

Implementation of User Experience Using the Design Thinking Method in Prototype Cleanstic Applications

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ABSTRAK

Permasalahan plastik menjadi penyumbang terbesar limbah, karena sifatnya yang sulit terurai menghasilkan efek terlalu banyaknya limbah plastik yang kemudian menjadi salah satu sebab ketidakseimbangannya alam. Ancaman yang dihasilkan mulai dari kesehatan, rusaknya ekosistem dan banyak hal lainnya merupakan sebuah masalah yang ada saat ini. Tujuan dari *prototype* ini adalah untuk mengedukasi masyarakat tentang pengolahan sampah plastik dan juga mempermudah masyarakat dengan *prototype* berbasis android ini dalam menjual ataupun menyumbangkan sampah plastiknya kepada yang membutuhkan. Metode yang digunakan dalam penelitian ini adalah *design thinking* mulai dari awal perancangan sampai akhir, sehingga menghasilkan tingkat user experience yang baik. Dari hasil evaluasi yang didapat dari pengujian *prototype* menggunakan *System Usability Scale (SUS)* dan *User Experience Questionnaire (UEQ)* dengan hasil *learnability* 62.5, *usability* 82.2, *SUS score* 78.8 serta impresi kelompok *attractiveness* 2.197, *perspicuity* 2.275, *efficiency* 2.150, *dependability* 2.050, *stimulation* 2.383, *novelty* 2.089. Keseluruhan hasil pengujian mendapatkan hasil *good* dan *excellent*.

INTRODUCTION

The development of technology that continues to develop over time, requires us to continue to be able to make innovations in making things that are traditional to be modern by utilizing existing technology. Many problems that arise in the era of instantaneous nowadays, abundant use of plastic is one of the problems that arise in the present age and it is the concern of many people. The impact arising from excessive use of plastic can threaten and even damage the ecosystem both on land, sea and air. From the health side it is very very threatening, the food sources that we eat can become dangerous due to the contamination of the plastic waste.

From several previous studies that have conducted research on implementing user experience. Research conducted [1] conducted testing on its application using field testing. Research conducted [12] conducted testing on its application using prototyping and questionnaire testing. Then the research conducted [5] tested the application using a blackbox. Furthermore, the research conducted [7] tested the application using the Heuristic Evaluation method.

Seeing the reference from previous studies that have been carried out by several researchers, the authors add a method in the application testing phase that has been made, namely by adding the System Usability Scale and User Experience Questionnaire testing methods that are useful to determine the level of usability and the user experience of the cleanstic application starts from how easily understood this application is easy to use or not.

With the addition of the System Usability Scale method and the User Experience Questionnaire to cleanstic application testing it is expected to be more precise and accurate in producing applications that answer, meet needs, provide ease and provide comfort for the user. This study aims as an innovation to create solutions from plastic waste problems as an effort to educate the public and as a solution in the prevention of plastic waste, where the age range of users is in the productive age of 15 - 55 years. This application is expected to be a solution to these problems, especially for the general public.

RESEARCH METHOD

In designing prototype cleanstic applications, various processes are adapted from the design thinking method as a reference, while the process is as follows [5]:

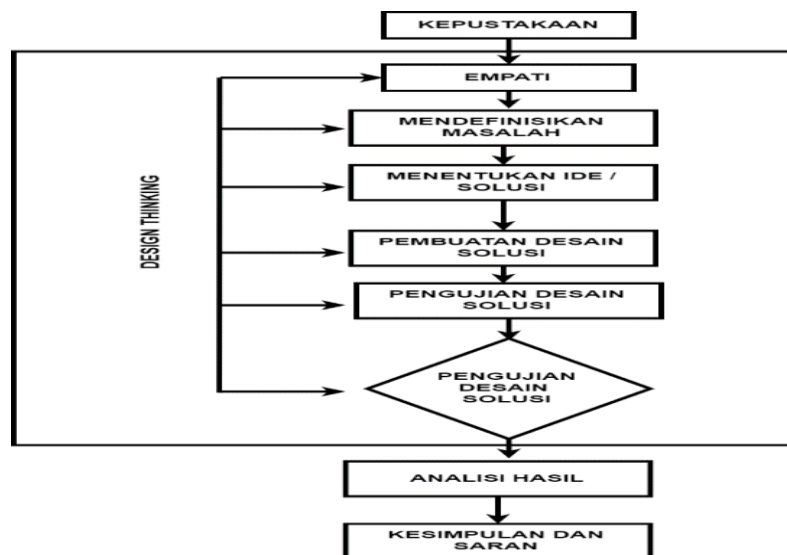


Figure 1. Research Method

The flow diagram that will be used in this research is as in Figure 1. The stage of the literature study is the process of finding a reference theory that is relevant to the case study or problem to be raised. Information gathered about the impact of the use of plastic, user experience, pro-totype, design thinking and application. References are obtained from reference books, articles, journals or on internet sites.

