The Implementation of Mobile Technology in The Process of Reporting Disasters and Events

Ade Silvia Handayani*[1], Nur Hopipah[2], Mohammad Fadhli[3]
[1,2,3]Department of Telecomunication engineering, Politeknik Negeri Sriwjiya, Palembang, Indonesia
e-mail: *[1]adesilviahy@gmail.com, [2]hopipahnur15@gmail.com, [3]mohammad.fadhli@polsri.ac.id

Abstrak

Telekomunikasi memiliki peran penting dalam memfasilitasi komunikasi dan pertukaran informasi, terutama dalam situasi darurat seperti bencana alam dan kejadian masyarakat yang tak terduga. Menerapkan teknologi seluler adalah solusi yang menjanjikan untuk meningkatkan respons dan penanganan masalah-masalah in.Teknologi mobile memungkinkan masyarakat untuk dengan mudah melaporkan kejadian bencana atau masalah keamanan melalui aplikasi atau layanan pesan singkat. Implementasi teknologi mobile memfasilitasi komunikasi real-time antara masyarakat dan Babinsa. Masyarakat dapat mengirimkan laporan dengan cepat, menyampaikan informasi penting, serta berbagi foto atau video sebagai bukti kejadian. Babinsa, di sisi lain, dapat merespons laporan tersebut dengan lebih efisien dan mengambil tindakan yang diperlukan berdasarkan informasi yang diterima.Selain itu, teknologi mobile juga mendukung komunikasi dua arah antara Babinsa dan masyarakat.. Masyarakat juga dapat memperoleh informasi terkini tentang situasi darurat, upaya penanganan, atau evakuasi melalui aplikasi atau pemberitahuan pesan langsung. Dengan demikian, implementasi teknologi mobile dapat memberikan kontribusi yang signifikan dalam meningkatkan komunikasi, respons, dan penanganan bencana serta kejadian masyarakat.

Kata Kunci *-- Perancangan, Aplikasi Mobile berbasis Android, Implementasi teknologi mobile, Pelaporan.*

Abstract

Telecommunications have an important role in facilitating communication and information exchange, especially in emergency situations such as natural disasters and unexpected community events. Implementing mobile technology is a promising solution to improve the response and handling of in-kind problems. Mobile technology allows the public to quickly report incidents of disaster or security issues through applications or short message services. The implementation of mobile technology facilitates real-time communication between the community and Babinsa. The public can send reports quickly, convey important information, and share photos or videos as evidence of events. Babinsa, on the other hand, can respond more efficiently to these reports and take necessary actions based on the information received. Apart from that, mobile technology also supports two-way communication between Babinsa and the community. The public can also get the latest information about emergencies, efforts handling, or evacuation via app or direct message notification. Thus, the implementation of mobile technology can make a significant contribution to improving communication, response, and handling of disasters and community events.

***Keywords*—** *Design, Android-based Mobile Application, Implementation of mobile technology,Reporting.*

1. INTRODUCTION

Previous research by[1] shows that disasters often occur in Asian countries, including Indonesia. Indonesia is the 2nd most disaster-prone country in the world, according to [2]. Natural disasters commonly occurring in Indonesia include earthquakes, floods, hurricanes, fire disasters, and community emergencies such as major accidents or criminal offenses that can cause extensive damage and impact many people.[3]. However, communication methods such as telephone calls or manual reports can sometimes be less effective and time-consuming. In the current digital age, the development of information technology is increasing, so the use of smartphones is also growing, with the help of smartphones themselves being used for long-distance communication[4]. Using smartphones provides an opportunity to create a system or platform that makes it easier for people to report disasters and events quickly and efficiently. The development of information technology has progressed very rapidly, and one of the significant breakthroughs in mobile technology[5]. Cell phones or Mobile Phones are practical and portable communication tools, allowing users to take them wherever they go. Today, almost everyone from all walks of life owns a smartphone, making it one of the most widespread and accessible technologies for all walks of life[6].

