631

Innovation in Digitalization of UI/UX Design with User Centered Design to Increase Customer Satisfaction

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ABSTRACT

In the era of rapid digitalization, the economic sector, especially small and medium enterprises, is required to adapt to the development of digitalization. SDS YPMM Cooperative is one example of a small business that still relies on traditional systems in its business processes. To overcome this problem, a website-based User Interface (UI) and User Experience (UX) design was carried out to digitize the SDS YPMM cooperative business process. In the design, the User Centered Design method is used which focuses on user needs. This method is done by Specify the context of use, specify user and organizational requirements, produce design solutions, and evaluate design against user requirements. At the evaluation stage, the System Usability Scale (SUS) was used to measure the level of usability of the resulting design. The evaluation results obtained 179 respondents out of 533 population for the user interface showed a score of 84.97, which falls into the "acceptable" category and a rating of B or "Excellent". Meanwhile, the admin interface received 5 respondents from 5 populations and scored 93, which falls into the "acceptable" category and an A or "Best Imaginable" rating. These findings indicate that the UI/UX design is highly accepted by both categories of users, thereby improving operational efficiency and shopping experience, which creates satisfaction with SDS YPMM cooperative services.

I. INTRODUCTION

In the era of rapid digitalization, demands for efficiency, effectiveness, and ease of information are getting stronger, especially in the economic sector [1]. Businesses, especially middle to lower class businesses, are required to adapt to the digitalization that occurs [1], [2]. This adaptation is needed to be able to compete in this economic field [2], [3]. The way to adapt to digitalization in this economic sector is to digitize business processes [1]. This is done to optimize marketing and expand market reach, which can increase revenue. With the application of digitalization, a business line can improve the products and services offered [1]. The use of digitalization such as marketing websites can increase consumer interest because it provides convenience, speed, and reliability [2], [4].

Every website must have a User Interface (UI) and User Experience (UX) that is attractive, interactive, and easy to use.

Where User Interface (UI) is a science that studies grids, layouts, typography, colors, animations, and micro-interactions that produce good and natural interactions [5]. User Interface (UI) becomes a display that connects users and systems that allow users and systems to communicate [6]. User Experience is a science that studies problem solving whose main focus is user satisfaction in its design [7]. User Experience aims to identify problems that occur in an environment, identify user needs, and produce application designs that meet user needs [7], [8].

This is supported by previous research that has succeeded in getting satisfactory results. The first research was conducted by Dayanti et al [9] who built a website using the User Centered Design method with the aim of increasing satisfaction for users. An evaluation was carried out in this study and the results of user satisfaction in each aspect of the assessment were obtained which resulted in a decent predicate.

The second research was conducted by Samosir et al [10] who designed and developed a web-based stock application using the User Centered Design method and Unified Modeling Language design modeling. This design and development aims to create significant business success. After obtaining the research results, an evaluation is carried out which gets the results of the design and development carried out in accordance with user needs and easy to use.

The third research was conducted by Sasmito et al [11] who created a website-based mapping media that aims to categorize public services in Tegal city in order to provide service satisfaction to the people of Tegal city. This website was built with the User Centered Design method in order to create a user-centered solution. After the website was successfully created, an evaluation was conducted to assess the effectiveness of the website using black box testing with the equivalence partitions method which resulted in 83% effectiveness. The second test was conducted using the Usability Testing method by applying the SUS scale, which resulted in 89% or excellent.

The fourth study was conducted by Daggubati [12] who designed digital payment experiences that aim to align product management strategies with user-centered principles. This is done by optimizing user satisfaction and integrating user feedback in the development process. After the interface was successfully implemented, an evaluation was carried out which resulted in the interface being very intuitive and easy to access, so that users have high trust and loyalty to the brand or company.

Innovation in the form of UI/UX design is the first step in adapting to the era of digitalization in the economic sector. UI/UX design innovation using the User Centered Design method can create better and easier services for consumers. In addition, an evaluation will be carried out to ensure whether the design produced is in accordance with the needs and can provide the best service to users [9], [10], [11]. Collaboration between the User Centered Design method in the development stage and the System Usability Scale method in the evaluation stage can produce a website that improves services, expands market reach, and increases revenue.

