

Development of ATOBAT: an Android-Based Medicinal Plant Application Using Google Sites and MIT App Inventor

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Abstract - Indonesia, as a "Live Laboratory," has abundant biological wealth, especially in traditional medicinal plants. The knowledge of these plants has been passed down through generations within communities. However, modernization and societal shifts have contributed to a decline in public understanding of the benefits of medicinal plants. In Pagebangan Village, while 55 types of medicinal plants are recognized, many inhabitants lack detailed knowledge about the specific advantages of each plant. To address this critical knowledge gap, an Android application named ATOBAT was developed. This application was created using Google Sites and MIT App Inventor, both of which do not require advanced programming skills. The primary aim of ATOBAT is to enhance residents' understanding of the medicinal plants available in their environment. This research employs an experimental design utilizing the Research and Development (R&D) methodology, which encompasses the design, development, and evaluation of the application. The evaluation process included validation by media experts and feasibility testing with 92 respondents from the Pagebangan Village community, using purposive sampling and a Likert scale questionnaire. The results indicated a feasibility score of 74% from media experts and 85% from users, confirming that the ATOBAT application effectively enhances community understanding of medicinal plants and their benefits.

Keywords: ATOBAT, google sites, MIT app inventor, android, Pagebangan

I. INTRODUCTION

Indonesia is frequently referred to as a "Live Laboratory" due to its tropical climate, which facilitates the preservation of various traditional medicinal plants. This biodiversity is particularly evident in herbal plants that have been utilized and inherited across generations. Although the efficacy of these plants has been

scientifically substantiated, knowledge regarding traditional medicinal plants remains limited due to modernization, which has resulted in a decline in public understanding. Local wisdom in traditional medicine in Indonesia, including the use of medicinal plants, is increasingly eroded over time. The "Back to Nature" trend and a heightened awareness of the dangers associated with chemical medications have stimulated a growing interest in natural remedies. Consequently, many pharmaceutical companies are now beginning to focus on the production of traditional medicines [1].

Plants utilized in traditional medicine are known as medicinal plants. The use of traditional remedies in Indonesia has been practiced for thousands of years, long before the advent of modern pharmaceuticals. Knowledge and experience regarding the application of medicinal plants have been passed down through generations, resulting in various distinctive formulations that characterize Indonesian traditional medicine [2].

Indonesia is home to approximately 30,000 species of medicinal plants out of the 40,000 plant species found globally. Of these, 940 species have been cultivated for traditional medicine, while the remaining varieties continue to grow wild in forests [3]. The utilization of medicinal plants by the Indonesian population has a long history, with knowledge evolving concurrently with the understanding of various types of diseases [4].

According to data from the Central Statistics Agency 2022, approximately 79.74% to 84.23% of the Indonesian population engaged in self-medication during the period from 2021 to 2023 [5]. However, knowledge regarding medicinal plants has declined in the era of globalization and modernization. This decline is attributed to a reduction in both the quality and quantity of plants in the surrounding environment [6].

Android-based applications that provide comprehensive information about the benefits of traditional medicinal plants are essential in this era of modernization. This solution is particularly relevant, considering that smartphones have become an integral part of daily life. Such applications enable users to access information anytime and anywhere [7].

The desire to enhance community knowledge, particularly in Pagebangan Village, has prompted the development of an Android-based application focused on the utilization of medicinal plants. The ATOBAT (Medicinal Plant Application) has been designed as a platform that assists individuals in leveraging the plants available in their surroundings for therapeutic purposes. Essential information, such as daily dosages, usage guidelines, and methods for processing medicinal plants, is included in this application to facilitate user engagement and application.

Pagebangan Village, located in the Karanggayam District of Kebumen Regency, comprises 2 community units (RW) and 8 neighborhood units (RT), with a population of 1,230 individuals. Observations and interviews indicate that the community is familiar with 56 species of medicinal plants; however, the majority lack knowledge regarding their benefits and processing methods. This situation reflects a deficiency in public understanding of the uses and preparation of medicinal plants, particularly in the context of globalization and modernization.

