Preservation of the Muyu Indigenous Language with an Android-based Dictionary

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Abstract

Indonesia is a country rich in cultural diversity, with each culture having its own regional language characterizing the area. The Muyu language is one of the regional languages, used by the Muyu tribal community in Boven Digoel Regency, Papua Province. The language is now under the threat of abandonment by the Muyu community, especially the younger generation. One of the causes is the lack of written learning media for the language to be inherited by older speakers in the form of books and electronic dictionaries. This study will try to develop an Android-based Muyu-Indonesian-English dictionary application using the waterfall method (classic life cycle). The aim is to test students' preferences and attitudes towards the development of Muyu language knowledge. The research sample consisted of 40 respondents consisting of Muyu students at Musamus University. A questionnaire was used to measure the extent of student responses to the use of the Muyu-Indonesian-English dictionary application. The test results show that the system has no errors in carrying out the functions that have been created previously at the manufacturing stage. The three-language Muyu-Indonesian-English dictionary application is able to search for vocabulary properly and correctly in Muyu, Indonesian, and English. The attitude of students towards the usefulness of this dictionary application is measured at the medium category, meaning that the application is useful as a tool to facilitate students of the Muyu language, especially Android users, in finding vocabulary in three languages, and can be a tool for learning the Muyu language and preserving local wisdom so that it does not become extinct.

1- Introduction

Indonesia is a country rich in cultural diversity. Each different ethnic and tribal groups produce their own unique culture and cultural products, including regional languages that characterize the areas [1-3]. Language is a tool or means of communication that humans use to interact with one another, and different regions, even in the same general area, often have different languages used as a medium of communication.

Boven Digoel Regency is located between 40 98'-70 10' S and 1390 90'-1410 E, at the southern part of the eastern tip of Indonesia, with an area of 27,108.29 km^2. The Regency consists of 20 districts, namely: Jair, Subur, Ki, Mindiptana, Iniyandit, Kombut, Sesnukt, Mandobo, Fofi, Arimop, Kouh, Bomakia, Firiwage, Magelum, Yaniruma, Kawagit, Kombay, Waropko, Ambatkwi, and Ninativ [4]. The Muyu tribe mostly live in Mindiptana district, which in the Dutch colonial era was a larger and busier town than Tanah Merah, the current capital of Boven Digoel Regency. The Muyu tribe has spread to Merauke, even to Sorong in West Papua [5]. The Muyu speaks a distinct language, which

is currently being threatened with abandonment by the community, especially the younger generation. Younger Muyus are leaving their hometown, and continue their studies at various universities in the cities of Merauke, Jayapura, Makassar, and in Java, with the aim of improving their life. Increasingly, though slowly, the youth begins to adapt to the developments of modern technology and culture. However, in the process of adaptation, they also found that speaking Muyu as their sole language will result in difficulties in communicating, especially with people speaking Indonesian and English. Newcomers or non-indigenous peoples who live side by side with the Muyu tribe sometimes have difficulty communicating with Muyu speakers. The tendency to use foreign languages and slangs has ruled out the use of regional languages [6, 7]. Even as many Muyu speakers grow older and die, there have been no written local language learning media bequeathed by previous speakers in the form of printed or electronic books, dictionaries.

All of these problems can threaten the Muyu culture and their local wisdom with extinction. Until now, there has been no local language learning tool in the form of an application that can provide information about vocabulary. This has an impact on the Muyu community, especially the younger generation, who find it increasingly difficult to interact in the Muyu language [8]. To overcome this problem, a media that can help in preserving the language used by the Muyu community is necessary. A dictionary is a collection of vocabulary that is complemented with the meanings and other information that aims to explain information related to the words contained in the word list [9]. There have been many studies on the implementation of dictionaries as an effort to preserve the language of local wisdom and help learning on a day-to-day basis. Tamheryaan (2017) [10] designed an Android-based dictionary application of Kei, Indonesian and English languages, the results of which could help users in introducing and preserving Kei culture. Sari (2018) [11] made an English dictionary with Android-based text to speech, the results of which was an English language learning media with a portable and interactive nature. Fernanda and Rosnelly (2020) [12] developed an Android-based synonym and antonym dictionary application using the Binary Search method. The advantage of this method is that the search process is highly efficient and timesaving. Most recently, Nurlete and Fatkhurohman (2021) [13] conducted research on Mobile Design for Hitu language. They used the SWOT (Strengths, Weaknesses, Opportunities,Threats) method to obtain optimal results, which are particularly helpful for tourists who visit Hitu, and people in Hitu who are not fluent in Indonesian.

Some of the research that have been described above show efforts to develop an Android dictionary application to preserve culture and become a learning medium for users. Until now, there has been no research and efforts to use technology to preserve the culture and language of the Muyu tribe. Yet, information technology has become the basis of effective and communicative language learning methodologies and media [14-16]. In current developments, smartphones have also been used as learning media in improving performance and contributing to increasing vocabulary [17-20]. However, the use of these media is still conventional , so an integration process is needed for the use of Android applications. Many researchers have also tried using Android-based mobile devices to create learning tools [21, 22], however, in reality the application is only limited to a description of the functionality and test implementation. Therefore, a more in-depth study is needed to test the effectiveness of the Android-based application.

Rapid technological progress has given rise to a new method, namely the era of mobile learning, which allows a flexible learning method that utilizes mobile devices as a language learning medium [23]. Many researchers use smartphones as language learning media devices. Cakmak (2019) [24] discussed the concept of Mobile – Language Learning System (MALL) as a method of developing language learning. The study found that learning with the MALL concept has made learning English easier and increased the level of pedagogy. Mutiaraningrum & Nugroho examine student attitudes towards the use of smartphone, finding that the increasing role of smartphones in language learning must pay attention to students' readiness in preparing for new pedagogical instructions. The study found that system improvements are needed to help students better understand pedagogical instructions [25]. Ababneh examined the attitude of using mobile phones as a language learning method. Yurgal and Oz found that similarly, learning through smartphone media has made it easier for users to access information and improve language skills [26]. Klimova (2019) confirmed that smartphone media facilitates improving student performance in the learning process in an E-learning situation [17].