A. Data Collection Stages

Several methods are used in the data collection phase of designing prototype cleanstic applications, as follows:

a. Library study

Literature study is a process of finding a reference that is relevant to a case or problem that will be raised as a foundation in the design of a solution. References obtained from journals, books and through information sites that are on the internet [6].

b. Field observation

Field observations are techniques that are carried out directly by seeing the actual conditions that occur in the field. This observation also aims to understand the problems faced by residents. In this case, observations were made in the residents of RT 10 RW 09 kelurahan, Pasar Manggis

c. Survey

Survey is a process to find out who our correspondents are, their anxiety about a problem, and to find out the input of their statements. This survey also aims to understand the problems faced by residents.

B. Defining The Problem

After going through the phase of understanding the problem or emphasize, the process of defining the problem is carried out. The results of the process of defining this problem are adapted from the phase of understanding the problem beforehand and then selecting several topics of the problem to be raised.

C. Determine The Solution Idea

Problems that have been raised in the previous phase then become the focus for the determination of an idea or solution at this stage.

D. Making Design Solutions

After an idea or solution has been determined in the previous phase, the next step is to make a design of the idea or solution. The platform used for prototype is Android, making the design of solutions starting from the process of making a sketch, wireframe and high-fidelity prototype. Prototype design using Figma and Marvel software [7].

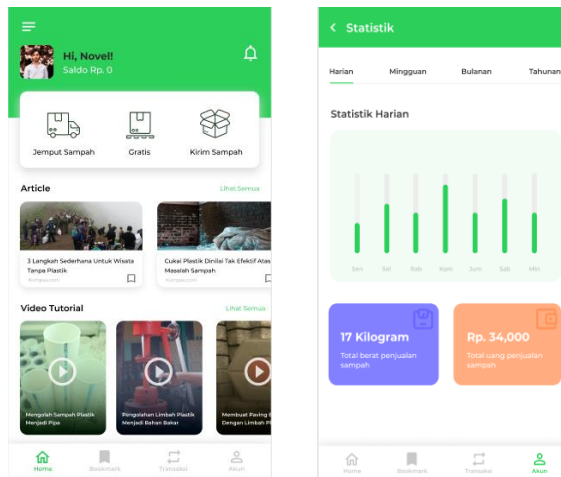


Figure 2. User Interface Cleanstic

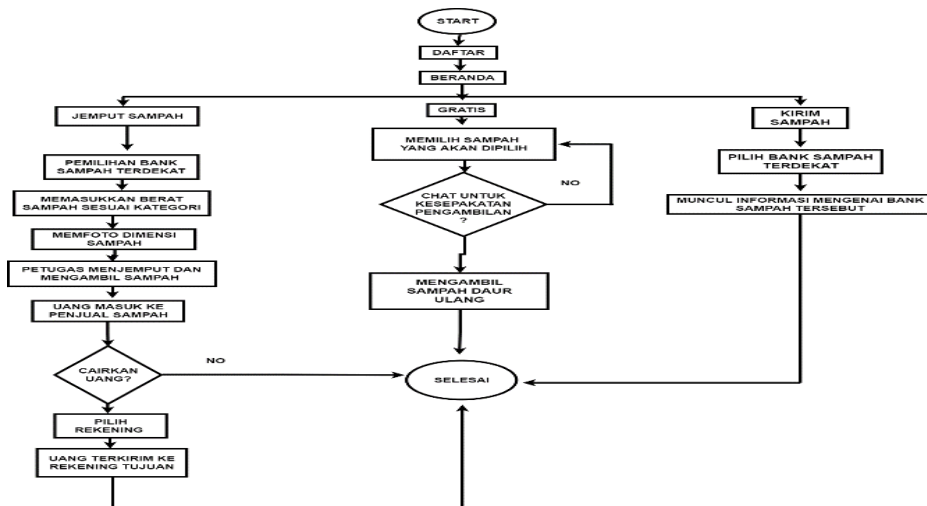


Figure 3. Flowchart System Process

The system process begins with registering, after registering the user will then enter the system homepage display and then select the features to be selected for use on the system. The first feature chosen is the pick up trash, after which a garbage bank or collector appears closest to the system from the user's location. Then the user enters the weight of the garbage

that will be sold according to the category and after that takes photos of the waste that will be picked up by the officer, after which the garbage is taken by the officer and the money from the sale will enter the system to be disbursed by making a transfer to the intended account. Then the selection of free features on the system, which in this feature the user can take the trash that other users have posted to donate graphically and can be used by anyone. The user selects the garbage to be taken in this feature, then the user determines the agreement with the donor of the waste regarding the location of the collection and after which the garbage is taken then finished. Then the selection of the send garbage feature on the system, which in this feature the user can see information about the nearest garbage bank or collectors. After the user selects the waste bank for which information will be seen, the information will appear.