II. METHOD

Research methodology is the workflow carried out in research to solve problems [1]. In conducting research, a research flow is used to ensure research is directed. The flow that will be carried out in conducting research as in Figure 1.

A. Specify the Context of Use

Specify the context of use is done as an initial step to determine the users who will interact with the product [13], [14], [15]. This is done to identify in what conditions the user uses the system. Based on the identification results, a data collection instrument is used in the form of a questionnaire using google form tools. This is done to get to know the user more deeply, so that the user can convey the needs properly. Before being distributed to users, an instrument test was

conducted to measure the feasibility of the questions asked. This test was carried out using 3 stages consisting of content validity, test validation, and test reliability.
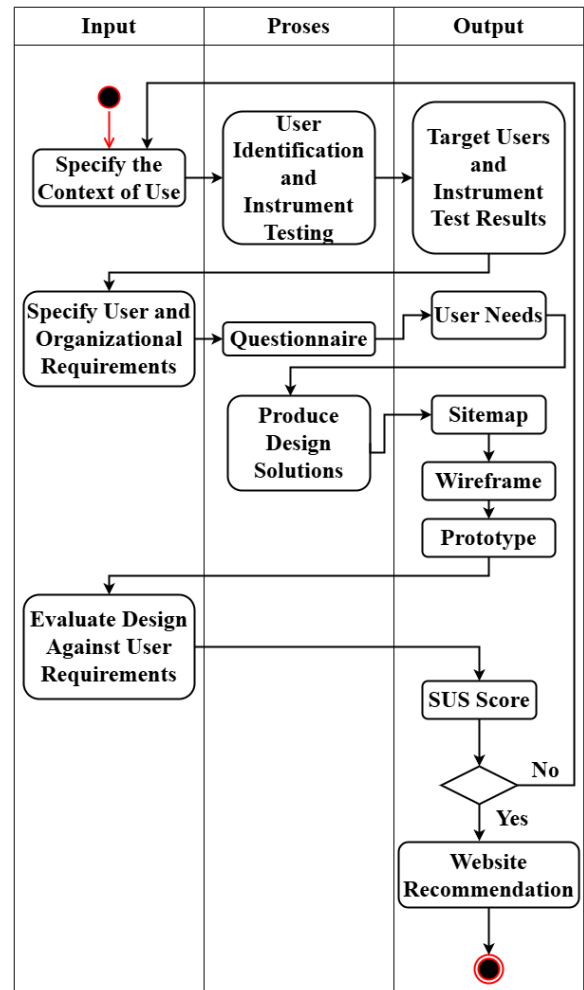

Figure 1. Research Activity Diagram

B. Specify User and Organizational Requirements

Specify user and organizational requirements is a stage to identify user needs which is done through data collection and analysis [15], [16], [17]. Data collection was carried out on the research sample. The research sample was determined using proportional simple random sampling technique with the Slovin formula (10% percentage error) [18], [19].

$$n = \frac{N}{1 + Ne^2} \qquad (1)$$

With a user population of 533 people, a minimum research sample of 85 people is obtained. And for the admin, the research sample is obtained at least 4 people from 5 samples. Based on this sample size, data collection is carried out to the user sample. Data collection is done by distributing questionnaires via google form to sample users. The data that has been collected will be processed into a list of needs using descriptive analysis as a guide. Descriptive analysis is a

method used to investigate the entire data by sorting the data based on the mean and standard deviation [14], [20], [21].

C. *Produce Design Solutions*

Produce design solutions is a stage to design solutions to problems and needs that have been identified. [15], [16], [17]. This solution is a website design that is formed based on user needs. The design process is carried out in stages using figma as a tool. The design process begins with designing a design framework to structure the page, improving the design to be more detailed and concrete through wireframes, and ends with the formation of an interactive prototype.