While previous studies tend to be related to the development of E-learning and feedback from students' attitudes towards smartphone-based learning, this study begins by developing the Waterfall Classic Life Cycle method to design a three-language Muyu-Indonesian-English dictionary Android application. The development of this application system is expected to contribute to Muyu students who live in Merauke to develop their indigenous language and have implications for efforts to preserve the indigenous Muyu tribal culture, particularly language. Furthermore, based on the development of the Muyu-Indonesian-English three-language dictionary application, this research attempts to measure the attitudes of Muyu students towards the use of the Muyu-Indonesian-English three-language dictionary application. This study seeks to contribute to the closing of the knowledge gap regarding the application of smartphone application technology in learning the Muyu language to ensure its preservation, through the Muyu-Indonesian-English dictionary application. The purpose of this study is to develop the application of smartphone application technology and explore technological constraints in the use of the Muyu-Indonesian-English three-language dictionary application.

This research contributes to science by providing information about the use of IoT technology in preserving culture and language. In particular, the results of this study have a major impact on the Muyu tribe, including learning media in the form of a digital dictionary; media to assist communication; adding vocabulary, and preserving the culture and language of the Muyu tribe.

The discussion of the article begins with an explanation of the materials and methods in Section 2. This subsection will describe the Muyu tribe and language, the making of the Muyu-Indonesian-English dictionary application using the waterfall method, using case diagrams as a system-based development, Android, and the concept of benefit perception as a unit of analysis in testing the effectiveness of the application on the benefits for Muyu students. The next sub-section describes the research methodology using a quantitative approach with the Likert scale method to measure the extent of perceptions of the effectiveness of the Muyu Language dictionary application. Further, in Section 3 the results of the discussion are described in sub-sections, the first explaining the results of the application test that has been made and the results of testing the effectiveness of the application on the benefits for Muyu students. The final section concludes on the results found and the development of the application in the future.

2- Materials and Methods

2-1- Muyu Languages

Figure 1 shows a map of the island of Papua, Indonesia. The red line shows the location of the Boven Digoel district, which is the homeland of the Muyu tribe. Boven Digoel is one of the regencies in Papua Province, which before being established as a separate regency under Law No. 26 of 2002, was part of Merauke Regency. In 2018, Boven Digoel Regency consisted of 20 districts, namely Jair, Subur, Ki, Mindiptana, Iniyandit, Kombut, Sesnukt, Mandobo, Fofi, Arimop, Kouh, Bomakia, Firiwage, Manggelum, Yaniruma, Kawagit, Kombay, Waropko, Ambatkwi, and Ninati [27]. Since the days of the Dutch colonial rule, the Muyu tribe had been known to have a good mentality and competitiveness compared to other tribes in the Papua region. Many of the tall Muyu people have achieved the position of officials in the government of Boven Digoel Regency, including in several neighboring regencies in the southern part of Papua Province.

Figure 1. A map of Papua showing Boven Digoel Regency.

Language is a medium of communication used by humans to interact with each other, and thus it cannot be separated from human life. Language is an arbitrary sound-symbol system used by members of a society to work together, interact and identify themselves. Many people learn a foreign language, in addition to their mother tongue. One way to learn a language is to learn the vocabulary, by knowing and understanding the vocabulary of a person speaking a language, it is easier to learn the language [28]. According to a linguistics study, in Papua there are approximately 307 local languages spoken by different tribal groups (research result of the Papua and West Papua Language Center team in 2013). These different local languages are grouped by linguists into two broad categories: local languages that are members of the Austronesian language family; and languages that are not Austronesian (non-Austronesian), which are called Papuan languages. Examples of the first category are the Biak, Waropen, Wandamen, and Raja Ampat ethnic groups/tribes and languages, while the examples of Papuan languages are those spoken by the Muyu, Dani, Kapauku, and Ayamaru ethnic groups or tribes. The Muyu language features an SOV (Subject-Object-Verb) word order, rather than the more common SVO (Subject-Verb-Object) order, as can be seen in the examples below:

Table 1. Examples of word order in Muyu language in comparison to English and Indonesian.

Ne	ambib	wananggekeman
Subject ('I')	Object ('home')	Verb ('return')
Compare to: 'I want to go home' in English and 'Saya hendak pulang ke rumah' in Indonesian		
Emba	**yongbon**	**weneen**
Subject ('Father')	Object ('garden')	Verb ('went')
Compare to 'Father went to the garden' in English and 'Ayah pergi ke kebun' in Indonesian		

The Kati or Muyu language is further divided into 8 sub-languages or dialects according to the 8 sub-tribes in the Muyu or Kati tribal area, including Kamindip, Okpari, Kakaib, Kawiyet, Are, Kasaut, Yonggom, and Ninggrum. Each of these 8 sub-tribes have their own particular dialects, however there is much mutual intelligibility due to similarities in the vocabulary. The Kamindip and Okpari sub-tribes speak the same language, yet they claim to be distinct sub-tribes [28]. Table 2 shows examples of vocabulary from 8 Muyu sub-tribes.

Table 2. Examples of words in the dialects of the eight sub-tribes of the Muyu.