E. Testing Design Solutions

Testing the solution design is done by giving some tasks related to the use of the prototype, in this phase we can find out how the user experience when trying to use prototype cleanstic applications [8]. Do users find it difficult or not to use the prototype of this application.

F. Analysis of Results

The results analysis phase is carried out to find out whether the specified metrics have not yet been achieved. This analysis process is achieved by using the System Usability Scale and User Experience Questionnaire [9-10].

G. Conclusions and Recommendations

Writing conclusions and suggestions made when the results of testing the test de-design solutions and the results of the analysis are as expected. Fill in the conclusions about the results of the analysis conducted in the testing phase of the solution design and analysis of the results.

RESULT AND DISCUSSION

Analysis of User Needs

A. User Identification

The results of the analysis that has been processed from the user survey process resulted in many complaints faced by users about the problem to be raised [11]. The results obtained from the survey process carried out are many of the correspondents who know about things that can be done to reduce plastic waste and things that can be done to treat plastic waste.

However, many correspondents do not know how to process the plastic waste so that it can be useful and can produce.

B. Identification of User Characteristics

The characteristics of cleanstic application users are as follows:

1. All community of Android-based smartphone users
2. Applications can be used by men and women
3. Application users must be at least 15 to 55 years old

C. Identification of User Needs

The identification of user needs is obtained through interviews and surveys that have been carried out in the previous stages, at this stage a lot of input is obtained from users through interviews and online surveys that have been conducted. But due to time constraints, some problems or user needs were chosen.

D. Persona

Persona contains a summary of user information that has been researched by survey interview methods that have been conducted previously. The survey results that have defined the problem are then summarized into a persona that contains the user's imaginative information description, user difficulties and the needs or desires that the user expects.



Figure 4. Persona

E. Identification of Product Goals

The purpose of designing a prototype cleanstic application is as an offer of a solution in educating the public in tackling plastic waste and also bridging the community with garbage banks or garbage collectors so that their recycled plastic waste becomes economically valuable.

The goals that users can achieve through the cleanstic application are as follows:

1. Recycled plastic waste for sale can be picked up at the seller's location
2. Can donate recycled plastic waste to be used by others
3. Can see information about the location of the nearest collector or garbage bank
4. The public can get education about the processing and utilization of plastic waste

F. Identification of The System Environment

In identifying the system environment, it contains specifications regarding hardware, software and also about other equipment that must be fulfilled as a condition for using cleanstic applications. The identification of the system environment is explained in Table 1.

Table 1. System Environment

No	System Characteristics
1	Hardware Android smartphone with a minimum of 1GB of memory
2	Software Android operating system is at least version 4.4 Cleanstic application
3	Other Equipment Using the internet Turn on GPS Turn on camera access

Making Solution Design

A. Information Architecture



Figure 5. Information Architecture

In figure 5 there is information architecture of the cleanstic application, in the picture above the model of information architecture is in the form of a hierarchy. The information presented in Figure 5 is the main menu, where users can access the functions or features through the main menu.

B. Wireframe

Wireframe is a picture of a framework or usually called low-fidelity an application design that serves as a description of the layout of the content that will be designed into a Mock Up that has a more de-tail appearance by adding elements of color, icon and typography.

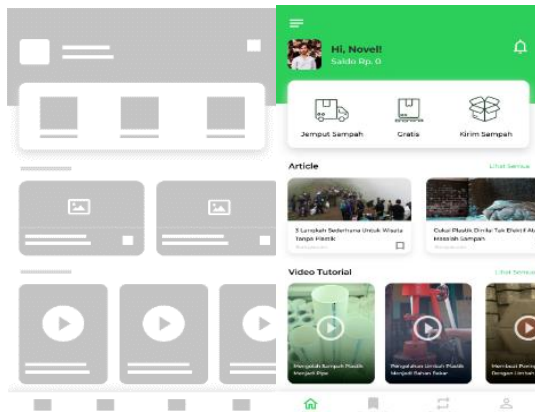


Figure 6. Wireframe and Mockup Home

C. Prototype

Based on several design stages to produce a mock up, a prototype was subsequently designed so that an application design would be more interactive when tested and used to users later. Interactions that add to this prototype such as swipe and click. The software used in the design of the prototype of this cleanstic application design is Figma and Marvel App.