D. *Evaluate Design Against User Requirements*

Evaluate design against user requirements is done by measuring the design solution of the problem [15], [16], [17]. Usability testing is carried out by guiding the System Usability Scale (SUS) method where the evaluation is carried out by directly involving the user as an assessor [22], [23], [24]. SUS has three main aspects that will be assessed in the implementation of its evaluation, these aspects are effectiveness, efficiency, and satisfaction [25]. To support the evaluation using the SUS method, a questionnaire is used as a data collection instrument [24]. The test result data is the identification of aspects that need to be improved on the design [24], [26]. In its implementation, the evaluation using SUS is done by subtracting 1 on odd numbered questions, while for even numbered questions minus 5 [26], [27]. Based on the results of this calculation, the sum of all question values and multiply by 2.5 so that the final result ranges from 0 - 100 which results in a $\sum x$ value [26], [27]. After obtaining the $\sum x$ value, the score calculation is carried out with the formula:

$$\bar{x} = \frac{\sum x}{n} \qquad (3)$$

III. RESULTS AND DISCUSSION

A. *Specify the Context of Use*

At this stage, user identification and user context have been carried out. Based on observations that have been made, the categories identified as users of the SDS YPMM cooperative website are parents of SDS YPMM students, teachers, and staff who work at SDS YPMM. While the categories identified as admins in charge of maintaining the SDS YPMM cooperative website are cooperative guards, cooperative organizers, and SDS YPMM principals. At this stage, the data collection instrument was also tested, and the following results were obtained.

1) *Content Validity*

Content validity is a way used in this study to assess the construction and adjustment of validated dimensions through validator assessment and statistical analysis. Validators are judges or experts in a field who can provide input and assessment of the instrument being assessed [28]. Content

validity in this study was carried out by two experts who were lecturers from the Information Systems Department of Sriwijaya University. Based on the results of validation conducted by two experts, the calculation process was carried out using the Content Validity Index (CVI) as in Table 1. CVI analysis is a validity testing approach used in this study. The calculation is done by converting the validator's score into a dichotomous value (0 or 1). Scores 1 and 2 were converted into a dichotomous value of 0, stating that they were not relevant and needed to be revised, while scores 4 and 5 were converted into a dichotomous value of 1, stating that they were relevant [13]. Furthermore, calculations were carried out to find the I-CVI value, which was done by averaging the scores of all validators. The I-CVI value of more than 0.80 states that the instrument used is suitable for further distribution [13].

TABEL I
CONTENT VALIDITY RESULT

Item	Expert 1	Expert 2	Expert in Agreement	I-CVI	Category
P1	1	1	2	1	Relevant
P2	1	1	2	1	Relevant
P3	1	1	2	1	Relevant
P4	1	1	2	1	Relevant
P5	1	1	2	1	Relevant
P6	1	1	2	1	Relevant
P7	1	1	2	1	Relevant
P8	1	1	2	1	Relevant
P9	1	1	2	1	Relevant
P10	1	1	2	1	Relevant
P11	1	1	2	1	Relevant
P12	1	1	2	1	Relevant
P13	1	1	2	1	Relevant
P14	1	1	2	1	Relevant
P15	1	1	2	1	Relevant
P16	1	1	2	1	Relevant
P17	1	1	2	1	Relevant
P18	1	1	2	1	Relevant
P19	1	1	2	1	Relevant
P20	1	1	2	1	Relevant
P21	1	1	2	1	Relevant
P22	1	1	2	1	Relevant
P23	1	1	2	1	Relevant

Based on the calculation results in Table 1, the results show that the 23 questions asked are relevant for use in collecting user requirements. Each question is said to be relevant because it has met the Content Validity requirements, namely having an I-CVI value above 0.80.