The development of Android applications necessitates proficiency in programming languages and coding [8-10]. This expertise is primarily acquired through specific disciplines, such as computer science, while other fields often lack coverage of topics related to coding and programming languages. To address this gap, the use of Google Sites and MIT App Inventor offers an effective solution for creating Android applications. These platforms enable individuals to develop Android-based applications easily and efficiently, without requiring in-depth knowledge of programming languages or coding. Google Sites is a platform provided by Google for creating websites, which can subsequently be converted into Android applications using MIT App Inventor. It facilitates the customization of an application's appearance and layout, allowing users to organize various content types, such as text, images, and videos. Furthermore, Google Sites offers enhanced security compared to other web platforms, providing robust protection against viruses and hackers, along with regular updates and secure storage managed by Google's security system [11]. MIT App Inventor is specifically designed to simplify and accelerate the creation of

Android applications, employing a drag-and-drop interface that eliminates the need for extensive programming knowledge [12]. This platform fosters opportunities for innovation and creativity, enabling individuals to realize their ideas for Android application development without requiring expertise in programming, thereby facilitating the rapid and effortless creation of applications [13].

Google Sites is utilized for creating the application layout. Within Google Sites, there are various attractive features that can be integrated into the application, enhancing its visual appeal. The use of Google Sites for layout development offers several advantages: it is free to use, it is easy to create, making it accessible for beginners without the need to learn programming languages, and it can be accessed through various internet-connected devices such as smartphones, tablets, laptops, and computers. Additionally, the platform provides 100 MB of free storage, which is beneficial for data management, along with robust security measures against viruses and hacking attempts [14-16].

MIT App Inventor is a development platform created by the Massachusetts Institute of Technology (MIT) that enables users to easily create Android applications without the need to learn programming languages. This eliminates one of the significant barriers that many laypersons face when attempting to develop Android applications, making the process more accessible to a broader audience [12]. The development of Android applications typically involves programming languages such as Java, which is the most commonly used language and officially supported by Google [17]. MIT App Inventor serves as a solution for creating Android applications without the necessity of learning programming languages, significantly reducing the time required for development [18]. Use of MIT App Inventor for creating Android applications offers several advantages, including ease of use and rapid application development. Users do not need to learn programming languages or coding to create applications, and application development process can be conducted online using MIT App Inventor website, eliminating the need for installation of additional software [19].

The development of Android applications focused on medicinal plants has been previously conducted by Najmatullah, Mailinda, and Yusman. In Najmatullah's research, the application created for processing traditional medicinal plants utilized the waterfall method. Mailinda's study involved an Android application for herbal remedies targeting diabetes mellitus, employing Android Studio as the development platform, with Java as the programming language and also utilizing the

waterfall methodology. Yusman's research focused on an Android-based information system for the identification of family medicinal plants, applying the prototype method. The applications developed feature several components, including a main menu, a list of plants, a list of diseases, a search column, a search history menu, and an "About" section providing details about the application [20-22].

Differences between ATOBAT application and previously developed medicinal plant applications lie primarily in the research methodology employed. ATOBAT application was created using a straightforward method that does not require knowledge of programming languages or coding. This application was designed using Google Sites for layout development and MIT App Inventor to convert Google Sites into an Android application. Information regarding plants included in ATOBAT application has been validated, as it is sourced from Ministry of Health of the Republic of Indonesia, specifically Formularium Ramuan Obat Tradisional (FROTI) and 11 certified herbal formulations [23-24]. ATOBAT application to be developed will incorporate several features, including a main page menu, a sub-menu for formulations, a general instructions menu, a single formulation menu, a combination formulation menu, and a search column.

Based on the aforementioned discussion, it is essential to develop an Android application focused on medicinal plants using a straightforward method that does not require coding, utilizing Google Sites and MIT App Inventor.

II. METHOD

To achieve the research objectives, the activities of his study can be illustrated as shown in Fig. 1.

A. Development of Google Sites and Layout

The initial step in designing the ATOBAT application involves conducting a needs analysis through observations and interviews related to medicinal plants and their utilization. Data from the observations, which include a total of 67 plant species, are integrated into

Google Sites. Before creating Google Sites, the first step is to log in using a Google account. Next, a layout is created in which the main page (home) includes a menu for general instructions, single formulations, and combination formulations. The general instructions menu contains various guidelines to consider before preparing medicinal formulations. The single formulations menu features 55 plants used to treat ailments, with data regarding each plant's therapeutic functions and processing methods sourced from FROTI. The combination formulations menu includes 11 standardized herbal combinations. Upon completing the data entry in Google Sites, the next step is to publish the Google Sites link and copy the URL.

