Something can be helpful if it minimizes failures and gives the user benefits and satisfaction [27]. The product or service is usable if users can do whatever they want without any barrier, doubt, or question.

Usability consists of 5 quality components as determined by Schneiderman [28]: learnability (ease to learn), efficiency, memorability, errors (errors and security), and satisfaction, which is measurable with System Usability Scale (SUS) [29]. The purpose of usability testing is to identify whether the developed application has fulfilled the necessity of the user. According to ISO 9241–11:2018 [24], the usability standard in interface design must be relevant while designing and evaluating the interaction with the system, product, or service for development, procurement, observation or comparison, and marketing and market research.

Tullis and Albert [30] assert that usability can be used as a formative and summative test. Formative tests provide feedback to the system's designer while the design is being designed or developed. Formative evaluation is carried out to make sure of the product. Summative tests provide assessments of the finished product, evaluate the improvement done to the previous product, or compare it with a similar product from another company.

II. Materials and Method

The evaluation of usability testing employing the performance matrix to examine time on task, efficiency, error, satisfaction, and Retrospective Think Aloud (RTA) towards UI that has existed initiated this research. A performance measurement method or user testing is a usability analysis accomplished by directly testing the product user to obtain the documents on the product's appropriateness. The RTA evaluation technique is conducted when the respondent has finished interacting with the system. The respondent will be asked to verbalize the thoughts, emotions, and opinions by rewinding a video that shows the respondent's activity during the session with the system.

Furthermore, the suggested improvements from the evaluation will be used to design the wireframe. HCI and data from usability testing will be the groundwork for developing suggested improvements. The last will compare the usability of the new design UI with that of the previous (existing).

A. Participants

The required number of participants in the analysis of matrix performance is 20 to allow the analysis to obtain a statistically significant data analysis [30] [31]. The characteristics of respondents are those who are familiar with software design in computers.

B. Experimental Design

The experimental design succeeded the research design by Shrestha and Murano [16], which had been done before. The experimental design phase is explained in Figure 2 below.

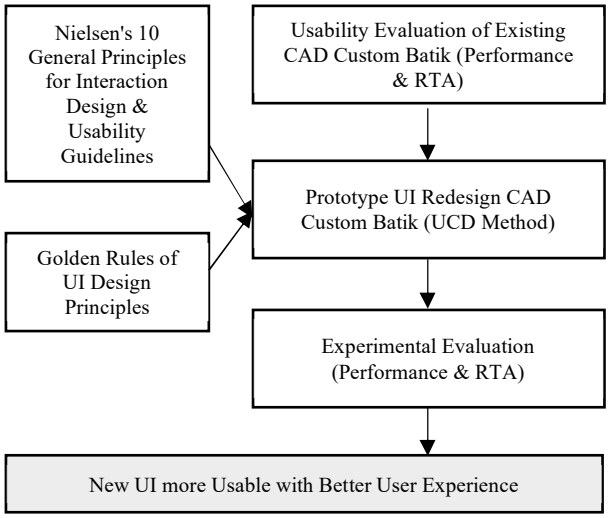


Fig. 2 Phases of Experimental Design

C. Procedure

According to ISO 9241-210:2019 [32], UCD is an approach to interactive system development purposing to develop a sound system for users. In comparison, Barnum [33] argued that UCD is a design approach and UI development involving users in the overall process of designing and developing an application. This method does not focus only on the comprehension of the user of the developed system. Furthermore, an understanding of the task where the system will be used is required. Several phases are performed iteratively, as shown in Figure 3. below.

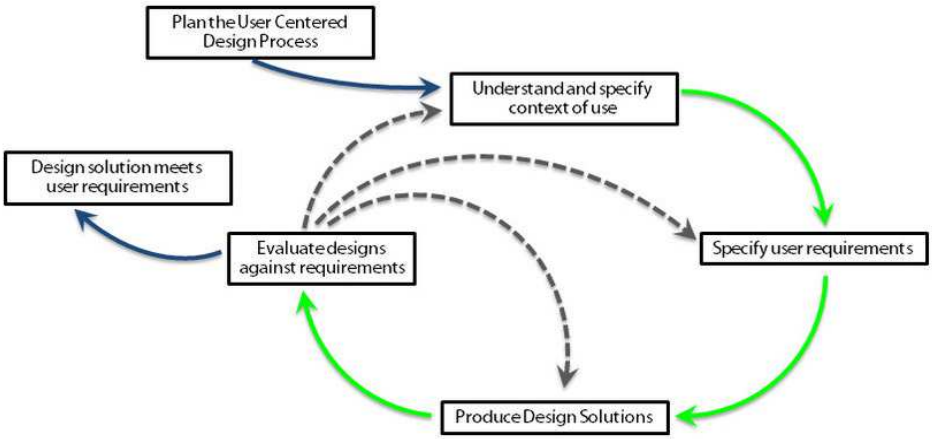


Fig. 3 Phases of UCD by ISO 9241 – 210 [32]

The CAD custom design of batik motifs with UCD consists of four phases.

