Development Monitoring Laundry Management System Based on Ios Core Data

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ABSTRACT

Laundry is an alternative service that can help people wash their clothes. Nowadays, there are a lot of laundry users, from teenagers to adults. It's no wonder that we often carry out and encounter this business because it is indeed a great business opportunity and can be developed. Even so, there are still problems that often occur in using laundry services. These problems include laundry service users who forget their own laundry clothes, clothes that are lost or lacking during washing, and forget to take laundry clothes. Therefore, the writing team discusses how the Apparel Management Application for Laundry Users Using iOS-Based Core Data can help solve many people's laundry problems. Based on our survey with questions, most users are onboarding in the DiLaundry application. With the results obtained, 96.8% of respondents answered yes, 1 respondent (3.2%) answered no, and all the respondents agreed 100% that they could properly manage and check their laundry clothes through the DiLaundry application. Based on our research, we wish this monitoring laundry application could continue with more utility and facility in serving the laundry client.

Keywords: laundry, mobile application, management, Core Data, iOS

1. INTRODUCTION

People these days also have lifestyle changes in terms of clothing due to the influence of the internet and social media. The number of clothes has become an important part of life today. The emergence of new trends that continue to be the thing that makes human dressing styles also change. For example, from usually only wearing 1 t-shirt, now the t-shirt is layered again with other clothes, which means that the clothes worn by a person are getting more and more. So, the clothes owned by humans today are quite a lot. Clothes must also be washed regularly, while most people today want everything to be practical. That is why this causes problems for many people.

From the two things above, namely a lot of activities and clothing matters, many people today use the help of laundry to overcome it. Laundry is an alternative that can be used easily and has the opportunity to be developed. Laundry is a practical and fast laundry service that only takes about 1-3 days. All groups are currently using this service, from students to parents. This service is also still very profitable, so this service is easily found everywhere. The high public interest in using laundry services is partly due to the large number of people who currently live in rental or boarding houses. However, there are some shortcomings that laundry currently has. The current laundry system, which is still manual, makes some people difficult and less helpful. Difficulties are experienced, such as a manual counting system for clothes, so it is possible that there are incidents of missing or lack of clothes. Then the management system is long, and sometimes people forget the estimated time or time to pick up the clothes that have been completed.

Therefore, the solution that can be done must provide more convenience for laundry users. The solution that will be done is to create an application that is able to record the clothes to be laundered, based on the type of clothing. After that, the application is also able to provide reminder notifications for users to notify laundry pickup schedules. This notification works after the user enters the pickup date according to the information from the laundry place. With the appearance of this application, problems regarding laundry that may occur will be minimized, and then users will become more helpful and feel confident when going to use laundry services anywhere.

2. LITERATURE REVIEW

Laundry has a definition, namely the process of cleaning an object by removing unwanted particles or impurities from the object so that the original state of the difference is obtained [1]. To help solve laundry-related problems in today's society, a practical and appropriate solution is needed. One of them is through mobile applications. Mobile application is software that can only be obtained and run on mobile devices [2]. Why use a mobile application? Because many people today like mobile applications because they are cheap, flexible, and portable.
In that case, the laundry application that will be created is iOS-based. In making applications, of course, we use programming languages. A programming language is a language that is a tool for programmers to use in the process

of making software [3]. The programming language used in this application is Swift programming language. Swift Programming Language is a hybrid programming language that has a functional object orientation. Swift is a fast and secure programming language. Swift is currently used to develop apps and systems for iOS, watchOS, and tvOS [4]. Furthermore, Xcode, which is software and part of Apple's development tools, helps in coding [5]. The application will be core data-based, as core data serves as the framework used to manage the model layer objects in the application [6].

In creating this application, the design pattern used is MVVM (Model-View-ViewModel). This MVVM concept is a design pattern with 3 layers, which involves a new concept of ViewModel and is a companion object for ViewController on iOS [7]. To call and facilitate communication with other applications, an API is needed in the application [8]. After that, the Rest API is needed, which is a protocol that utilizes HTTP (Hypertext Transfer Protocol) [9]. If the API is to communicate with other applications, then the Rest API is the architectural design of the API. This API was built and documented using software called Postman. [10]. For the framework, Laravel Middleware is used. Laravel is a PHP website-based backend and has an MVC (Model-View-Controller) pattern [11]. Some of the advantages of using the Laravel framework are the lightweight template, support for MVC, many object-oriented libraries, artisan tools available, and individual and independent modules [12]. The process of modeling and implementing the system in the application will be done through UML (Unified Modeling Language). UML aims to make developers have a reference, and users also have a reference for how to use the application. [13]. After the model of the system has been formed, it is also necessary to model the form of the application itself. Therefore, a prototype is needed. A prototype is a product model that already includes some of the main features of the product before proceeding to the final phase [14].