B. Converting Google Sites into an Android Application Using MIT App Inventor

MIT App Inventor is utilized to convert Google Sites into Android applications. The process involves accessing MIT App Inventor and logging in using a Google account. The following steps outline the procedure for converting Google Sites into an Android application using MIT App Inventor:

- 1) Click "Start New Project" to create a new project and name it "ATOBAT". This action will automatically display the layout of the Android application.
- 2) In MIT App Inventor, navigate to the user interface menu to find "Web Viewer". Click and drag the Web Viewer to the viewer area (represented by a mobile device icon).
- 3) Observe the right-hand section, which contains the properties menu; beneath it, there is a behavior menu. In the behavior section, locate "HomeUrl".
- 4) Subsequently, input the Google Sites link into the "HomeUrl" field.
- 5) Next, in the top menu, click on "Build" and select "Android App". Wait for a moment until the application build process is completed, indicated by the appearance of a download app icon or barcode.
- 6) Finally, install the application.

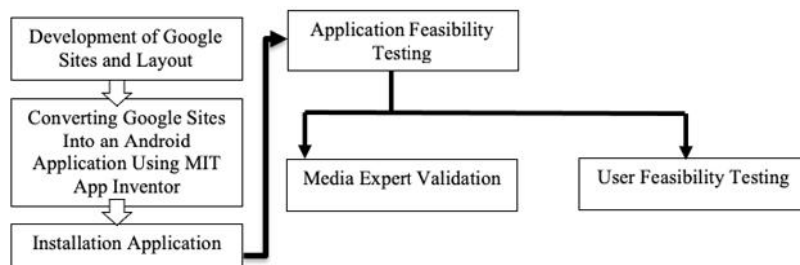


Fig. 1 Research framework

C. Installation Application

To install the ATOBAT application, prior permission is required, as this application has not yet been officially published on the Play Store. Therefore, it is necessary to adjust the device settings to allow the installation of this application.

D. Application Feasibility Testing

The feasibility testing of the application is conducted to evaluate user responses to the application. This testing is carried out through a questionnaire administered to both media experts and users to collect the necessary data. Evaluation by media experts occurs prior to direct testing with users or the community of Pagebangan Village, with the aim of validating the readiness and appropriateness of the Android application for use. The media experts in this context are two faculty members from the Department of Information Technology at Universitas Muhammadiyah Gombong. The assessment criteria for the application's feasibility validation by the media experts consist of five levels of evaluation: strongly dislike, dislike, neutral, like, and strongly like. The indicators employed for validating the application have been adapted from the questionnaire used in the study by Purwantoro and include modifications such as:

- 1) Evaluation of the android application, encompassing aspects of design, accessibility, and functionality.
- 2) Assessment of the application's general instructions.
- 3) Comments and suggestions.
- 4) A conclusion containing a statement regarding the application's feasibility [25].

The feasibility assessment conducted with the community of Pagebangan Village utilizes the following evaluation indicators:

-) Usefulness of the application.
-) User satisfaction with the application.
-) Ease of use of the application.
-) Ease of learning how to use the application.

III. RESULT AND DISCUSSION

This research and development project aims to produce a web-based Android application for medicinal plants, designated as ATOBAT, utilizing Google Sites and MIT App Inventor. The outcome of this development is the ATOBAT Android application, which focuses on medicinal plants that can be utilized by the community of Pagebangan Village. The resulting

application is in the form of a file with the .apk extension and can be installed on smartphones. The creation of the ATOBAT application incorporates both Google Sites and MIT App Inventor.

A. Creation of Google Sites Layout

The layout or design of the application is created using Google Sites. Google Sites is utilized to edit the appearance or layout of the application being developed, organizing the information to be included, such as text, images, or videos. The process of creating a layout using Google Sites for the application is straightforward, requiring no knowledge of coding or programming languages. According to research by Rasapta, Google Sites is user-friendly and can be easily navigated by individuals creating a website layout for the first time [26]. Google Sites offers a variety of features that are free of charge, which is advantageous as it allows users to create application layouts according to their preferences without the need for a subscription.

Based on the research conducted using Google Sites, the utilization of this platform offers significant advantages. Notably, Google Sites provides superior security compared to other websites, featuring robust protection against virus attacks and hacking attempts, as well as regular updates and secure storage managed by Google's security system [11]. This ensures the protection of the created data, making it difficult for unauthorized individuals to access or duplicate it. The resulting layout of the ATOBAT application can be viewed in Fig. 2.

B. Conversion of Google Sites Into an Android Applications Using MIT App Inventor and Installation

The conversion of Google Sites into an Android application is achieved using MIT App Inventor. MIT App Inventor is a tool designed to facilitate the easy and rapid development of Android applications without the need to master programming languages, as it employs a drag-and-drop interface for application creation [12].