This study aims to delve into the diverse ways in which mobile technology is being harnessed to enhance the reporting and monitoring of disasters and events. By harnessing the power of mobile applications, real-time updates, multimedia capabilities, and geolocation services, stakeholders, including emergency responders, government agencies, humanitarian organizations, and even affected individuals, can obtain critical data and share vital information seamlessly[7]. Throughout this research, we will examine various case studies, best practices, and challenges faced while adopting mobile technology in disaster reporting[8]. As technology keeps developing quickly, it is crucial to understand the implications of these advancements in disaster and event reporting[9]. This journal seeks to contribute to the growing body of knowledge in this field and provide valuable insights for policymakers, disaster management practitioners, and technology developers to make informed decisions and design effective strategies to harness the full potential of mobile technology in disaster reporting and response.

In this context, the implementation of mobile technology has emerged as a promising solution to improve the efficiency and effectiveness of communication in emergency situations[10]. Mobile technology allows the public to easily and quickly report disasters or community events to Babinsa through mobile applications or short message services. The information sent can be received in real time, enabling the authorities to respond quickly and take the necessary action based on the information received[11]. The Implementation of Mobile Technology in the Process of Reporting Disasters and Events is a comprehensive exploration of mobile technology's transformative role in revolutionizing disaster and event reporting[12]. As we embrace these advances, we can develop a robust disaster management strategy that harnesses the full potential of mobile technology to save lives, protect communities, and build a more resilient future in the face of natural and artificial crises. Based on the problems described above, an application has been designed to be a forum for the community to report disasters and conflicts in their area. Hopefully, this system can become a place of promotion and a place to complain or report what is happening in the community.

2. METHODS

2.1 System Design

Designing a website based complaint and disaster system will be a forum for complaints and disasters to BABINSA to be something that needs to be done by the community to report complaints and disasters. To build a new system, a system design is needed. Below is a system design that has been developed to describe the whole system in general using a use case diagram.

2.2 Use Case Diagram

A use case diagram is a diagram model that contains steps of the relationship between the user and the system. The following is a Use Case Diagram of the Complaint and Disaster Reporting System. Use case diagrams on actors to show that users can enter reports and check reports on the application system. After that, if the user enters a report, then the user can select the type of report, choose the details of the report option, enter the report description, and input data by entering photos and videos. While in the admin use case, the admin can do this by opening the dashboard, responding to incoming reports, completing reports, and viewing the history of incoming reports.
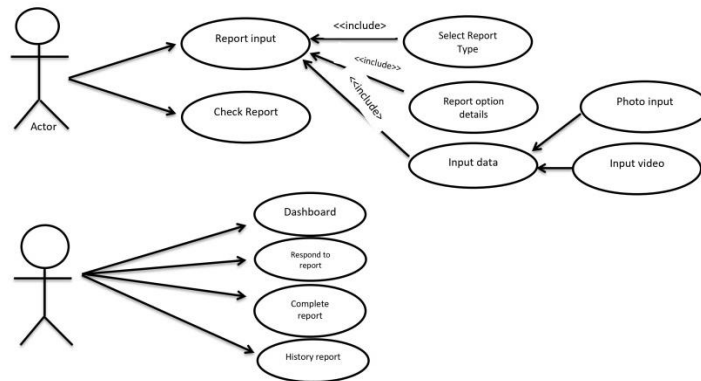

Figure 2. Use Case Diagram

2.3 Activity Diagram

Activity diagrams describe the workflow or activity of a system or business process or menu in the software. The activities performed by the Admin in updating the status of the complaint are described in the figure below On the Complaint List page, the Admin can change the status of the complaint according to the follow-up that has been performed. In admin activities, if the admin logs into the system, the system will display the login page; the admin must enter an email and password then the system will validate the email and password. If the email and password are valid, the system will display the dashboard page, and if the email and password are invalid, the system will return to the login page. After the system displays the dashboard page, the admin can update the status of the complaint. After the admin updates the complaint status, the system will save the data into the database. After that, it returns to the admin.
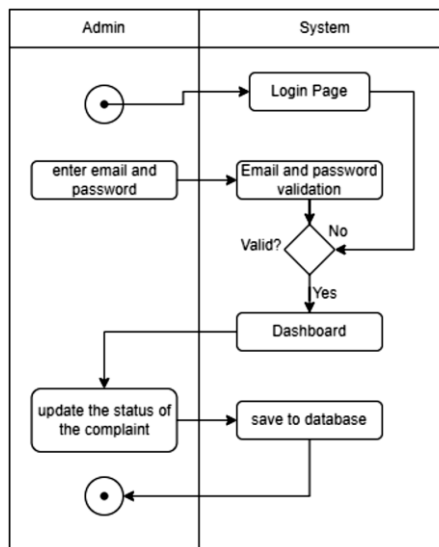