1) Understand and specify the context of use: determine the context by identifying the user and the context of use. It is determined from the result of usability testing in existing products, literature studies, and interviews to accomplish the requirement to make a UI design. The literature study focused on several materials: E-Commerce for web-based Custom Products, HCI & UI, User Experience (UX), UCD, and Usability Testing. The purpose of the interview is to compile all the requirements from the service provider's perspective. To establish the context of use, the writers evaluate the websites served according to the users' perspectives.

2) Specify user requirements. The following phases are related to the development of the UCD system, such as specifying, identifying, and analyzing the user's requirements and tasks. The outcomes of this phase are specified user requirements, the analysis of the user's task, the business process in the swimlane diagram, and the d use case diagram.

3) *Produce design solution.* In this phase, the user's requirements will be printed into a blueprint system, which consists of layout design, storyboard design, and a UI mockup of the user. The solution of this research focuses on designing an interactive interface system.

4) Evaluate designs against requirements. Following all others is the evaluation of the suggested solution. The review examines usability testing methods in the new UI design.

Creating wireframes and mockups of UI can be done manually or using software such as Figma. UX/UI designers use specialized tools such as Sketch or Figma to create High-Fidelity and Low-Fidelity prototypes of their products [34]. Such tools are feature-rich and produce prototypes that can be seen as instantiations of their underlying metamodel. Figma is among the most commonly used UI design tools globally [35], [36], [37].

The wireframe developed in this research is a High-Fidelity Wireframe that provides various displays, such as pictures, colors, and layouts, that are relatively close to the system's final result. With Figma, the wireframe can provide detailed information from the last suggested improvement of the interface page of the CAD custom design batik application.

D. Usability Attributes

Table 1 below shows the evaluation with 5 (five) usability and matrix testing principles and 7 (seven) tasks.

TABLE I
USABILITY ATTRIBUTES

No	Section		Description
1	Metrics		
	a. Performance		
		Learnability	Comparing the required time for respondents to finish the task with 2x repetitions.
		Efficiency	Efficiency is measured by comparing all the respondents who completed the task to the time required for the respondents to finish the task.
		Memorability	The required time for respondents to finish the task in the first and second sessions in a certain period.
		Error	The number of product errors and how the users solve the mistakes.
	b. Self-report		SUS questionnaire to evaluate user's subjective satisfaction [29], [38]
2	Tools and materials		Computer/ Laptop min 11", internet connection, Figma
3	Tasks		
	a	Task I	Login to the system using username & password
	b	Task II	Open the custom design creation page, size: scarf, spiral, and click "Create New Design" button.
	c	Task III	Adjust design configuration: click "Add Motif," select a chicken character in code "AY4", color of the material: the brown, color of the motif: yellow. Click "Save Batik"
	d	Task IV	Save the design, click coloring technique: Colet, "SAVE"
	e	Task V	Open the Designed Batik page downloading the result by clicking "Download Batik."
	f	Task VI	Add to the cart by clicking "Place Order" or the cart icon button
	g	Task VII	Logout the system by clicking the "Logout" button

III. Result and Discussion

A. Evaluation Result on User Customer Usability on Existing CAD Custom Batik

From the usability testing conducted using two techniques, several data were obtained. From the test with performance measurement, the task completion time of the 20 respondents was obtained. In contrast, another one with RTA technique shows the data of issues, difficulties, and feedback left by the respondents while operating CAD custom design batik.

1) Efficiency. Table 2 shows how the time needed to fulfill user needs and the efficiency percentage value in the existing CAD of batik motifs are calculated.

TABLE II
THE PERCENTAGE EFFICIENCY SCORE OF THE EXISTING CAD CUSTOM DESIGN BATIK

No	Task	Completion Rate	Task Time (s)	Efficiency
1	Task 1	100%	6.15	100.00%
2	Task 2	100%	5.18	100.00%
3	Task 3	75%	15.15	34.45%
4	Task 4	65%	46.20	58.98%
5	Task 5	100%	3.60	100.00%
6	Task 6	100%	5.48	100.00%
7	Task 7	100%	6.17	100.00%

Based on the data above, the percentage efficiency score of the existing CAD custom design batik reaches an average of 84.77% with an average processing time (task time) of around 12.56 seconds and a completion rate of 91.43%.

2) Error. The calculation results of the total respondents went to errors shown in Table 3. below.

TABLE III
PRODUCT EXISTING ERROR DATA

Task	Error	
	Respondent	Description
1	0	
2	0	
3	R5, R6, R7, R19, R20	The button and navigation menu are hard to find, page layout got separated
4	R3, R6, R9, R12, R13, R16, R20	Trouble inputting quite a lot of data, not sure which one to fill in
5	0	
6	0	
7	0	
Error rate	12 of 140 tasks = 0.0857 (8.57%)	

The most common error made by respondents was in Task 4. While saving the design results, much data must be inputted. So, it is less efficient and requires quite a long time. In task 3, respondents had difficulty adjusting the design configuration because buttons and navigation menus were difficult to find, and the page layout was separate. When respondents had trouble and wanted to access the guide page, they had to switch pages first. The error occurs since the time provided has ended. The average error score of existing CAD custom batik design is around 0,0857 (8.57%).

B. New UI Wireframe Design and Evaluation

Based on the evaluation results, recommendations for improvement are made by creating a new UI wireframe for "Customer" users using the UCD method, including designs for other types of users.