After the application is ready to be given to the user, testing will be carried out. Testing is done in several ways, one of which is the black box testing method. This method is done by testing a person or group of people who do not know anything about the system of the application and how the application works [15].

Here are some of the features loaded in this app:

- Users can have data on their clothes that are being laundered.
- Users can view and know the laundry time in progress.
- Users can get an automatic reminder if the laundry process has been completed.
- Laundry users become more helpful to check laundry clothes.

3. METHOD

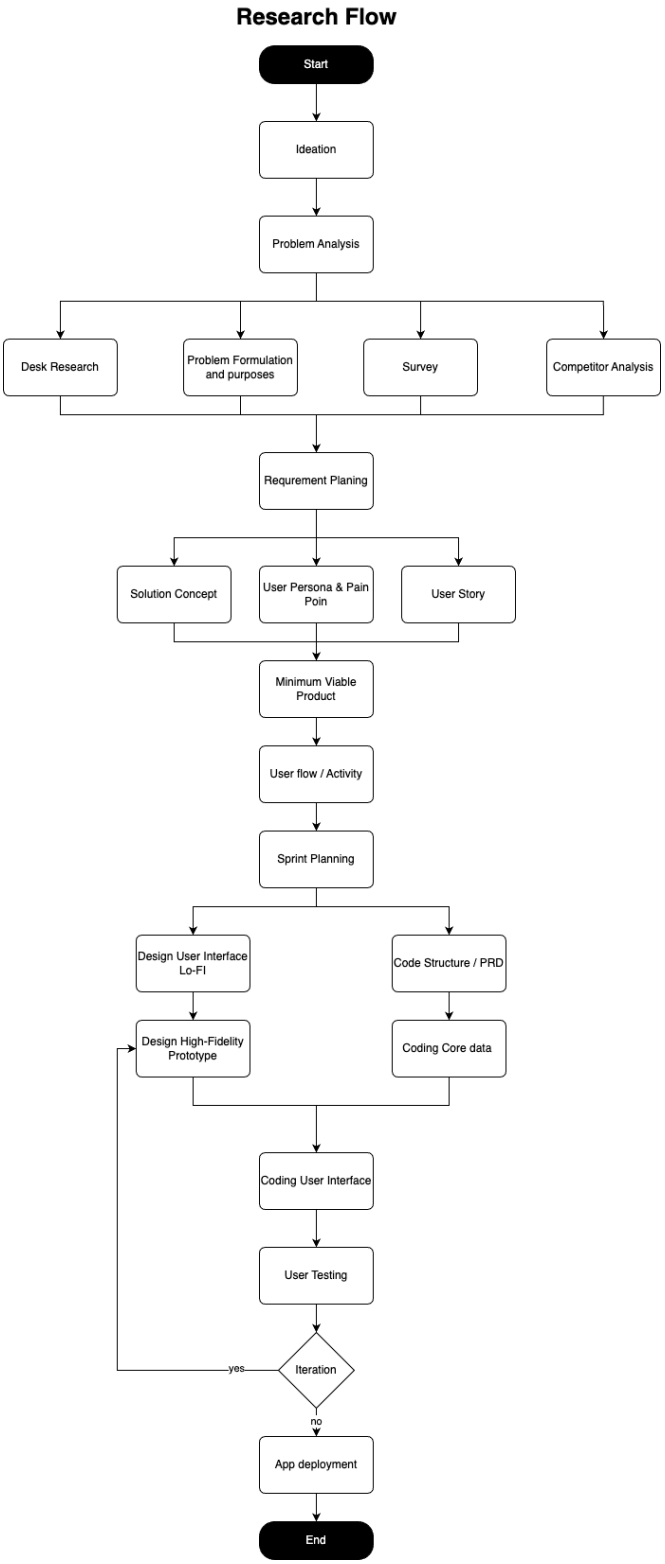

Figure 1. Application Development Process

The author sets the name for the application to be made with the name DiLaundry. There are several stages of the research method carried out by the author in making this DiLaundry application. First, the author develops the idea of what application will be made. The application that the author thinks of is one that does not currently exist but is needed by the community. The author has several ideas at this early stage. Finally, the author chose to make this