2) *Validity Test*

The validity test is a test conducted to measure how well an instrument measures the indicators that must be measured [12]. Instrument validity was tested by distributing questionnaires to at least 30 users [15], [16]. The data obtained is then processed and analyzed using SPSS. The instrument is said to be valid if the correlation value is more

than 0.6 [13], [17], [18]. From this data collection, 33 respondents were obtained. In the validity test, the respondent data amounted to 33 respondents with the results of the validity test calculation as in Table 2.

TABEL II
VALIDITY TEST RESULT

Variabel	Item	*correlations*
A	P1	0.951
	P2	0.895
B	P3	0.894
	P4	0.930
C	P5	0.871
	P6	0.746
	P7	0.774
	P8	0.693
D	P9	0.865
	P10	0.769
	P11	0.854
E	P12	0.967
	P13	0.957
F	P14	0.689
	P15	0.739
	P16	0.689
	P17	0.845
	P18	0.883
G	P19	0.741
	P20	0.868
	P21	0.868
H	P22	0.939
	P23	0.959

Based on Table 2, each variable and each question meets the validity requirements and is said to be valid for the collection of user needs. Each variable and question is said to be valid because it has met the validity test requirements, namely having a correlation value above 0.6.

3)   Realibility Test

The reliability test is carried out to ensure that the research instrument can produce consistent and stable data [15]. The reliability of the instrument was tested by distributing questionnaires to at least 30 users [16], [17].

TABEL III
REALIBILITY TEST RESULT

Variabel	*cronbach's alpha*
A	0.800
B	0.790
C	0.766
D	0.773
E	0.916
F	0.829
G	0.754
H	0.882

Cronbach's alpha coefficient is used as an indicator of instrument reliability [15]. A good reliability test has a Cronbach's alpha value of more than 0.7 [13], [15], [18]. From

this data collection, 33 respondents were obtained. In the reliability analysis, the respondent data amounted to 33 respondents with the results of the reliability analysis calculation as in Table 3.

Based on Table 3, each variable and each question meets the reliability requirements and is said to be reliable for the collection of user needs. Each variable is reliable because it has met the requirements of the reliability test, which has a correlation value above 0.7.

B.   Specify User and Organizational Requirements

At this stage, data collection has been carried out through questionnaires with google form tools that are distributed online. Data collection was carried out on September 16-24, 2024 which successfully collected 194 respondents.

TABEL IV
DESCRIPTIVE ANALYSIS

Instrument	Mean	Standar Deviasi	Sequence
H23	4.84	470	1
E13	4.82	502	2
H22	4.81	538	3
D9	4.81	526	4
G20	4.81	495	5
D11	4.79	508	6
E12	4.79	508	7
B3	4.77	532	8
B4	4.75	611	9
F16	4.75	551	10
F15	4.74	618	11
G21	4.74	556	12
D10	4.74	544	13
F18	4.7	622	14
F17	4.68	620	15
C6	4.64	629	16
F14	4.63	671	17
G19	4.6	722	18
C8	4.58	717	19
C7	4.58	710	20
A2	4.56	727	21
A1	4.53	790	22
C5	4.44	827	23

Based on the results of the description analysis in table 4, the following user requirements are obtained.

TABEL IV
USER NEEDS

No.	Needs
1.	Has a description of the number of items in accordance with the reality of offline stores in the user interface.
2.	The design should be easy to use.
3.	Features the payment status of each transaction on the admin view.
4.	Has a product detail page that explains the product details on the user interface.
5.	Buying and selling activities should be easy.

6.	Has an order feature that contains a structured list of orders in the admin view.
7.	The procedure for picking up goods should be clear and easy to understand
8.	Has an attractive visual appearance.
9.	Has design representative.
10.	Has a serach bar feature.
11.	Connected to the online payment system.
12.	Has various facilities for retrieving goods that can make it easier for users.
13.	Has an ordered item status feature.
14.	Has a contact us feature to facilitate online communication.
15.	Has a feature that can display promo or new products on the user interface.
16.	Has interactive and consistent elements.
17.	Ability to provide detailed information.
18.	Transactions must be possible 24 hours a day.
19.	Has an admin view that is connected to the user view.
20.	Has an easy-to-understand interface.
21.	Design should represent the user.
22.	Has a familiar and unambiguous appearance.
23.	Has a simple look.