3) User Context Analysis. Respondents are determined to act as evaluators of the system. The new UI design of CAD design batik (namely Batik 4.0) includes several types and levels of users: customer, operator, manager & owner. The respondents in this study were limited to the type and level of the user, as shown in Table 4.

TABLE IV
USER CONTEXT ANALYSIS

No	Users	Characteristics
1	Customer	Service users who can use technological devices
2	Operator	Finance division, machine & non-machine operator, warehouse division
3	Manager (Admin)	Part of the administrator and technical support, management of users in the system
4	Owner	View the statistical data (amount of production and business turnover)

4) User Needs Analysis. Based on the results of interviews and observations with the respondents of this study, it was found that there are several interface requirements for order processing in CAD custom batik products, including the following:

- Payment system for custom products with a Down Payment (DP) or paid off immediately
- Has an automation feature for calculating shipping costs and checking payments
- Price and time estimation validation or correction feature to compare the results of automatic cost calculations by the system with real prices & times
- There is an express checkout feature; price validation/ correction is carried out at the final stage so that the order is immediately entered the queue
- Order tracking feature for both the stages of the production process and the expedition shipping process
- Notifications via email about payment invoices and order status
- Provide ratings and assess the performance of services
- It has a simple yet informative display, so loading the interface doesn't take much time.
- Views and features can be used easily.
- The order process flow is short and straightforward, making it easier for users to use.

Based on user needs analysis, various activities and functions are described in Table 5.

TABLE V
USER NEEDS ANALYSIS

No	Users	Characteristics
A.	**Customers**	
1.	Saving the result of batik	Displays the results of the process of storing batik designs that the customer has made
2.	Shopping cart	Displays a list of custom products that the customer has forwarded from the batik results page
3.	Checkout (Custom Design Batik)	Displays a list of products, shipping addresses, shipping options, total costs, estimated production time
4.	Payment	Displays the payment selection process
B.	**Operator**	
1.	List of payments and expeditions	Displays a list of incoming orders and their payment status
2.	Input the customer order tracking steps	Displays the input form for the steps of the production process per step
C.	**Manager (Administrator)**	
1.	List of payments and expeditions	Displays a list of incoming orders and their payment status
2.	Input the steps for tracking customer orders	Displays the input form for the steps of the production process per step
D.	**Owner**	
1.	List of payments and expeditions	Displays a list of incoming orders and their payment status
2.	Input stages for tracking customer orders	Displays the input form for the steps of the production process per step

Based on the needs analysis results, the relationships between interfaces are arranged in a state diagram. There are 67 pages for customer users, 20 for operators, 6 for administrators, and 5 for owner. Furthermore, for customer users, a relationship chart between views or state (page) diagrams is made, then switching between pages, there is a treatment in which the user is asked to click buttons and tabs, as shown in Figure 4 below.

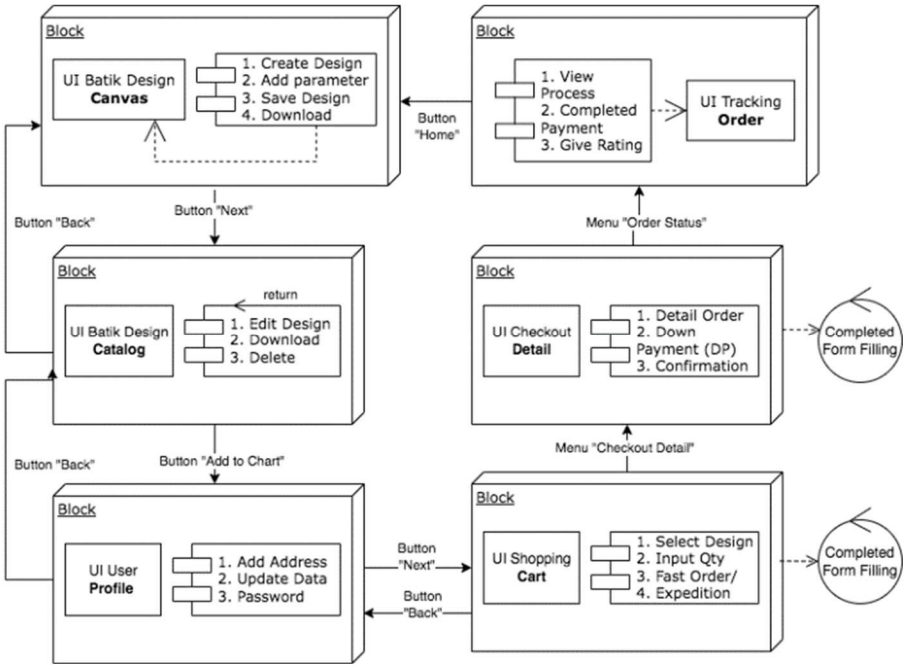


Fig. 4 State Diagrams of New CAD Custom Batik (Customer)

5) Making Design Solutions. At this stage, a solution design is made based on the results of the user needs analysis. The steps taken are as follows.

- Business Process Mapping.

Creating a solution design begins with mapping business processes in industries that apply CAD custom batik motifs. The batik industry has not yet used information technology to order custom products in the current business process. The ordering process is done manually. Furthermore, the proposed business process is based on the existence of information technology.