No	Indonesian	English	Dialect							
			1 Kamindip	2 Okpari	3 Kakaib	4 Kawiyet	5 Are	6 Kasaut	7 Yonggom	8 Ninggrum
1	Manusia	Human	Katuk	Katuk	Katuk	Kaduk	Katuk	Katup	Katuk	Karuk
2	Teman	Friend	Anggotmi	Anggotmi	Anggotmi	Anggotmi	Nege	Nekatupwa	Anggotmi	Nekaruk
3	Bapak	Father	Ambe	Ambe	Ambe	Emba	Ambe	Aetkok	Ambe	Yang
4	Mama	Mother	Enang	Enang	Enang	Ena	Ena	Ninggok	Enang	Neng
5	Anak	Soon	Tana	Tana	Tana	Tana	Tana	Tena	Tana	T'na
6	Kakak (L)	Brother	Ambang	Ambang	Ambang	Ambo	Onim	Bap	Ambang	Bap
7	Kakak (P)	Sister	Ambang	Ambang	Oni	Oni	Oni	Bap	Oni	Bap
8	Rumah	House	Ambip	Ambip	Ambip	Ambip	Amati	Ama	Ambip	Am
9	Uang	Money	Ot	Ot	Ort	Ot	Kewot	Kewot	Ot	K'we
10	Baik	Good	Amun	Amun	Amun	Kutok	Lapmum	Keplap	Amun	Kwinmo
11	Air	Water	Ok	Ok	Ok	Ok	Ok	Ok	Ok	Ok
12	Makanan	food	Anyiman	Anyiman	Anyiman	Animan	Iriman	Alol	Animan	Iriman
13	Kasuari	Cassowary	Dian	Dian	Dian	Niap	Ngatop	Byangtop	Banap	Byangrop
14	Hujan	Rain	Am	Am	Am	Am	Wali	Em	Am	We
15	Ikan	Fish	On	On	On	Ton	Son	Tem	Ton	K'ion
16	Pohon	Tree	Ap	Ap	At	Ap	Ap	Ataenunge	At	A
17	Burung	Bird	On	On	On	On	On	On	On	On

The following table lists the names of speakers of each of the existing Muyu sub-dialects as of July 2020. These people are active speakers of the language, and are also active in local wisdom language preservation activities in Boven Digoel Regency, Papua.

Table 3. List of names of speakers of each Dialect.

Full Name	Dialect	Status
Samuel Mindipkoman, S.Sos	Kamindip	Active Speaker
Samuel Mindipkoman, S.Sos	Okpari	Active Speaker
Bafo Kamunop	Kakaip	Active Speaker
Yakobus Wonam, S.Pd	Kawiyet	Active Speaker
Oto Dewak / Alfons Kakerok	Are	Active Speaker
Ignasius	Kasaut	Active Speaker
Fostinus Kakorop	Yonggom	Active Speaker
Geradus Ninggan	Ninggrun	Active Speaker

2-2- Dictionary

A Dictionary is a collection of vocabulary that is equipped with meaning and other information that aims to explain information related to the words contained in the list. All vocabularies and their meanings are arranged in an orderly, successive manner based on a certain systematics by the compiler of the dictionary to make it easier for users or readers to understand the meaning and information about the words being searched [9]. An Electronic Dictionary (E-Dictionary) is a digital dictionary in the form of a software or application, which can be installed on a computer (computer-based), or uploaded on a website (online page), or operated via mobile devices such as mobile phones, tablets, and similar. A computer-installed dictionary software must be installed on a computer device that has a compatible OS (Operation System) that can run the dictionary software. However, recently many portable dictionary software have been developed, which can be run without installation on a computer, and simply stored on a flash disk, for example. There are both free and paid dictionary software, however, the better dictionary software are payware. Online dictionaries are in the form of websites, which require an Internet connection for their operation; and mobile dictionaries, are used on smartphones and similar mobile devices [11].

2-3- Waterfall Method

The waterfall method or the classic life cycle method describes a systematic and sequential approach to software development by doing work from top to bottom, starting with the specification of user requirements and then continuing through the stages of planning, modeling, construction, and delivery of the system to customers or users (deployment), endings with complete software support [29]. The following are the stages of the waterfall model:
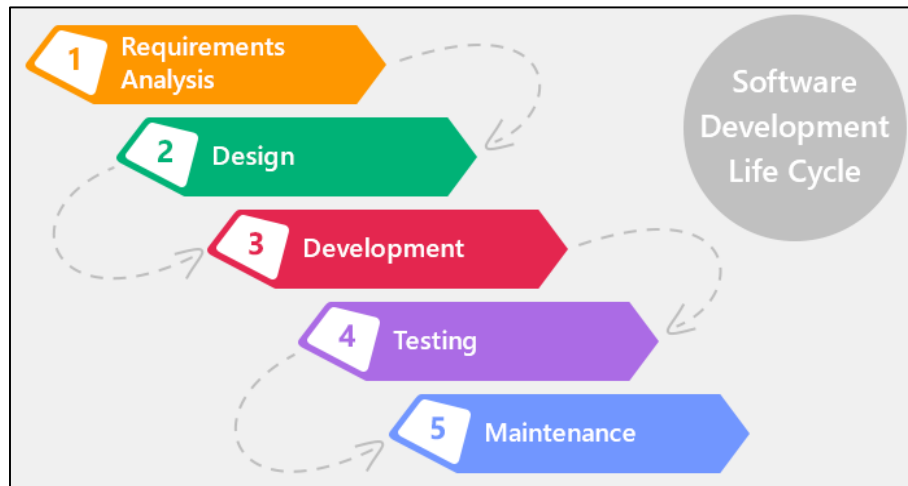

Figure 2. Waterfall Method Stage.

- Requirements Analysis: The needs analysis aims to analyze what the design needs, either in the form of documents or other sources that can assist in determining solutions to existing problems. To analyze software requirements, it is necessary to collect data by conducting observations, where researchers conduct direct research in the field, interviews where researchers conduct interviews with related staff and literature studies of previous researchers. After analyzing the data, the researcher provides input or solutions to the problems studied.

- Design: The software design process uses database modeling using flowcharts, context diagrams, and case diagrams. These describe the existing process and the process that will be carried out.

- Development: In this stage, the design of a new system is made using the Eclipse IDE application, Android SDK, ADT, and Java JDK as programming languages, SQLite Database to create the database, and BlueStacks App. Player as emulator.

- Testing: At this stage, the program testing is carried out using 2 testing methods, namely: Device testing and Blackbox to ensure that the application created can run well.

- Maintenance: In the maintenance process, the author seeks to develop the designed system in relation to software and hardware so that the application can run properly.

The advantage of using the waterfall method is that this method allows for grouping and control. The process of development is a phase by phase model so as to minimize errors that might occur. The drawback of using the waterfall model is that this method does not allow for many revisions if an error occurs in the process. After this application goes into the testing stage, it is difficult to go back and change something that was not documented in the previous concept stage [22].