C. Produce Design Solutions

At this stage, the solution design has been carried out. This solution is designed based on user needs that have been identified as in table 5. The solution obtained is implemented in the following form :
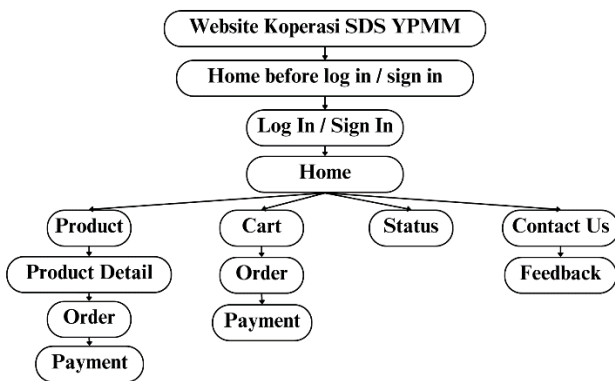
1) Sitemap

Figure 2. Sitemap User Interface

Sitemap is a structural design that defines navigation and guidelines in the design of the next stage [1], [29]. The designed sitemap was formed from the previously identified user requirements. The sitemap is designed to be as simple as possible to reduce ambiguity and difficulty when using the system. Thus, users can easily find the information needed without hesitation. This sitemap will then be used as a guide in designing wireframes and prototypes on the user interface.
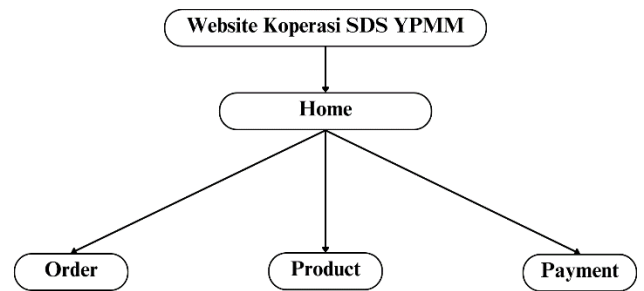

Figure 3. Sitemap Admin Interface

This sitemap will then be used as a guide in designing wireframes and prototypes on the admin interface.

2) Wireframe

Wireframe is a simple design of product design that focuses on functional aspects [1], [30]. One of the wireframes that have been designed, can be as follows.
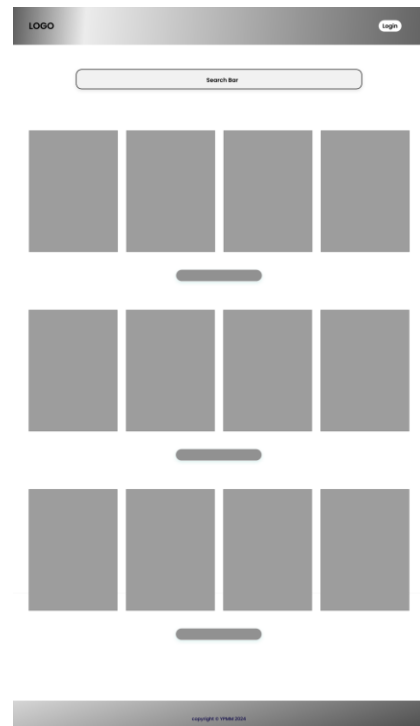