- Analysis of Users' Tasks & Privileges.

Table 6. shows the results of the task analysis for each class of users defined as follows.

TABLE VI
USER TASKS AND PRIVILEGES

No.	Customer	Operator
1.	Register, Login and Logout	Login, logout of the system
2.	Making the design of the batik pattern	Price data validation
3.	Get the estimated & validated price and production time	Incoming order data and production schedule
4.	Checkout and Invoice payment	Update the status of the production process
5.	Get payment status updates	Manage production machine status
6.	View the status of the steps of the production & delivery process.	
7.	Manage profile data	
No.	**Manager**	**Owner**
1.	Login and logout in the system	Login and logout in the system
2.	Operator data and profiles	Statistical data
3.	Customer data and profile Manage the cost components of the pricing system	Amount of production and turnover

- Use Case Diagram

Describes the activities contained in the application. In Figure 5. The following is a use case diagram of a custom CAD batik. One system to manage the Product Order and Tracking System. The four actors who carry out activities are the customer, operator, manager, and owner. The actors can carry out 22 Use Cases. There are differences in procedures between the UML Use Case Diagram that has been running and the one proposed.

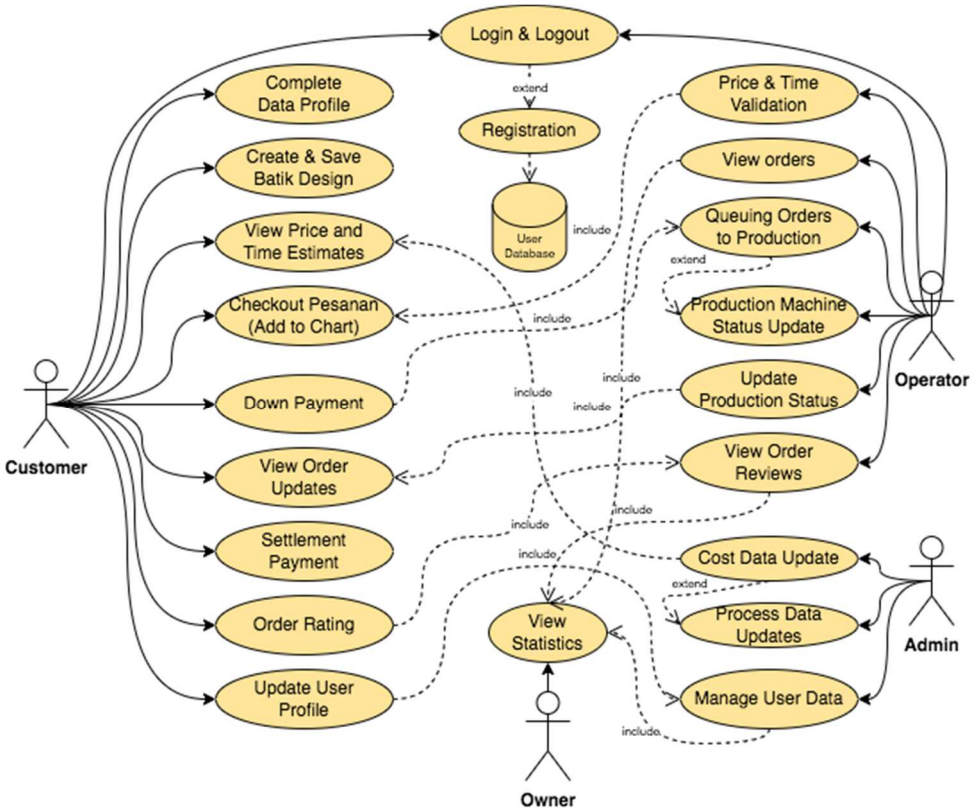


Fig. 5 UML Use Case Diagram of CAD Custom Batik

The payment transaction process is where the system that is running the payment process uses the manual transfer method. In the proposed system, the payment process already uses a payment gateway, so whether the transaction is successful or not, the system will automatically validate it. The system also calculates shipping costs automatically.

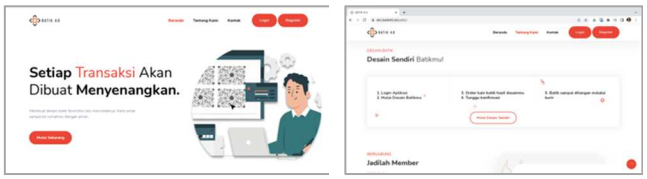
- Solution Design

Created referring to the needs analysis results and users' constraints when considering the usability principal rules. There is also error prevention and feedback while filling out the form incorrectly. Based on the results of the performance measurement, recommendations for improvement in this study will focus on page layouts and navigation menus according to the results of the data causing user errors according to the data causing user errors, as well as user suggestions through RTA results, called simplifying menus, consistency of button clarity, consistency of language use and terms for each button, and recommendations for functionality improvements.