2-4- Software

A software is a series of instructions with certain rules that govern the operation of the hardware. The development of increasingly complex hardware will have an effect on the development of software. This is evidenced by the growing development of the field of information technology, both hardware, and software. Indrajit (2001) [30] Management of Information Systems and Information Technology suggests three criteria to determine the quality of the software, namely:

- Meeting the needs of users, if the software cannot meet the needs of users, then the software is said to have no or low quality.

- Meeting software development standards, if the software development method does not follow the standard methodology, good quality will be difficult to achieve.

- Meeting a number of implicit criteria, if one of the implicit criteria cannot be met, then the software in question does not have good quality.

- Software can be classified into 4 groups, namely as follows:

- Operating System, software that is used to control resources during the process.

- Programming Language, software that is used as a tool to develop application programs.

- Query Language, a very high-level language software that can be used to display the desired information by simply writing a few commands.

- Application, a software developed for use in certain applications

2-5- Android

Android is a widely used operating system. Android functions as a liaison between the user and the hardware on smartphones or certain electronic devices so that it allows users to interact with the devices and run various kinds of mobile applications. Android's appeal lies in its open-source platform, which opens up many opportunities for technology developers. It aims to create and develop various application features that can be used by all Android users. Android was first developed by Android Inc., a company in Silicon Valley. In 2005, the company was taken over by Google, who made the operating system open source so that anyone can use it for free.

The advantages of Android allowing it to dominate smartphone operating systems are as follows: free, fast and responsive, easy to use, various product price variations, having Google as a developer, and various supporting hardware [31]. The Android operating system is an operating system for Linux-based mobile devices that includes an operating system, middleware, and applications. After Google's purchase of Android Inc., the Open Handset Alliance was formed, which is a consortium of 34 hardware, software, and telecommunications companies including Google, HTC, Intel, Motorola, Qualcomm, T-Mobile and Nvidia. The advantages of the Android operating system are as follows:

- Complete Platform, the Android operating system is an operating system that provides many useful tools to build an application that can then be further developed by developers.

- Open Source platform, Android's open source platform makes this operating system easy to develop by developers.

- Free Platform, developers can freely develop, distribute and trade the Android operating system without having to pay royalties to get a license.

2-6- System Design

The basic concept of programming is the most important role in designing, compiling, and developing a program, especially large and complex application programs. The structured approach (structure design) is handled easily if a large and complex problem is broken down into small modules so that it becomes easy to handle.

A program is a word, expression, statement, or combination that is compiled and assembled into a unified procedure in the form of a sequence of steps to solve a problem that is implemented in a programming language so that it can be executed by a computer. Structured programming is a work process for implementing a sequence of steps in solving a problem in the form of a program, having a structured and uncomplicated design so that it is easy to trace, understand and develop by anyone. The design process will provide an overview of the software that will be created and will later be developed. System design is the stage after system analysis of functional requirements, and preparation for system design, where a system formed can be a depiction of several different elements into a unified whole and functioning. Figure 3 shows the Flowchart of the proposed system.
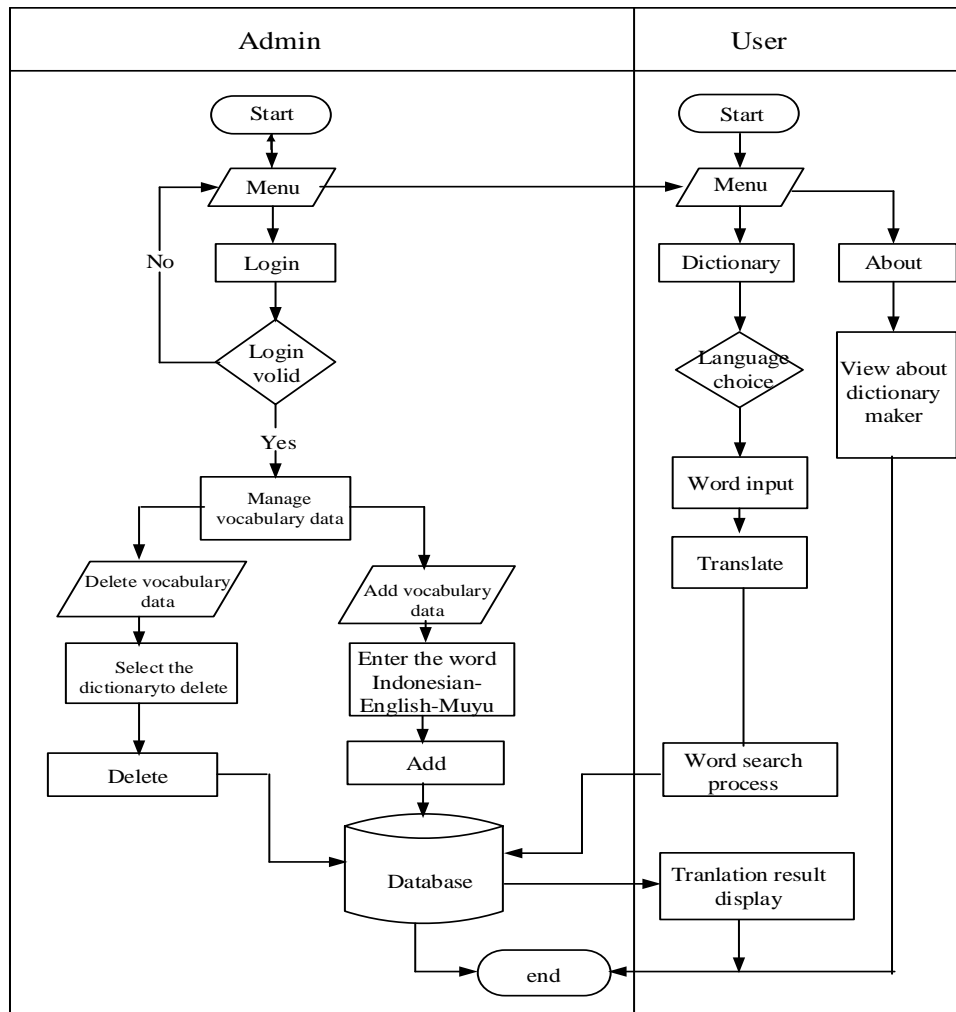
Figure 3. Flowchart of the proposed system.