Figure 3. Activity Diagram

While the activities carried out by the users in making complaints On the complaints page, the user selects the type of complaint and fills in all available forms to report the complaint. The following is a flowchart explanation of the activity diagram below. When the user opens the app, the app displays the login page. Then the user enters the email and password; then the application will validate the email and password; if the email and password are wrong, then the application will return to the login page, while if the email and password are valid, then the application will display the main page then the user selects the complaint type then the application will display the complaint form page after that the user fills out the complaint form and submits if he has filled out the form then the application will send data to the server. The application will display a list of complaints that the user has entered. After that, the activation returns to the user.
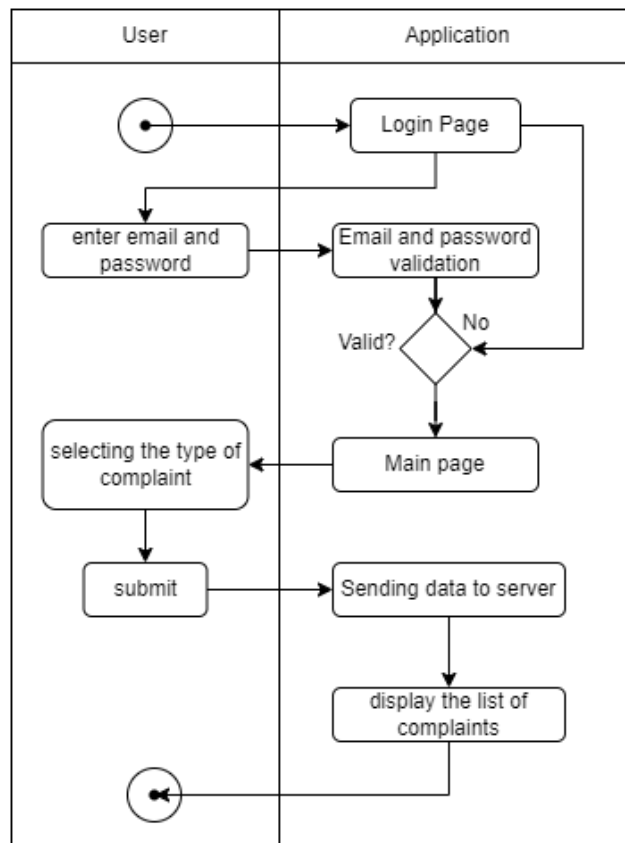

Figure 4. Activity Diagram User

2.4 Results Analysis

The analysis of the results is done by first testing the system. Application system that was created. Somebody measure the usability value. Whether the usability value can be increased. Usability is a quality attribute that measures how easily using a system's interface is. Usability is a factor that determines whether an application is good or not. There are five main components to usability. The five components are learnability, efficiency, memorability, errors, and satisfaction. So of the five components, the five components will be the test parameters on the system later. The test is carried out directly on the menu functions included in this web-based application and included in this web-based application. The test was carried out using the black box testing method and UAT (User Acceptance Testing). After all the system testing processes have been carried out, the next step is to analyze the test results to determine whether the web-based applications that have been designed are successful.