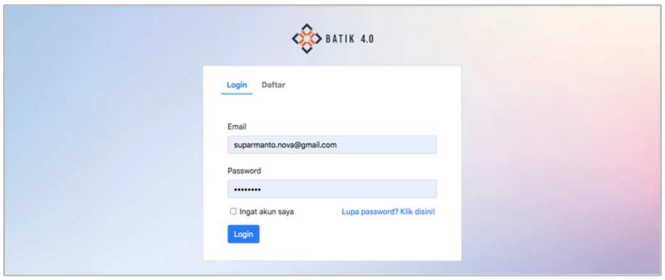
In Figure 6 – Figure 9 below is a CAD mockup/ prototype design for batik motifs in the form of high-fidelity UI, a design with a high level of precision using Figma.

- User - Customer

The new design of CAD Custom Batik is shown in Figure 6. UI design is added to the Customer Dashboard, namely the "Customer, Orders, and Transactions" navigation menus. This addition makes it easier and faster for users to access certain pages. Several changes include simplifying integrated forms so that users do not need to input a lot of data while using the software until checkout orders at the next stage.

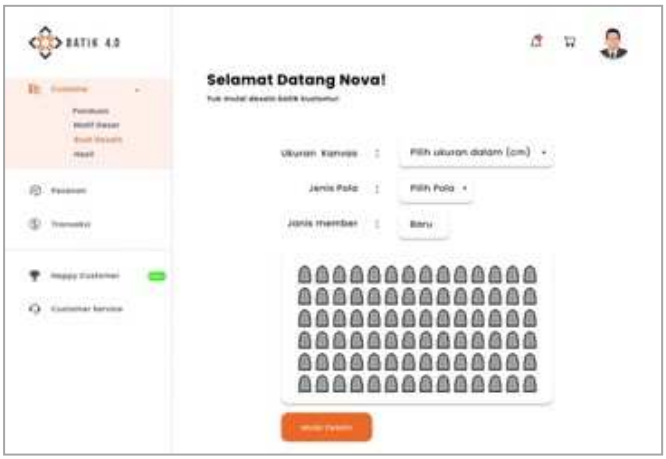


(a) Landing Page (Homepage)