Design Evaluation Solutions

A. Usability Testing Result

The SUS questionnaire is filled out by the user when finished using the prototype cleanstic application, based on the results of usability testing conducted on the user using the System Usability Scale (SUS). the results obtained are as follows:

Table 2. SUS Result

No.	Parameter	P1	P2
1	Learnability	58.3	62.5
2	Usability	80.2	82.8
3	SUS Score	75.8	78.8

The results of the SUS score of the first test, showed a value of 75.8 which value if seen in table 2 is included in grade C [12-13]. This means that the test results are good, because it is included in grade C which is included in the good category.

After that it is retested on the second test, and shows a value of 78.8 which is included in grade C, which means the results of the second test also show good results and are categorized as good.

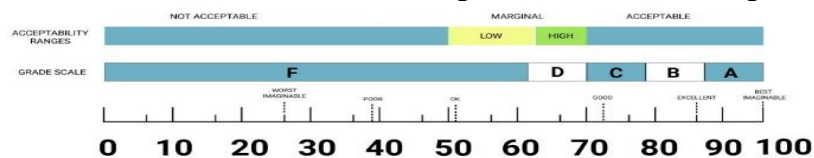


Figure 7. SUS Score Assesment

B. Measurement of UX with the User Experience Questionnaire

Based on testing that has been done using User Experience Quasi- naire, the results of the average scale as shown in Figure 6. The average value of the scale produced is Attractiveness 2,197, Perspicuity 2,275, Effi cency 2,150, Dependability 2,050, Stimulation 2,383 and Novelty for 2,089.

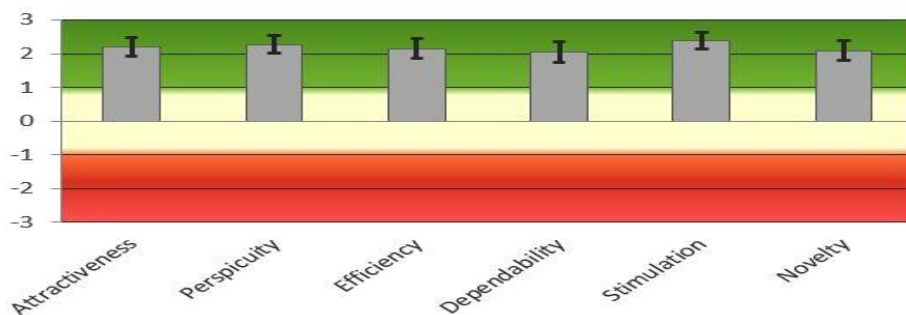


Figure 8. Average UEQ Testing Scale

From the test above shows that the design of the prototype that has been done has produced a very good impression on the prototype cleanstic application.

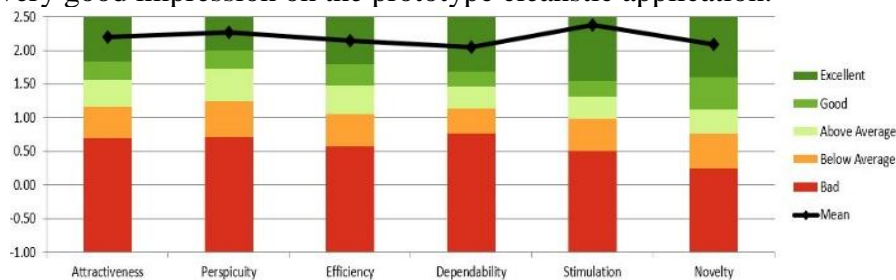


Figure 9. Benchmark Results Design Solutions

Based on the benchmark results that have been obtained as seen in Figure 7 above. Also seen excellent results from testing the design of cleanstic solutions that have been tested, all aspects ranging from the level of Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation and Novelty get the same value, which is excellent.

CONCLUSION

A. Conclusions

In terms of age the characteristics of users have not been able to reach children of primary school age. Because the age information that is the target of the prototype cleanstic application development will also affect the design of the solution to be made.

In the evaluation process that resulted from the scales in the usability scale system test resulted in an increase in sus score in the second test to 78.8 and in the user experience questionnaire test, it produced a very good value.

B. Recommendations

Based on the results obtained from the process of making and testing this cleanstic application, the author can suggest adding features that will be much needed by the user in the future, expanding the range of user criteria and adding even more correspondents when testing the application.

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