2-7- Context Diagram

A context diagram is a part that describes the system in general in an agency organization that shows the boundaries of the system with external entities that influence each other and the general flow of information that flows between the system and the outside entity. The context diagram of the application to be designed is as follows.
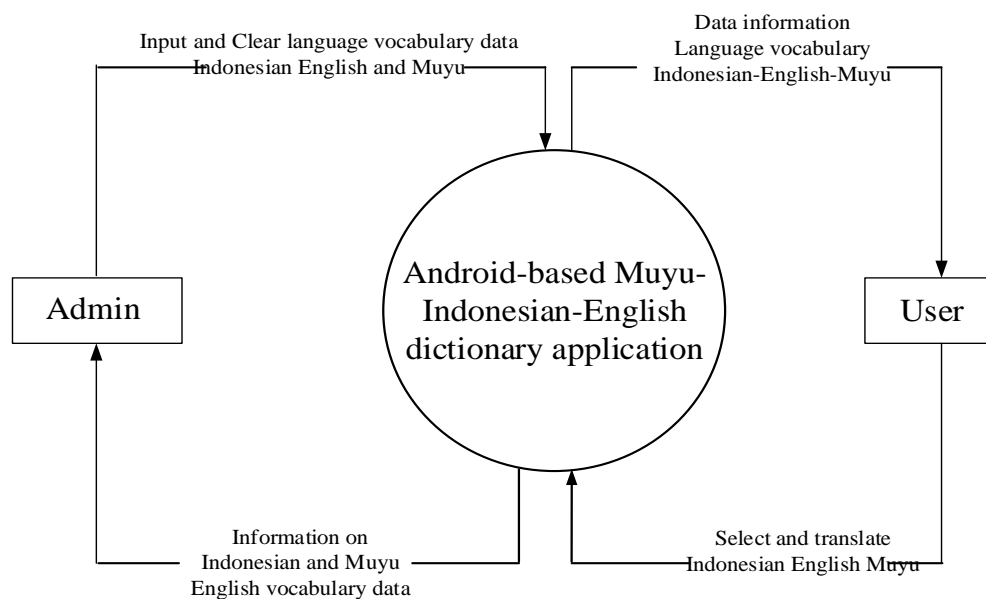

Figure 4. Context Diagram View.

2-8- Use Case Diagram

Use case diagrams are graphical depictions of some or all actors, use cases, and interactions between these components that introduce a system to be built and are used to explain how the steps should be taken by the system [32, 33]. Use case diagrams explain the benefits of a system when viewed from the perspective of people who are outside the system. This diagram shows the functionality of a system or class and how that system interacts with the outside world. The use case in this application is as follows.
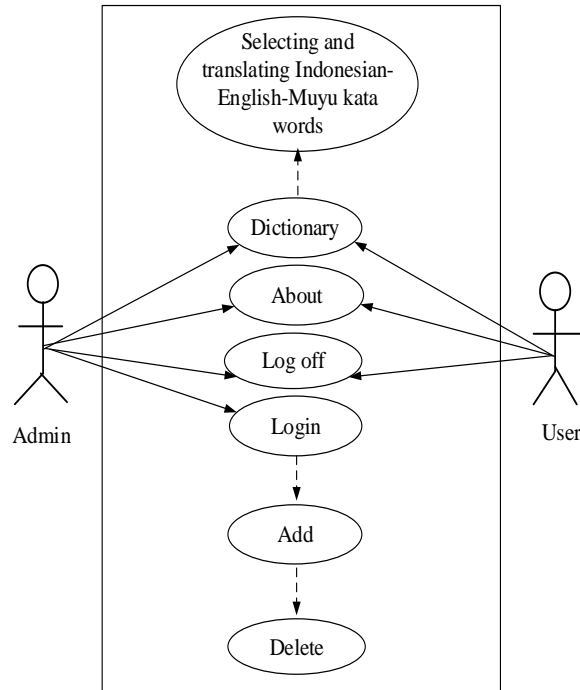
Figure 5. Use Case Diagram Three-Language Dictionary Application.

2-9- Sequence Diagram

Sequence diagrams will make it easier for programming to be more focused by showing what and where processes occur [34]. Sequence diagrams also show what paths an object will use. The following sequence diagram shows the sequence of processes that occur when entering the three-language dictionary application. The sequence diagram of the application is illustrated as follows:
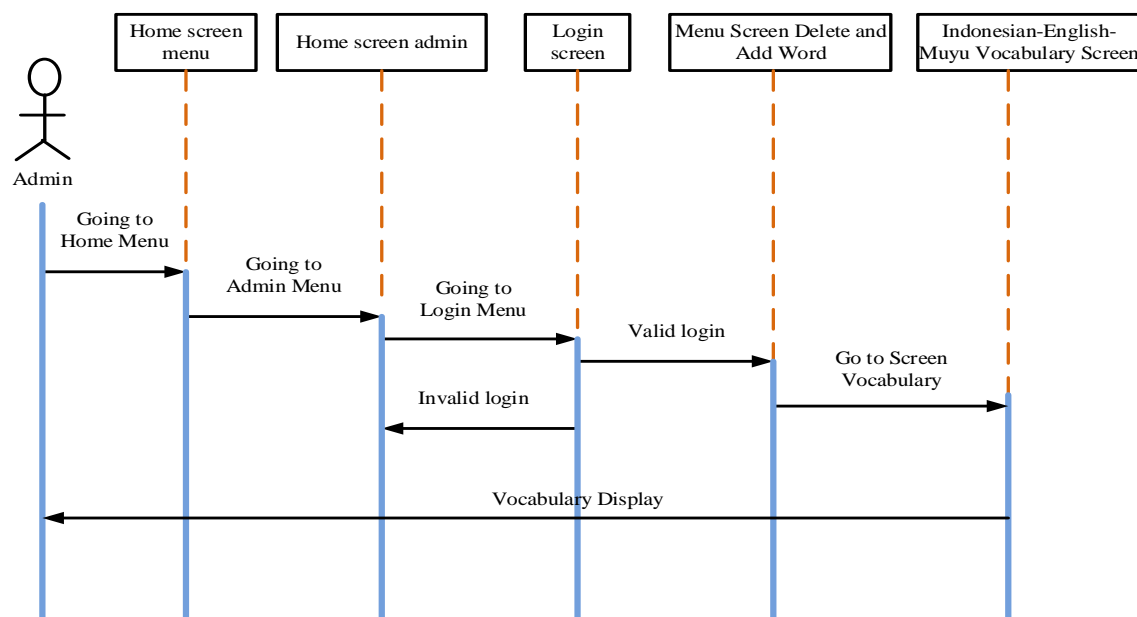
Figure 6. Admin Menu Sequence Diagram.