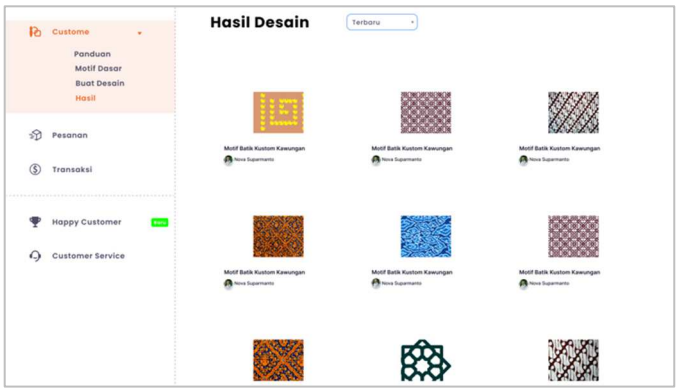


(b) Login & Signup

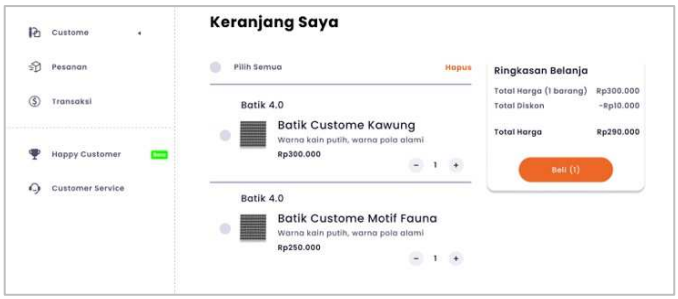
(c) Customer Dashboard



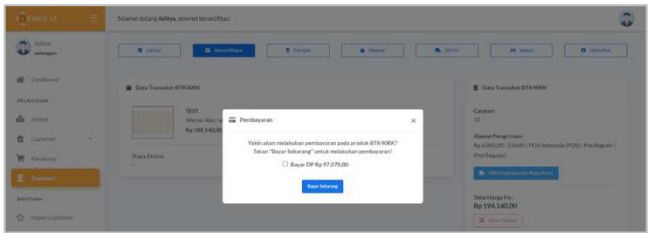
(d) Batik Design Canvas



(e) Catalog of Batik Design

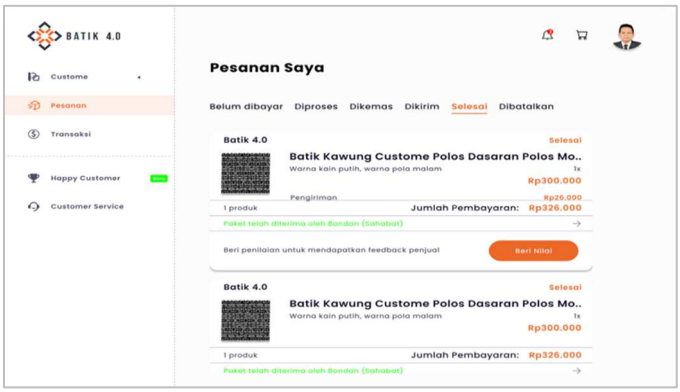


(f) Payment Options Page Shopping Cart Page



(g) Down Payment (DP) Page

(h) Tracking Order Page

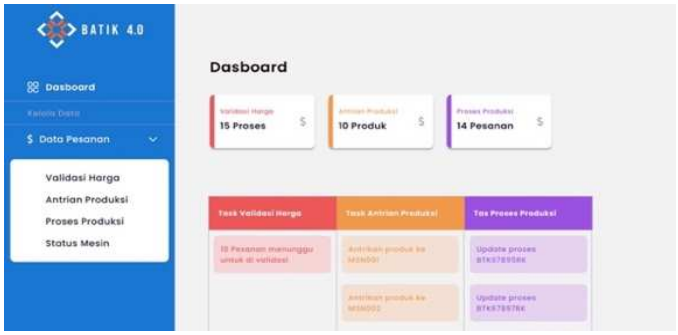


(i) Completed Orders and Ratings

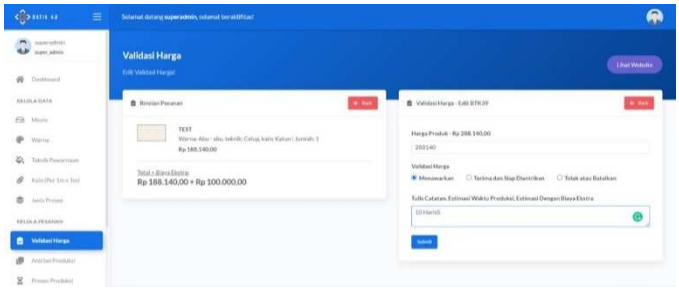
Fig. 6 (a-i) New Design of CAD Custom Batik (Customer)

- Operator

The dashboard of the operator is shown in Figure 7. there is an “Order Data” configuration menu to manage incoming order data from customers. The “Operator Menu” comprises several configurations: Price & Time Validation, Production Queue, Production Process, and Machine Status.



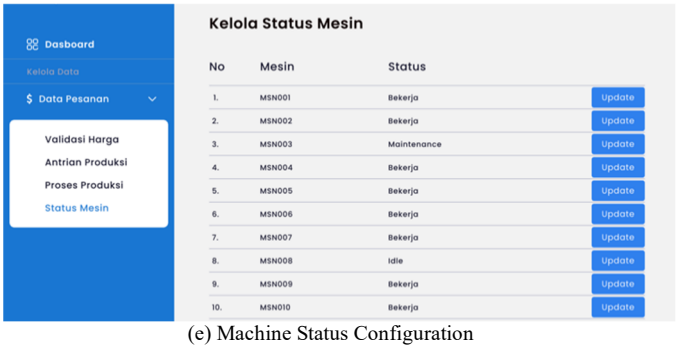
(a) Operator Dashboard Page



(b) Price & Time Validation Page

(c) Production Process Configuration

(d) Production Process Update

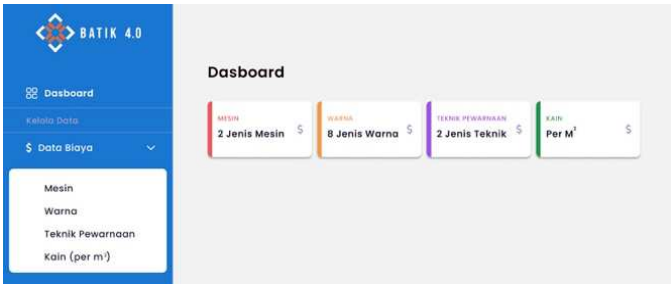


(e) Machine Status Configuration

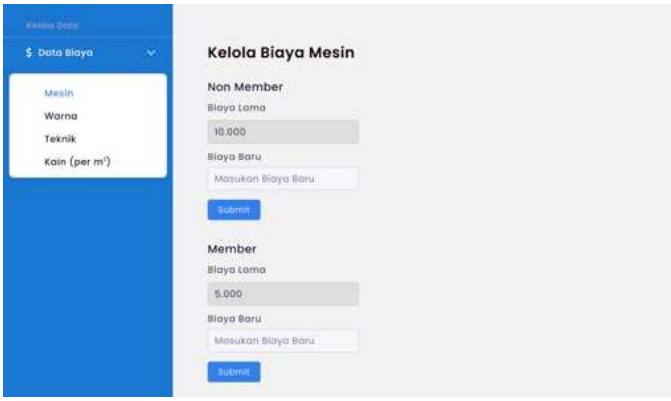
Fig. 7 (a-e) New Design of CAD Custom Batik (Operator)

- Manager – Administrator

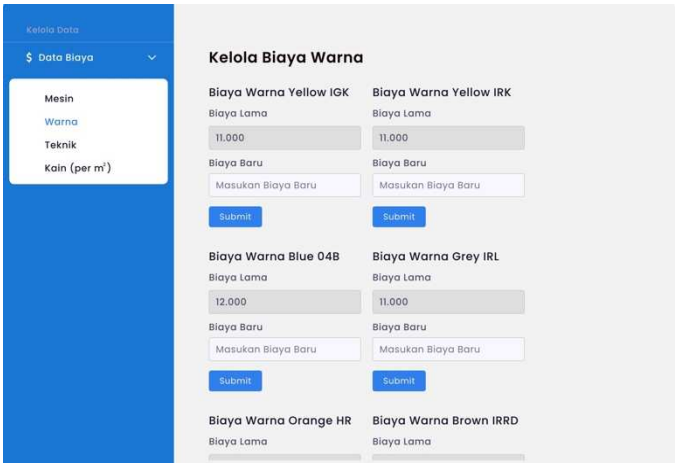
The Manager/ Administrator dashboard is shown in Figure 8. There is a “Cost Data” menu to manage the cost components of the pricing system in CAD custom batik. This menu has several cost configurations: Machine, Color, Dyeing Technique, and Fabric.