Figure 4. Wireframe Home Page

Wireframe design has been carried out using figma as a tool. Wireframe is formed according to the sitemap that has been designed previously. Wireframes that have been designed already have the features needed by users as listed in Table 5. The wireframe in Figure 4 is one of the applications of user requirements to the solution design. The wireframe focuses on the main aspects that can help user activities.
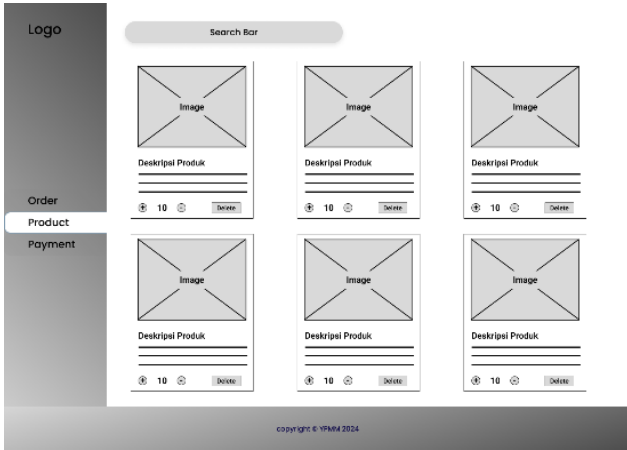
Figure 5. Wireframe Product Page

The wireframe in Figure 5 is one of the applications of user requirements in the design of a solution that focuses on the admin interface. The wireframe focuses on the main aspects that can help admin activities.
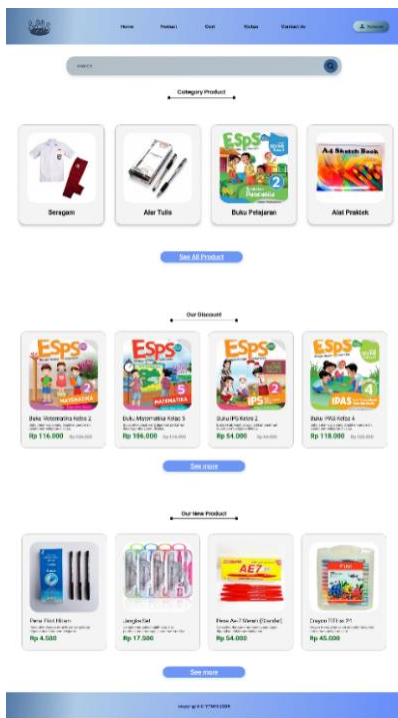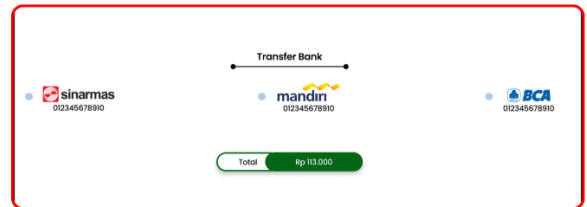
3) Prototype

Figure 6. Prototype Home Page

Prototype is the final design formed by exploring the concept to create a communicative and easy-to-understand result [1], [31]. Prototype design has been carried out in accordance with the wireframe that has been designed previously using figma as a tool. The designed prototype has a simple, representative, interactive, consistent, and attractive appearance in accordance with the user's needs in Table 5.

The prototype in Figure 6 is one of the final results of this research. In this prototype, the user requirements, sitemap, and wireframe have been implemented into the final form of a prototype for the user interface. The prototype emphasizes simple, representative, and attractive display results. In addition, the prototype built already has the features needed by users in the list of user requirements as in table 5.

Figure 7. Application of User Requirements to Prototype

Connected to the online payment system

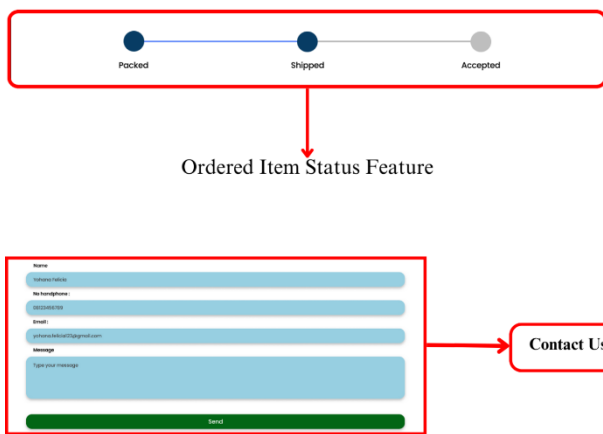Figure 8. Application of User Requirements to Prototype