2-10- Quality of Information and User Usability of Muyu Language Dictionary Application

The quality of information systems is also defined as perceived ease of use which is the level of how much computer technology is perceived as relatively easy to understand and use [35]. This shows that if information system users feel that using the system is easy, they do not require much effort to use it, so they will have more time to do other things that are likely to improve their overall performance. In measuring the perception of utilization, the Technology Acceptance Model (TAM) is a model used to predict user acceptance of technology. The variables and indicators are shown in Table 4 as follows:

Table 4. Measurement Variables and Indicators.

Variable	Indicator	code	Information
Information System Quality	Flexibility	X1	(1) The Muyu language dictionary application can be used in a social environment without much modification.
		X1	(1) The Muyu language dictionary application can be used for various agencies with different characteristics.
	Ease of use	X1	(3) There is a facility to correct the language (help function) in the application.
		X1	(2) Errors that occur are easy to correct and identify in the application.
	Reliability	X1	(5) The application is easy to learn for people who are using it for the first time.
			(3) The application is easy to use in vocabulary search.
Information Quality	Accurate	X2	(1) The information generated by the application is accurate.
			(1) The information generated by the application can be trusted.
	Relevance	X2	(2) The information generated by the application is relevant.
User Satisfaction	Content	X3	(1) The contents of the information generated by the application are what I really need.
		X3	(1) The application used generates the exact report I need.
	Accuracy	X3	(2) I am satisfied with the level of accuracy of the application used.
	Ease of use	X3	(4) The Muyu Language Dictionary application that I use is user friendly
		X3	(3) I find it easy to use the Muyu Language Dictionary application
	Timeliness	X3	(4) The Muyu Language Dictionary application used is able to produce up-to-date vocabulary/dialects

2-11- Testing the Application Implementation on Respondents

The application implementation test on this respondent uses a quantitative approach. Subjects or sources of research data are Muyu-tribe students at Musamus University, selected using the purposive sampling method with a total of 40 samples. To test their attitude to the Muyu language dictionary application, a survey was implemented. The research instrument method used a questionnaire to measure the attitudes or perceptions of students from Muyu on the Muyu Language Dictionary Application. The aim is to determine the effectiveness of the Muyu language dictionary application, whether it contributes to improving vocabulary and local language skills as an effort to maintain local wisdom. Furthermore, the data analysis technique uses descriptive data analysis by explaining and verifying the data in testing the quality of information and perceived usefulness on the satisfaction of the end-user of the Muyu language dictionary application. Meanwhile, the data obtained from the questionnaire were analyzed and converted in the form of a Likert scale model to obtain preferences [36]. The test results are used as a basis for making conclusions. The general scheme in this study is shown in Figure 7:

Figure 7. General Schematic of Quantitative Research.

Meanwhile, in measuring the satisfaction of using the Android Dictionary application, this study uses a Likert scale where the Likert scale is a model for measuring one's opinions, perceptions, and attitudes towards a social phenomenon entity. The Likert scale has a degree of value from positive to negative.

$$Interval\ Level\ Value\ (ILV) = \frac{High\ Value - Low\ Value}{\int Number\ of\ Statement\ Criteria} \tag{1}$$

$$= Scale\ width\ = \frac{5-1}{5} = 0.8 \tag{2}$$

Table 5. Score Category.

Information	Score
Very Good	5
Good	4
Adequate	3
Inadequate	2
Poor	1

Minimum Index: 1   Maximum Index: 5   Interval: 5-1= 4   Distance Interval: (5-1): 5= 0.8

Table 6. Scale Category.

Scale		Information
1.00	1.80	Poor
1.81	2.60	Inadequate
2.61	3.40	Adequate
3.41	4.20	Good
4.21	5.00	Very Good

The following is a continuum line that is used to see the assessment categories regarding the variables studied:

Poor	*Inadequate*	*Adequate*	*Well*	*Very Good*
1.00	1.80	2.60	3.40	4.20 5.00
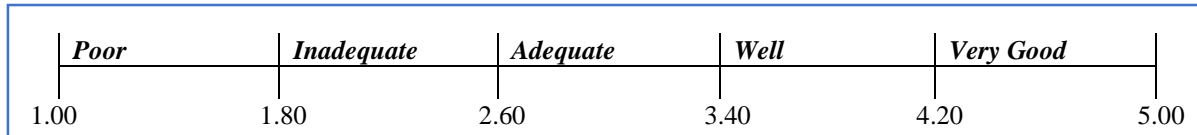
**Figure 8. Continuum of App Quality and Usability.**

3- Result and Discussion

3-1- Results

This trilingual Muyu-Indonesian-English dictionary application is an Android-based mobile application. The display of the trilingual dictionary application is as follows:

● *Application Icon*

On the main Android application selection screen, the trilingual Muyu Dictionary application icon is shown. This icon is clicked to start the application.
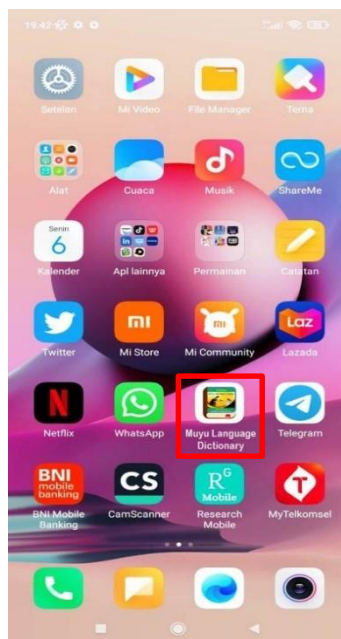
Figure 7. Trilingual Indonesian-English-Muyu Dictionary Application Icon.