(a) Manager Dashboard



b) Machine Cost Configuration



c) Batik Color Cost Configuration

Fig. 8 (a-c) New Design of CAD Batik (Manager – Administrator)

- Owner

The Owner dashboard is shown in Figure 9. It allows the Owner to view statistical data generated by the CAD custom batik system. The data displayed includes total revenue, number of transactions, and number of members. It is also presented in a diagram that can be displayed daily, weekly, or monthly. The owner can use this data to make business decisions.

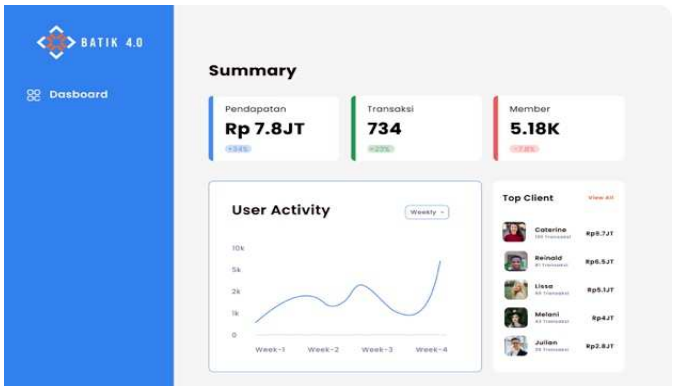


Fig. 9 New Design of CAD Batik (Owner Dashboard)

C. Evaluation Results

After developing a new UI for CAD custom batik according to the recommendations from the HCI guidelines and the results of usability testing data, the next step is to compare the usability evaluations of the new and existing UI designs.

1) Learnability. Learnability testing is carried out periodically with two repetitions of the task for respondents. The test results are presented in the graphs in Figure 10. below.

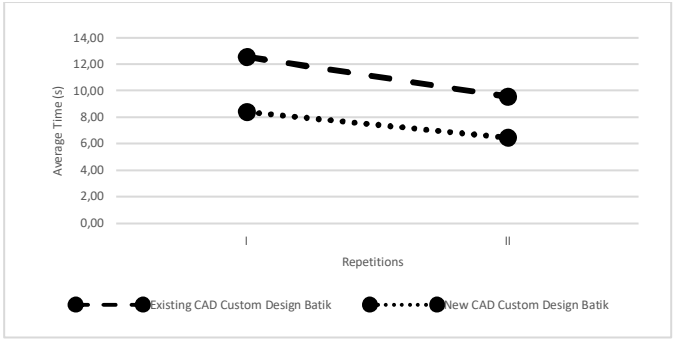
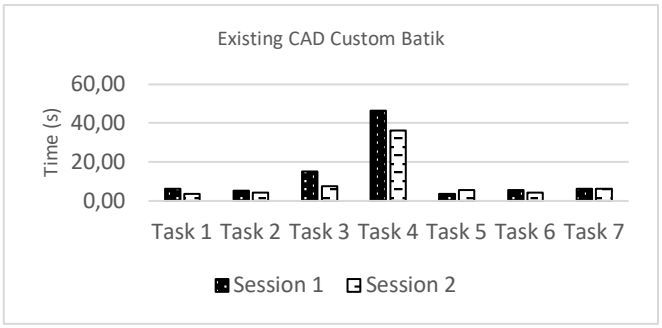


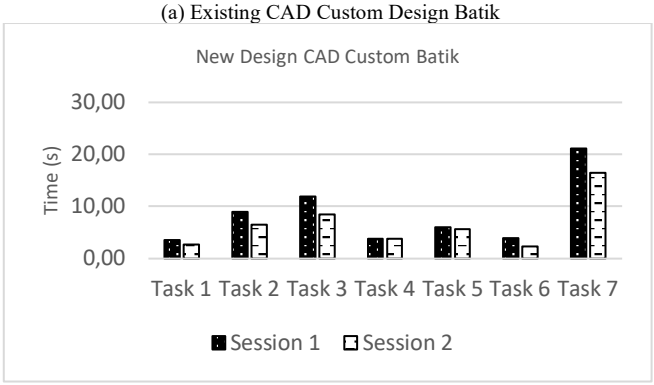
Fig. 10 Learnability Curve

These results show that both the existing and the new CAD custom design batik have experienced good learnability by decreasing task repetition time from the first and second.

2) Memorability. These results show that respondents' average time needed by both existing and new CAD Custom Batik designs in the first and second sessions (3 days after the first data collection) did not have a significant difference or was too far. All respondents have experienced good memorability, as shown in Figure 11. below.



(a) Existing CAD Custom Design Batik



(b) New CAD Custom Design Batik

Fig. 11 (a-b) Memorability Curve

3) Other Usability Aspects. Participants were asked to score the following 10 items with one of five responses ranging from Strongly Agree to Strongly disagree [29][38].