3. RESULTS AND DISCUSSION

3.1 User and Admin Display Results

    a.   Home

When opening the application, the first page appears, which is home.
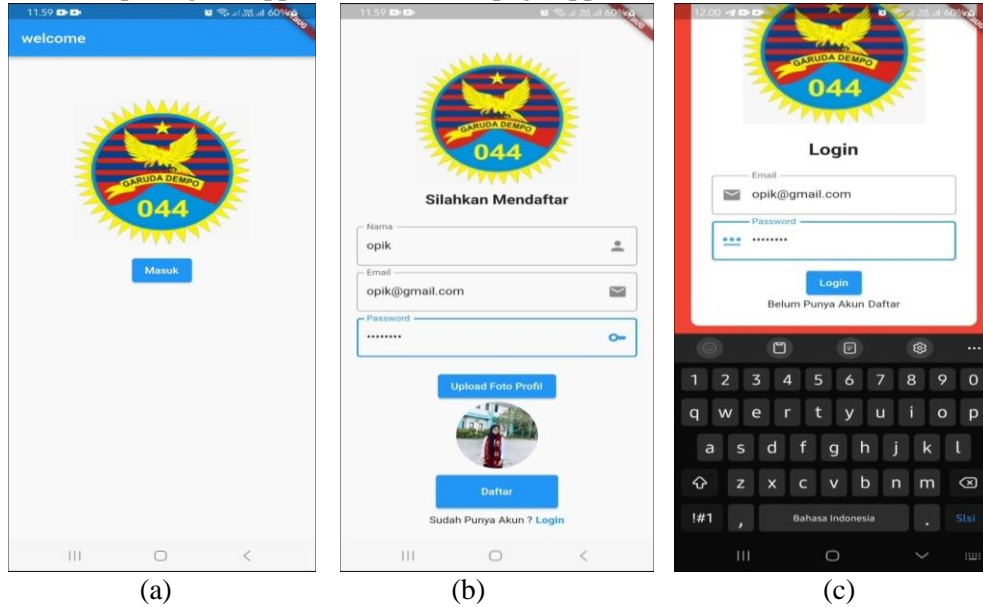
| (a) | (b) | (c) |

Figure 6. (a) Home (b) Register page (c) page log in

The home page displays the login button where directed to log in to the application as shown in Figure 7 (a). If you click the login button, then the next page displays the register page if you do not already have an account, you must fill in the data such as your name, email, password, and profile photo. If you click the list button, the data will be stored in the database as shown in Figure 7(b). If the register is successful, the next page displays the login page as shown in Figure 7 (c).

    b.   Enter the report data

After the registration is completed, enter the data that will be sent.
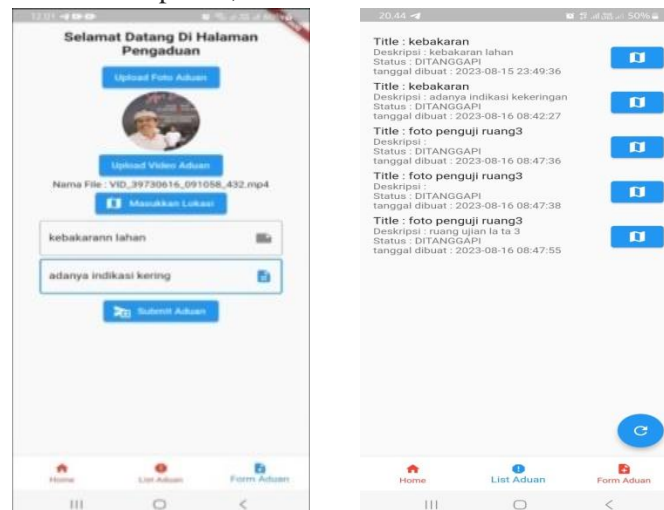

Figure 7. (a) Form of Report (b) List of report

On the home page, please click the complaint form button. After that, please fill in the data that will be sent as evidence of the report, which is the location, photo of evidence, video of

evidence, as well as the type of complaints and chronology as seen in image 8 (a). If you have already filled in the report data with complete and next click submit, then the data report will be sent, and we can see it by clicking the complaint list button as in picture 8 (b).

3.1.1 Admin Display Result

For admins, they only need to enter email and keywords that have been registered in the database.