● *Main Menu Page*

The main menu contains buttons that lead to the next page. The buttons or buttons are Dictionary, About, Login and Exit buttons.

● *Menu Dictionary*

The dictionary menu contains a selection of radio buttons that will lead to the next page, namely the Indonesian-English-Muyu, English-Indonesian-Muyu, and Muyu-Indonesian-English translation mode pages.

● *About Menu*

The About menu displays a brief explanation of the application and displays examples of words in the classification table for the different dialects of the 8 Muyu sub-tribes.

Figure 8. Main menu page display.   **Figure 9. Dictionary Menu page display.**   **Figure 10. About Menu page display.**

● *Login Menu*

The login menu is used by the Admin to enter the next page. The following shows what the login page looks like.
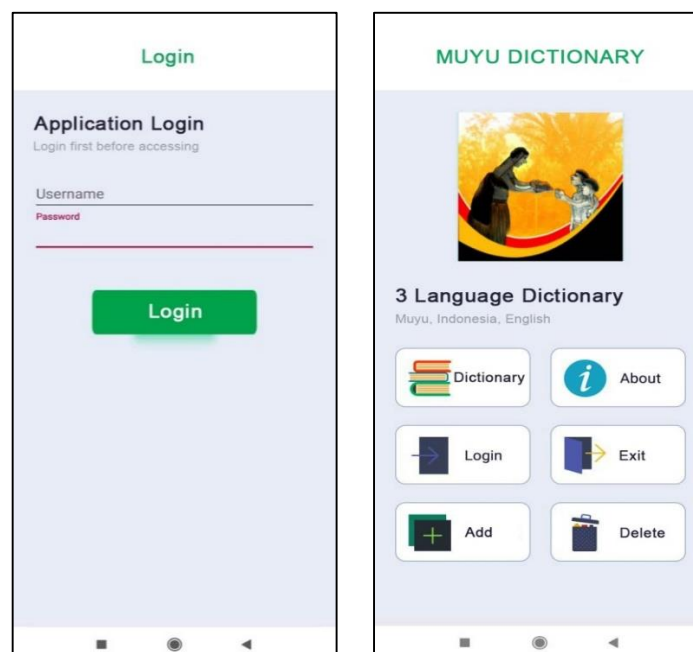

Figure 11. Display Menu Log in and after successful Login.

● *Input Word Menu*

The input word menu can be used by admin users to add words to the vocabulary database. An example is shown, in which the word "I" ("Saya") is inserted into the vocabulary, with the appropriate Muyu equivalent.

● *Delete Word Menu*

The delete word menu can be used by the admin to delete vocabulary data from a list of words that already exist in the database. To delete existing vocabulary data, a list of words that need to be deleted is displayed. The user can click at the word, for more details, and then delete it. The example shown below is the word 'absent' (Eng.) or 'absen' (Ind.), which was mistyped as 'M noan' in Muyu - it should be 'mini noan'. The incorrect word can be deleted.
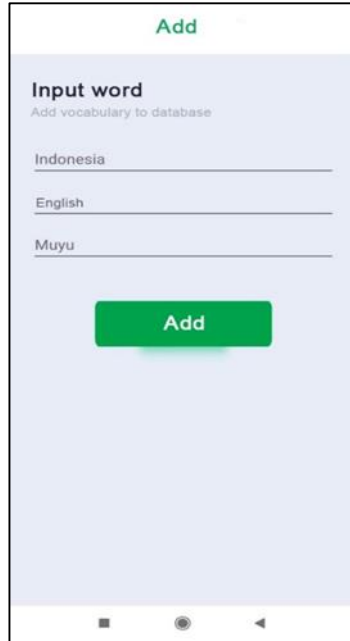

Figure 12. Input Word data page display.

Figure 13. Display the delete page and list the words you want to delete.

3-2- Discussion

Testing is carried out to prove the correspondence of the application with the system specifications set out in the design and implementation analysis sections. Through this test, it will also be known whether the system has met the required specifications. The tests carried out aim to ensure the system works according to the code being implemented. There are 2 testing methods, namely black box and device testing, explained as follows:

● *Black Box Test Results*

Blackbox testing focuses on functionality, especially on the input and output of the application whether it is in accordance with what is expected or not.

o Testing Procedures, the preparations needed for testing are as follows: 1. Setting up a smartphone with the Android operating system; 2. Installing the Dictionary application on the smartphone; 3. Carry out the testing process; 4. Record the test results.

o System Test Results, before displaying the main menu, the Indonesian-English-Muyu dictionary application icon appears, which is tapped to start the application.

o Main Menu Test, Table 7 shows the results of testing the Main menu used to determine whether the user can choose the appropriate one:

Table 7. Main Menu Testing.

Test Results of the case (True Data)			
Input Data	**Expected results**	**Observation**	**Conclusion**
Selecting an App Icon	Showing Main Menu	Trilingual Dictionary is displayed successfully	[√] Received [ ] Rejected

- *Dictionary Menu Testing*

Table 8 shows the test results of the dictionary menu containing radio button options that will lead to the Indonesian-English-Muyu, English-Indonesian-Muyu, and Muyu-Indonesian-English language selection page. Next, users enter the data they want to find.

Table 8. Dictionary Menu Testing.

Test Results of the case (True Data)			
Input Data	**Expected results**	**Observation**	**Conclusion**
Enter the data you want to find	Displays vocabulary according to the data entered in the dictionary	Three Languages successfully displayed	[√] Received [ ] Rejected

- *About Menu Testing*

Table 9 shows the results of testing the "About" menu which is used to find out information about the application of the dictionary maker and to know the classification of the different dialects of the 8 Muyu sub-tribe.

Table 9. About Menu Testing.