- I found the system unnecessarily complex.
- I thought the system was easy to use.
- I think that I would need a technical person's support to use this system.
- I found the various functions in this system were well integrated.
- I thought there was too much inconsistency in this system.
- I imagine that most people would learn to use this system quickly.
- I found the system very cumbersome to use.
- I felt very confident using the system.
- I needed to learn many things before I could get going with this system.

The following is a data recapitulation for the satisfaction aspect using the SUS questionnaire for the new UI CAD custom batik shown in Table 7.

TABLE VII
DATA RECAPITULATION OF THE SATISFACTION ASPECT

	Questions											
Respondents	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Sub Total**	**x 2.5**
1	3	2	4	2	3	2	4	2	4	2	28	70
2	3	4	2	5	3	4	2	3	3	5	34	85
3	3	4	2	3	3	2	2	3	3	3	28	70
4	3	5	3	2	4	1	3	1	4	4	30	75
5	4	5	5	2	4	1	5	1	4	1	32	80
6	2	3	2	3	2	2	2	1	4	3	24	60
7	3	5	2	3	4	2	2	3	3	4	31	77.5
8	5	4	4	3	4	3	3	2	3	2	33	82.5
9	3	5	3	4	3	3	2	3	2	4	32	80
10	3	3	3	4	3	3	3	2	3	3	30	75

	Questions											
Respondents	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Sub Total**	**x 2.5**
11	3	2	3	4	3	2	3	2	3	3	28	70
12	4	3	3	4	4	3	3	2	3	3	32	80
13	3	3	4	4	3	3	3	2	4	4	33	82.5
14	4	2	3	4	3	3	3	2	4	3	31	77.5
15	3	4	4	2	4	3	5	1	4	2	32	80
16	3	3	4	4	4	3	4	2	4	5	36	90
17	4	4	4	3	4	3	4	2	4	3	35	87.5
18	3	2	4	3	4	3	5	2	4	2	32	80
19	4	3	5	1	3	3	5	2	5	2	33	82.5
20	3	3	4	2	4	3	5	2	3	4	33	82.5
Total Score												1567,5
Average Score												78,375

Testing the usability aspects of Efficiency, Error, and Satisfaction with the results of calculating the average score is shown in Table 8. below.

TABLE VIII
NEW DESIGN USABILITY TESTING RESULTS

	Task Time	**Efficiency**	**Error Rate**	**SUS Score**
CAD Custom Batik Existing	12.563 s	84.77 %	8.57 %	78
New Design of CAD Custom Batik	8.411 s	90.15 %	2.86%	78.375

The results of the usability test comparison for existing and new design products from the level of effectiveness, efficiency, and satisfaction have increased for almost all aspects. The usability testing results from the efficiency aspect resulted in an increased usability value from 84.77% to 90.15% and a task time average from 12,563 to 8,411 seconds.

The number of errors in the new CAD Custom Batik design also decreased, namely four errors out of 140 tasks or 0.02857 (2.86%). The error occurred in the 7th task, System Logout, due to exceeding the specified time. The difficulty experienced by respondents was that a mistake occurred in the logout button function on the prototype due to server and internet connection factors.

The satisfaction aspect is tested using the System Usability Scale (SUS) questionnaire, which contains 10 questions. The results of calculating the average score are shown in Table VII. The average score is 78 (existing) and 78.375 (new design), including the Acceptable category based on Brooke [29], which has a value of more than 70. Or in grade C, with a GOOD rating.

IV. CONCLUSION

The usability evaluation results obtained from the usability testing process with performance measurement & RTA for existing CAD Custom Batik designs show some usability problems. This can be seen in the user's difficulties when operating the system, such as when saving the design results, they have to input quite a lot of data and adjust the design configuration because buttons and navigation menus are hard to find. Several recommendations for improvement are generated from the usability evaluation of the existing design, supported by the HCI guidelines.

The process of designing a new CAD Custom Batik called "Batik 4.0" was carried out based on the results of interface recommendations with better usability values and user satisfaction. Wireframe design uses the UCD method involving several types of users: customer, operator, manager, and owner. This is based on observational data and interviews at the CAD custom batik location supported by adequate literature studies. Fundamental changes for customer users lie in the application navigation section and menu interface design.

Recommendations for improvement in this study are focused on changing the page layout and fulfilling the navigation menu according to the results of the data causing user errors, simplifying the input form, clarity of buttons, consistency of language use, and recommendations for improving CAD Batik functionality according to the data causing user errors.

The result of the design includes system and user analysis in the form of user maps or running business processes and the proposed ones in the form of swimlane diagrams, task analysis, user access rights (privileges), use case diagrams, and the new wireframe designs for several types of users. The usability evaluation results show that the new CAD custom design batik has fewer errors and a better usability value than before. The new design CAD custom batik is easier to use and can be used as a reference for further development and improvement.

Future research, hopefully, will continue to implement the new wireframe design of CAD custom batik and carry out a more complete usability evaluation for all users, which has not been done yet. The hope is that with the new CAD custom batik "Batik 4.0", the process of design and production of batik can be more effective, efficient, and integrated, and used by other small and medium-scale batik industries. The method of ordering and reporting stages can be done in real time and can be easily accessed.

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