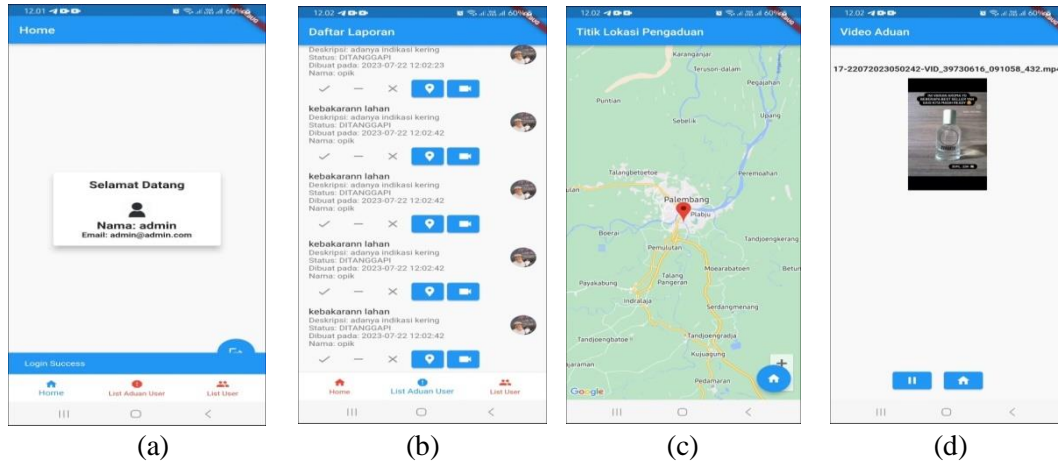| (a) | (b) | (c) | (d) |

Figure 8. (a) admin has entered (b) List of reports (c) location (d) Proof of video

On this admin page, the report list will appear if the report has already been entered, as seen in Figure 9 (b) If the admin wants to see the location point of the report, then please click the GPS button on the report list page. If it is already clicked, then it will look like in image 9 (c) And if the admin wants to see the video evidence report, then you can click on the camera image on the report list page, and it will look like in image 9 (d). On the report list page the admin can respond to the report by clicking the check mark meaning it was completed and the crossmark means it was rejected.

3.2 Testing System
3.2.1 Black box

Blackbox processes penguins run tap validating whether or not the system created is compatible with what users expected[13].The system is done with a penguin black box. The main focus of this test blackbox is the input and output of the application knowing how the software processes the input or output.

Table 1. User Black Box Test Results

Number	Testing Department	Tested Function	Input	Output	Status
1.	Login	Login menu to enter the system	Enter the true email address and password.	Enter the system and display the home page	Valid
			Enter the wrong email address and password	Return to login page	Valid
2.	Register	Account register menu	Click Register on the login page by filling in your name, email, password, and profile photo.	The data is saved to the database, and there is a successful registration notification.	Valid
3.	Home Menu	User Account	After successfully log in	Displays user, profile photo and email.	Valid

Number	Testing Department	Test Function	Input	Output	Status
4.	Report form menu	Report form menu	Click Report form	Displays the report form page.	Valid
		Location button	Click submit location according to the location point.	Displays google maps.	Valid
		Photo upload button	Click the upload photo button according to the evidence of the incident	Displays the photos in the file then enter one selected photo.	Valid
		Video upload button	Click the upload video button according to the evidence of the incident	Displays the videos in the file then select one selected video.	Valid
		Report Title button	Click the complaint title box, the contents according to the disaster or incident.	Displays the keyboard and starts filling in the report title.	Valid
		Report Description button	Click the description box for the report's contents according to the disaster or incident.	Displays the keyboard and starts filling in the report description.	Valid
		Submit Report button	Click the submit report button	Displays a text notification that your report was successfully sent	Valid
5.	Report List Menu	Refresh button	Click the refresh button to review the report that has been submitted	Displays a list of complaints that have been sent	Valid
6.	Home Menu	Logout button	Click the Logout Button	Displaying the login page means successfully log out	Valid