laundry application. This is because there are not many laundry applications that exist and are known by the public. Then, the author analyzes the problems of the laundry-related community. Several problems were found that could be overcome by the author through the application to be developed. In the next stage, the author conducts searches related to books, journals, and information from various sources that contain laundry, goods, and data management systems, as well as about the application base that will be made, namely iOS. Next, the author formulates the problem and purpose of this application. The author then conducts a survey of the community, ranging from teenagers to adults. This is useful so that the targets and objectives of this application can and are appropriate. After the survey data is collected, the author also collects data from surveys of applications that are similar to what the author wants to develop. The author found several applications that refer to laundry purposes. From all these data, the author can finally formulate the needs of the community to be included in the application. In the next stage, the author compiles a series of good solutions so that later they can be used by the community. Therefore, the author must create user personas, pain points, and user stories. Next, the author creates an MVP (minimum viable product) to get appropriate results by reducing things that can mess up the final result of the application. After that, the author creates an activity diagram related to the process of working the application. Followed by sprint planning to discuss the next work steps. The next series of work is to create a Lo-FI User Interface Design, which is then followed by a High Fidelity Prototype Design. At the same time, the author also created a code structure/PPRD and created the core data. After that, the author did the coding for the application interface. Because this application is for the community later, the next step is testing with the user. This testing aims to examine how the user experiences the interface and the workings of the application. If there are shortcomings, then iteration of prototyping is carried out. The author must ensure that this application is working properly. And finally, the author can deploy the application that has been developed.

4. RESULTS AND DISCUSSION

In designing DiLaundry, it really requires needs analysis which is very supportive in the design and development of this application.

A. Requirement defination

The following are the supporting needs in the development of this application:

1) Create a system that can record the amount by categorizing the user's clothes when they want to do laundry.
2) Help laundry users to record how long the laundry process takes from the estimate given by the service provider.
3) Provide reminders in the form of notifications for picking up laundry clothes for users after the laundry process is complete.
4) Creating a useful system so that laundry users can confirm the clothes they receive.

B. Software and Design System

After all the requirements are carried out by users, start by designing the system using use cases and UML.

1) System Design

At the beginning, we planned by making a Use Case Diagram which can be seen in figure 2.