Test Results of the case (True Data)			
Input Data	**Expected results**	**Observation**	**Conclusion**
Select the About menu	Displays information about the application and language classification of the 8 sub-tribes of Muyu	Description of the application successfully displayed	[√] Received [ ] Rejected

- *Add Menu Testing*

Table 10 shows the results of testing the added menu used by admin users to add vocabulary data to the database.

Table 10. Add Menu Testing.

Test Results of the case (True Data)			
Input Data	**Expected results**	**Observation**	**Conclusion**
Add vocabulary data	Storing vocabulary data in the database	Vocabulary data successfully displayed	[√] Received [ ] Rejected

- *Delete Menu Testing*

Meanwhile, Table 11 shows the results of testing the delete menu used by admin users to replace or delete vocabulary data in the database.

Table 11. Delete Menu Testing.

Test Results of the case (True Data)			
Input Data	**Expected results**	**Observation**	**Conclusion**
Delete vocabulary data	Saving vocabulary data changes in the database	Vocabulary data change successfully displayed	[√] Received [ ] Rejected

- *Device Testing*

In the trial phase, this dictionary application is installed on several smartphones that have different screen types, and then the results of the application are observed, whether it runs well or not. The following Table 12 shows the results of device testing and specifications.

Table 12. Device Testing.

No	Device	Specification	Test Results 1 Interface Display	Test Results 2 Functions of Each Menu
1	Oppo A11w	Android OS Kitkat, 4.7 inch screen, CPU Quad Core, RAM 1 GB	Valid	Valid
2	Samsung Galaxy A10	Android OS Oreo, 6.2 inch screen, CPU Octa Core, RAM 1 GB	Valid	Valid
3	Vivo Y12	Android OS Pie, 6,5 inch screen, CPU Octa Core, RAM 1 GB	Valid	Valid
4	Advan i6C	Android OS Nougat, 6.35 inch screen, CPU Octa Core, RAM 1 GB	Valid	Valid
5	Xiaomi Redmi 2	Android OS Kitkat, 4.7 inch screen, CPU Quad Core, RAM 1 GB	Valid	Valid

- *Technology Acceptance Model (TAM) Analysis*

  o Information Application Quality Dimensions

The information application quality dimension is measured through three indicators consisting of flexibility, ease of use, and reliability. The results show that the subjects have a moderate attitude, with an average score of 'adequate'. Thus, redevelopment is needed to strengthen the quality of the Muyu language dictionary application to make it easier and more flexible to use. This can be seen from the Likert scale test results as follows:

Table 13. Information Application Quality Test Results.

No	Indicator	1	2	3	4	5	Average	Conclusion
1	X1.1	0	6	24	10	0	3.1	Adequate
2	X1.2	1	20	16	3	0	2.5	Inadequate
3	X1.3	0	10	24	6	0	2.9	Adequate
4	X1.4	0	21	19	0	0	2.5	Inadequate
5	X1.5	0	10	28	2	0	2.8	Adequate
6	X1.6	0	17	22	1	0	2.6	Inadequate
							2.7	**Adequate**

  o Information Quality dimension

The information quality dimension measurements show an average score of 'adequate'. This can be seen as an indication that the information quality dimension of the Android-based Muyu Language Dictionary application still has weaknesses. Therefore, it is necessary to develop the application so that the quality of information is improved. The Table 14 shows the results as follows:

Table 14. Information Quality Test Results.

No	Indicator	1	2	3	4	5	Average	Conclusion
1	X2.1	0	6	33	1	0	2.9	Adequate
2	X2.2	1	20	19	0	0	2.5	Inadequate
3	X2.3	0	11	29	0	0	2.7	Inadequate
							2.7	**Adequate**

  o User Satisfaction Dimension

Similarly, in the measurement of the user satisfaction dimension, the respondents also provided responses that classify the results as 'adequate'. As such, it is necessary to revise the Android-based Muyu Language Dictionary application system. The results in Likert scale can be seen as follows:

Table 15. User Satisfaction Test Results.

No	Indicator	1	2	3	4	5	Average	Conclusion
1	X3.1	0	4	22	13	0	3.2	Adequate
2	X3.2	0	7	23	9	0	3.0	Adequate
3	X3.3	0	7	23	8	0	2.9	Adequate
4	X3.4	0	14	18	7	0	2.8	Adequate
5	X3.5	0	9	25	4	0	2.7	Adequate
6	X3.6	0	10	22	6	0	2.8	Adequate
							2.9	**Adequate**

In the context of using the Muyu-Indonesian-English three-language dictionary application, most of the students gave moderate responses to the benefits and satisfaction of using the application. This also confirms that the application is a useful medium to find out new vocabulary and words from Muyu, Indonesian and English languages.

4- Conclusion

Based on the results of testing and implementation of the Android-Based Muyu-Indonesian-English Dictionary Application, several conclusions can be drawn, namely: This three-language dictionary application is able to search for vocabulary properly and correctly in Indonesian, English, and Muyu. This application is able to translate vocabulary from the Indonesian, English, and Muyu databases in the dictionary. The waterfall method (classic life cycle) is used in software development by doing work from top to bottom sequentially, and the application of the method strongly supports the running of the application making it easier for users to find vocabulary. The application can also be used to support the expansion of the vocabulary range as an interesting and interactive alternative method that has practicality and flexibility to support the preservation of the Muyu language. This dictionary application can run well on Jellybean, Kitkat, Oreo, Pie, and Nougat versions of Android. From the experimental results in testing the implementation of the information system, the quality and attitudes of users based on the respondents' results indicate that the system has no errors in carrying out its function as a learning medium to facilitate vocabulary search in the three languages. It can be seen that the Muyu students perceive the application as 'adequate'. However, according to the researchers in application development there are still shortcomings, such as lack of features in the application. Further research is expected to explore the extent to which the waterfall method improves construction of language dictionary applications that work more systematically in their application on smartphones. The application of the Muyu-Indonesian-English dictionary is also expected as a method of effective and efficient learning media in an effort to preserve the indigenous Muyu language.

5- Declarations

5-1- Author Contributions

5-2- Data Availability Statement

The data presented in this study are available in article.

5-3- Funding

5-4- Acknowledgements

5-5- Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies have been completely observed by the authors.

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