Tabel 2. Admin Black Box Test Results

Number	Testing Department	Test Function	Input	Output	Status
1.	Log In Menu	Login menu to enter the system	Enter the email and password already stored in the database.	Displays the successful login and display the home page	Valid

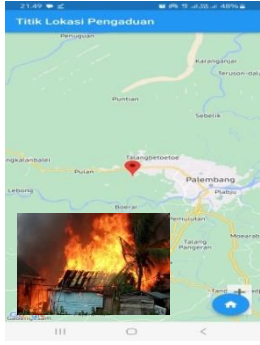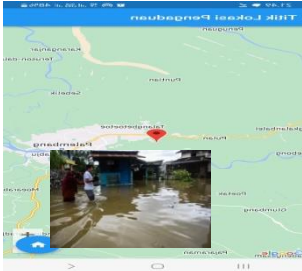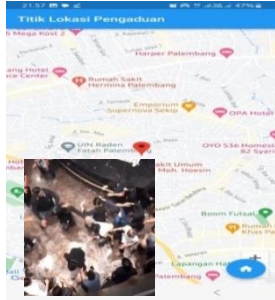| Number	Testing Department	Test Function	Input	Output	Status
2.	User Report List Menu	Menu button lists user reports	Click the user report list menu	Displays a list of user reports	Valid
		Check Button	Click the tick button	Respond to or complete reports	Valid
		Cross Button	Click the cross button	Deleting Reports	Valid
		GPS button	Click the GPS button	Displays the location point of the reporter	Valid
		Video button	Click the Videos button	Showing the video sent by the reporter	Valid
		play button	Click the play button	Plays the video sent by the reporter	Valid
		Photo button	Click button Photo	Displays a photo of the reporter.	Valid
		Home button	Click home button	Displays home.	Valid
3.	List User Menu	User List button	Click the list users button	Displays data from the user	Valid
4.	Home Menu	Logout button	Click the Log out button	Displays the Login page	Valid

Black box testing has proven itself as one of the critical and practical approaches to identifying potential defects and weaknesses in software or systems without requiring detailed knowledge of their implementation. By considering the input and output of the system, this test can uncover various problems that might not be visible from an internal perspective. Blackbox Testing allows system testing without the need to know the interior details. This makes this approach easier to implement as it only requires clear input and output specifications. It is clear what is being tested in black box testing, namely system functions or features in the application; in the table above, the input entered is by the initial design, the output on the system follows the design and the status column has been tested validly.
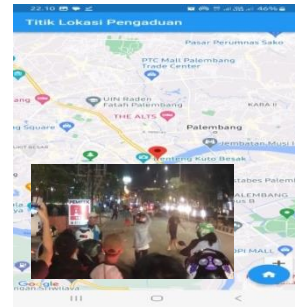
Table 3. Performance efficiency test results

	Kategori	Response Time (s)		
		Test 1	Test 2	Test 3
DEVICE	Splash screen	4,5	4,5	4,2
	Log in	3,2	3,2	3
	Register	3,1	3,2	3,1
	Home	3	3	3
	Report List	3,4	3,4	3,2
	Video Player	3,4	3,4	3,3
	Google Maps	3,8	3,7	3,4
	Log Out	3	3	3
Total		27,4	27,4	26,2
Average		3,42	3,42	3,2

In test 1, the Android smartphone used has a specification of 2 GB RAM; 1.6Hz Cortex-A53 octa-core CPU. In test 2, the smartphone used has a specification of 2GB RAM, Octa-core CPU 2.0GHz Cortex-A53, while in test 3, the smartphone has a specification of 4GB RAM, Octa-core 2.0 GHz Cortex-A55.From testing, the type of processor and RAM can affect the performance value of an application. Testing in the 3rd test obtained faster results when compared to test 1 and test 2. This is because test 3 uses the highest processor and RAM