- Use Case Diagram

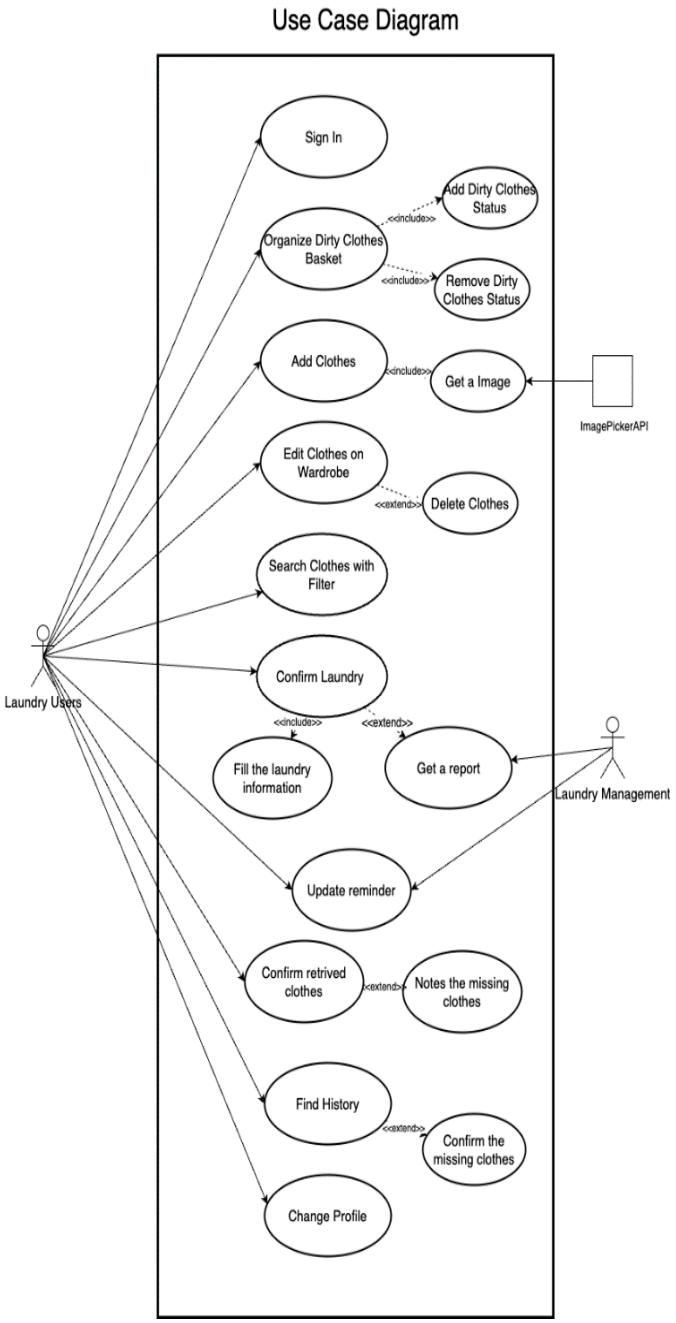

Figure 2. Use Case Diagram DiLaundry

Figure 2 explains the use case diagram of DiLaundry. In this use case, there are 3 actors: laundry users, laundry management, and the image picker API. The use case diagram explains activities that can be carried out by actors in using the application.

- Activity Diagram

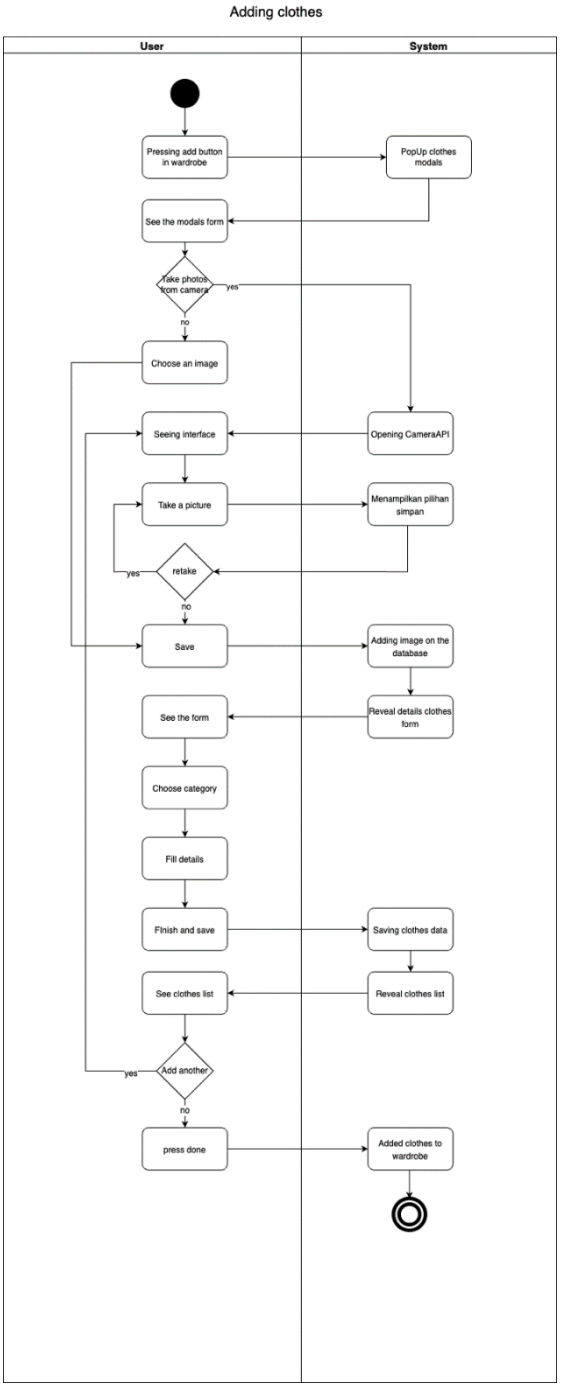

Figure 3. Activity Diagram

In figure 3 describes the activity diagram for adding clothes features within our DiLaundry application. From this figures there will be interaction between the users and system.