Figure 9. Application of User Requirements to Prototype

Figure 7, Figure 8, Figure 9 shows the application of user requirements in Table 5 into a prototype on the user interface. The final result in designing this solution has implemented user needs by adding features or facilities according to user needs. The display presented in the user interface prototype is designed by prioritizing a simple, representative, and attractive appearance.
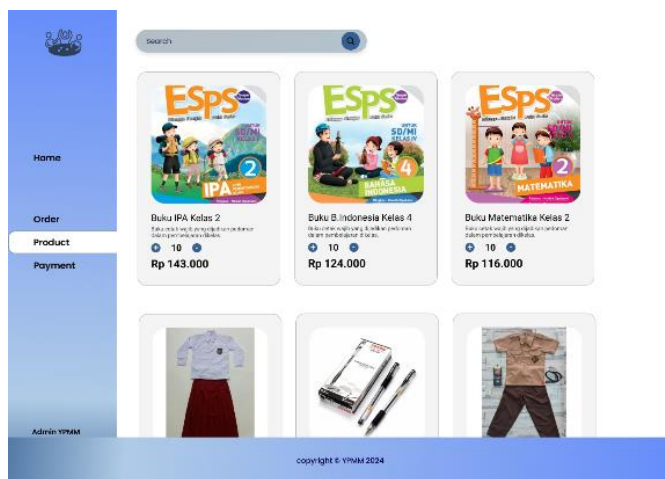

Figure 10. Product Page

The prototype in Figure 8 is one of the final results of this research. In this prototype, the user requirements, sitemap, and wireframe have been implemented into the final form of a prototype on the admin interface. The prototype prioritizes simple, representative, and attractive display results. In addition, the prototype built has the features needed by the admin in the list of user requirements as in table 5.

Figure 11 shows the implementation of user requirements in Table 5 into a prototype on the admin interface. The final result in designing this solution has implemented the needs of the admin by adding features or facilities according to user needs. The display presented in the prototype user interface is designed by prioritizing a simple, representative, and attractive appearance.

Figure 11. Application of Admin Requirements to Prototype

D. Evaluate Design Against User Requirements

At this stage an evaluation is carried out using the System Usability Scale (SUS). Evaluation using SUS was carried out by distributing questionnaires via google form on September 30, 2024 - October 7, 2024.

Evaluations conducted to users get 179 respondents with a value of $\sum x$ 15210. From these results, calculations are carried out using the SUS formula to get an evaluation score.

$$\bar{x} = \frac{15210}{179} \qquad (4)$$

The results of data processing for user interfaces obtained a score of 84.97. From this value, the resulting design has an acceptable range and a B or Excellent rating. Based on this value, the UI/UX design is very acceptable to users.

Evaluations conducted to admin get 5 respondents with a value of $\sum x$ 465. From these results, calculations are carried out using the SUS formula to get an evaluation score.

$$\bar{x} = \frac{465}{5} \qquad (5)$$

The results of data processing for the admin display obtained a score of 93. From this value, the resulting design has an acceptable range and an A or Best Imaginable rating. Based on this value, the UI/UX design is very acceptable to the admin.

IV. CONCLUSIONS

The research conducted can produce a solution design from the implementation of digitalization innovations in SDS YPMM cooperatives that are useful for improving services that can expand market reach and increase sales. This design

can improve services because the design produced using the UCD method is user friendly, attractive, and easy to use. This is obtained because the UCD method involves users in every stage. Quantitative data collection methods were used to involve more users in identifying user needs and evaluating results. This proved to be effective because it obtained satisfactory evaluation results in each category of users.

The evaluation in this study was carried out using the SUS method which resulted in an average score of 84.97 for the user interface and 93 for the admin interface. From these scores, it is known that the designed prototype has an acceptability range of acceptable or very acceptable to users and gets a B or Excellent rating for the user interface, and an acceptability range of acceptable or very acceptable to admins and gets an A or Best Imaginable rating.

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