Table 4. Data Testing Results

Number	Report title	Latitude	Longitude	Report photo
1.	fire	-2.9914052	104.803371	
2.	flood	-2.963637	104.747714	
3.	Riot	-3.040865	104.7309961	
4.	road repair	-2.944670	104.873957	

| 5. | fight | -2.993394 | 104.736762 | |

| 6. | landslide | -2.964278 | 104.752241 | |

| 7. | fallen tree | -2.964278 | 104.752241 | |

| 8. | fight | -2.989855 | 104.762433 | |

| 9. | bridge construction | -2.928339 | 104.780767 | |

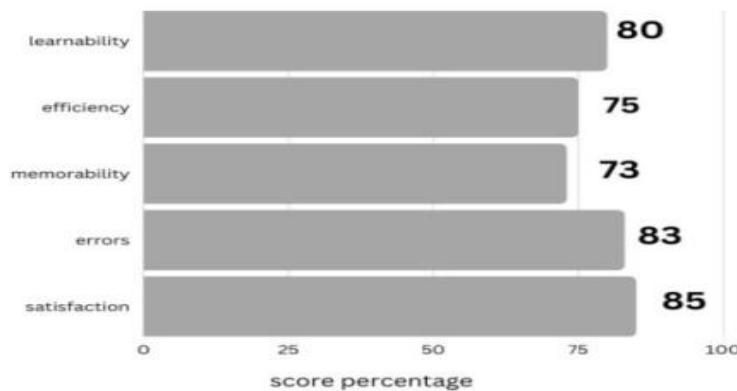| 10. | mosque construction | -2.952232 | 104.779957 |
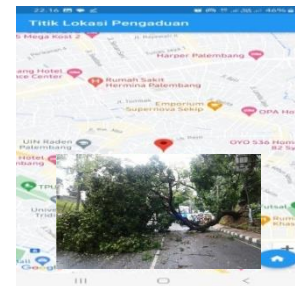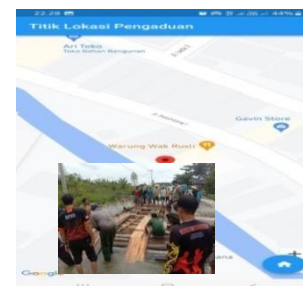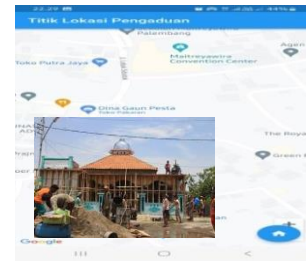
3.3 User acceptance testing

Figure 10. User acceptance testing for mobile application

This UAT test was carried out with several participants who used this disaster and incident reporting application. In this test, five main components are tested, namely learnability, memorability, efficiency, satisfaction, and errors, using a scale of 50-100 values where the vulnerable values have their respective meanings, namely between the 50-60 range, which is Enough and 60-80 that's good while the 80-100 range is excellent. The graph above has an average value of learnability 80, efficiency 75, memorability 73, errors 83, and satisfaction 85. Based on the results of these input values, three indicators have excellent deals, namely learnability, errors, and satisfaction.

3.4 Application performance analysis

This application was created to make it easier for people to report events and disasters that are happening where they live, where this application is designed as simply as possible so that users can run the application quickly and report through the application efficiently and effectively so that it can be appropriately handled and resolved soon by the authorities.

The test results are carried out by testing the application system first. In this application, the Usability value measurement is carried out to determine whether it can increase usability. Usability is a quality attribute that assesses how easy the interface of a system is to use. Usability is a factor that determines whether an application is good or not. Five main components exist in usability. The five components have been tested as follows, learnability of 80%, efficiency of 73.3%, memorability of users to remember) of 72.4%, functionality of 81.9%, satisfaction of 85%. So, from the results of testing, the five components the application used are running well. The results of testing this application are also supported using black box testing, where the application features are made as expected.

So the result of designing this application is a system made to report an event and an Android-based disaster using the Dart programming language.

4. CONCLUSIONS

Based on the results of the design and manufacture of this incident and disaster reporting system application, where application testing uses the black box testing method, the conclusion is that when the features of this application are run, the functions run as desired. From UAT testing, it was found that three indicators have excellent deals, namely learnability, errors, and satisfaction.

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