- Class Diagram

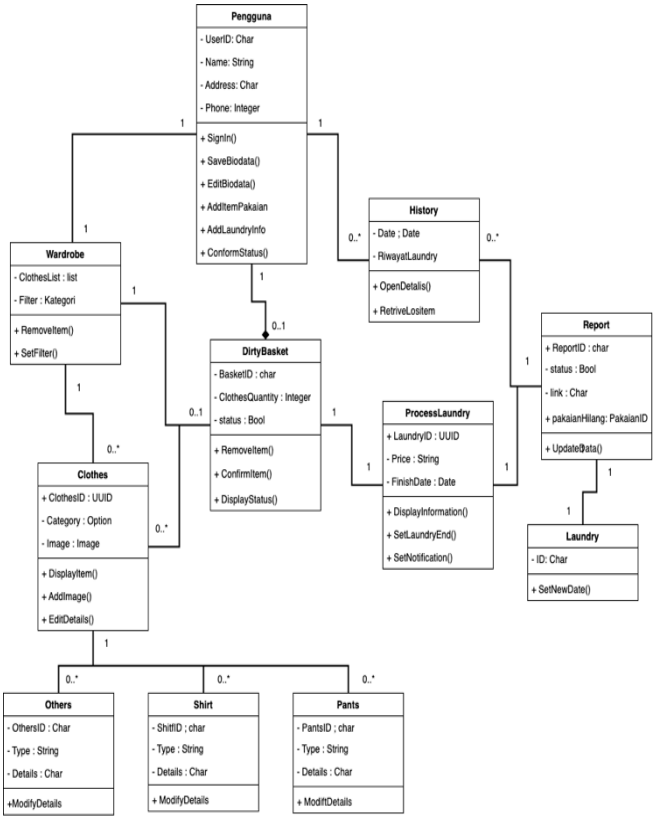

Figure 4. Class Diagram

In figure 4 describes the class diagrams that have been created for the DiLaundry application.

2) User Interface Design

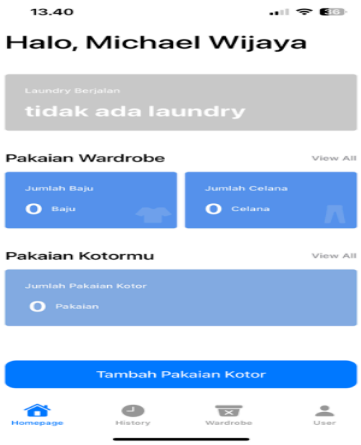

Figure 5. User Interface of Home Page

In figure 5 is a view of the home page of the DiLaundry app. In this application inform some menu to support the system.

C. Application Development

After completing the application development design with diagrams and prototypes, we started to create projects according to their needs, including the main thing is to creating Core Data as an essential backend in our application so that it can accommodate data and make your application work.

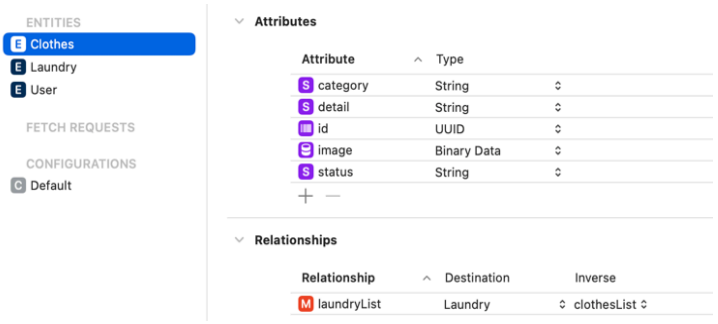

Figure 6. Core Data Laundry

In the figure above is a Core Data figure that is accommodated based on the entities that have been designed in the Entity Relation Diagram, including users, clothes, and laundry. Each entity has its own attributes and is related to recording the data involved. This core data creation only adds entities to the core data model, then adds their functions to each model.

```
import CoreData
class ClothesModel{
   private var context: NSManagedObjectContext
   init() {
      self.context = PersistenceController.shared.container.viewContext
   }
   init(context: NSManagedObjectContext) {
      self.context = context
   }
```

The source code of the SwiftUI Model is a coded part of the Clothes Model. Core Data can transform entities as a data model; you no longer need to create structs to insert data. Therefore, we must import Core Data at the top of the file. Use this import on every file that will deal with core data. Core Data runs in the background task so it doesn't interfere with the main thread. Make this context variable a global variable so you don't have to create this variable repeatedly.

```
func saveClothes(image: Data, category: String, status: String = "clean") -> Bool {
      let clothes = Clothes(context: context)
      clothes.id = UUID()
      clothes.image = image
      clothes.category = category
      clothes.status = status
      clothes.detail = ""
```

Then, we will create a function to save the core data. The creation of this method is optional, but since we will use it repeatedly Without using this method, the existing data model will be a regular structure. The data contained in it will not be saved into Core Data.

```
import SwiftUI
struct ImagePicker: UIViewControllerRepresentable {
   @Binding var image: UIImage?
   @Binding var isShown: Bool
   var sourceType: UIImagePickerController.SourceType = .photoLibrary
```

Then in the next source code is corelated with API. The use of the ImagePicker API is embedded in our application for image capture needs in the clothing addition feature. This function in it will call the camera to take a picture.

D. Testing

After developing the DiLaundry application, testing is carried out to confirm whether the application created is suitable in terms of system and functionality. Testing was carried out using the Black Box Testing method. In this test, all functions contained in the DiLaundry application were tested to ensure whether the functions,

flows, and appearance of the application were running as needed. The DiLaundry application was tested with a total of 22 test cases. The results of the tests are that 22 test cases were declared passed.

E. Questionnaires

To get evaluation data from users of the DiLaundry application, questionnaires are needed for that. The questionnaires are meant to find out whether users are interested or not in the DiLaundry application. Then, get information about things that are lacking from the DiLaundry application. The following are some of the questions contained in the DiLaundry application questionnaires:

1) Did you see the On Boarding screen when you find opened the DiLaundry application?

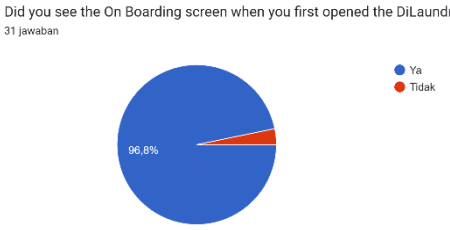

Figure 7. User see the on boarding room

In Figure 7, the conclusion of the question is that of the 31 respondents, most saw OnBoarding in the DiLaundry application. With the results obtained, 30 respondents (96.8%) answered yes, and 1 respondent (3.2%) answered no.

2) Can you add your dirty clothes in the DiLaundry application?

Figure 8. User can add their dirty clothes

In figure 8, the conclusion of this question is that of the 31 respondents, all respondents 100% agreed that the DiLaundry application could add their dirty clothes.

3) Can you manage and check your laundry clothes properly through the DiLaundry application?

Figure 9. User can manage and check their laundry

In figure 9, inform the conclusion of the questionnaire question that all the respondents agreed that they could properly manage and check their laundry clothes through the DiLaundry application.

4) Can you send a report on your laundry clothes to the laundry manager in the DiLaundry application?

Figure 10. User can send a report their laundry

In figure 10, the conclusion of the questionnaire question is that, from 31 respondents, most of the respondents were able to send their laundry report to the laundry manager. With the results obtained, 27 respondents (87.1%) answered yes, and 4 respondents (12.9%) answered no.

5) In general, are you satisfied with the DiLaundry app?

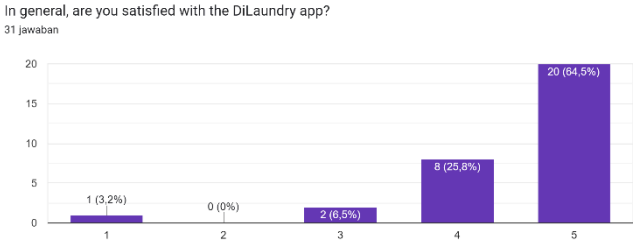

Figure 11. User satisfied with the app

In figure 11, inform the conclusion that of the 31 respondents, most agreed that they were satisfied with the DiLaundry application. With the acquisition of results, 20 respondents (64.5%) gave a value of 5, 8 respondents (25.8%) gave a value of 4, 2 respondents (6.5%) gave a value of 3, 1 respondent (3.2%) gave a value of 1.

5. CONCLUSION

1) Based on the DiLaundry application that has been developed using the Swift programming language with the main database using core data, the survey results from user evaluations that have been carried out show that most users feel helped by the features presented in the DiLaundry application. Then it can be concluded that the flow of using the DiLaundry application is easy to understand and makes it easier for most respondents to manage their dirty clothes. Not only that, the laundry manager also feels helped by the link report, which is presented by the DiLaundry application to see a summary of the clothes of their laundry service users while at the same time being able to change the date of collection of the laundry.
2) DiLaundry application development is built from database management system theory, which is in line with changeable and flexible management theory. Users will find it easier to categorize clothes, organize their dirty clothes, set reminders for picking up laundry clothes, and be assisted in checking laundry collection to minimize errors/lost clothes in the return process. Of course, these features are presented to help laundry users and managers so that the laundry process can run smoothly.
3) From a comparison of other similar applications related to laundry, there is no application that has functions like the DiLaundry application. This is what makes the DiLaundry application a new invention that can solve the main problems of laundry users.

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