The use of MIT App Inventor for creating Android applications simplifies the process for individuals who wish to develop applications without needing to learn coding or programming languages. According to research by Kadir, the utilization of MIT App Inventor offers several advantages, including ease of use and rapid application development, eliminating the necessity to learn programming languages and coding. Additionally, applications can be created online using the MIT App Inventor website without the need to install any software [19].



Fig. 2 Google sites layout creation result

The result of the application conversion is a file in .apk format. The development of the application yields an .apk file in the initial stage of development. According to research by Mailinda, the ATOBAT development represents the first phase before the application is disseminated to the general public, resulting in an .apk file that has not yet been uploaded to the Google Play Store [20]. The Google Play Store is one of Google's applications designed to facilitate the easy and rapid installation of Android applications [27].

The result of the converted application is subsequently followed by the installation process. Installing the application requires several approval stages on the smartphone, as the downloaded file is in .apk format and has not yet been officially uploaded to the Google Play Store.

The installation of an application in .apk format requires several stages and specific settings on the smartphone. According to Tama and Zulfikhar, installing applications from .apk files or those not available on the Google Play Store necessitates careful attention and special configurations. If these settings are not adjusted beforehand, the smartphone will automatically block the installation of such an application. To enable the installation of .apk files on an Android smartphone, the following steps should be taken: First, open the settings menu and select "Apps". Then, scroll down and choose "Special app access". Next, select "Install unknown apps". This page will display a list of applications on the Android device that can install applications. Choose the "File" application and activate the toggle next to "Allow from this source". Once this is done, the Android smartphone will be able to install applications in .apk format found within the File application. The next step is to open the installed application file. When tapping the file, a warning message stating "This application may be harmful" will appear. This is a standard warning when downloading any application file, so there is no need for concern; simply click "Download anyway". Wait for a moment until the installation prompt appears, then click "Install" and the application will be successfully

installed on the Android smartphone [28-29]. The result of the installed application can be seen in Fig. 3.

C. Application Overview Results

The overview of the application presents the ATOBAT application, which contains a diverse range of menus. The menus included in this application consist of a main page, a sub-menu for formulations, general instructions, single formulations, and combination formulations.

The results of the ATOBAT application overview align with the research conducted by Mailinda and Najmatullah. The commonality between this study and previous research lies in the fact that the applications developed are both Android-based and focus on medicinal plants. In Najmatullah's study, the application is centered on the processing of traditional medicinal plants, whereas Mailinda's research pertains to an Android application for herbal plants aimed at treating diabetes mellitus. The application developed by Najmatullah includes several features: a main menu, a plant list menu, a disease list menu, a search column, a search history menu, and an about menu. In Mailinda's study, the application comprises features such as a main menu, a plant menu, a plant display menu, an information menu, and an exit menu [20-21].

The ATOBAT application differs from the application developed by Najmatullah and Mailinda in several key aspects, specifically in the sub-menu for formulations, the general guidelines menu, the single formulation menu, and the combination formulation menu. Previous research did not include a sub-menu for formulations that contains a list of options within the ATOBAT application, which facilitates the search for plants. Additionally, there was no general guidelines menu to provide an introduction and instructions on how to use the application, create formulations, and install the application. Furthermore, the absence of a single formulation menu, which lists various formulations derived from a single herbal plant categorized by disease groups, and a combination formulation menu comprising various plants used to treat specific ailments is notable. These distinctions demonstrate that the ATOBAT application is fundamentally different from previously developed applications and possesses unique characteristics in terms of design, layout, and application overview.

User Interface (UI) and User Experience (UX) design play a crucial role in attracting users and ensuring a positive experience. UI encompasses all visual and interactive elements of an application, while UX refers to the overall experience of users when interacting with

the application. Previous research indicates that application development has been aligned with the User Centered Design (UCD) methodology, prioritizing users as the focal point to ensure that the designed application meets their needs and interests. A positive user experience can enhance user satisfaction and improve user retention [20-21].

Development of ATOBAT application aligns with User Centered Design (UCD) methodology, designed to meet community needs for information on medicinal plants available in local areas for use as remedies. Maintenance of ATOBAT application remains minimal due to utilization of Google Sites, which ensures security. When ATOBAT application is uploaded to Google Play Store, updates require only modifications to Google Sites without altering source code, unlike applications developed by Najmatullah and Mailinda, which necessitate source code changes for maintenance and updates. ATOBAT application's interface differs from that of Najmatullah and Mailinda's applications, which can be designed more abstractly with additional features and various colors. ATOBAT remains limited to features available on Google Sites and cannot incorporate extra functionalities. Therefore, ATOBAT application is distinct from those previously developed. The results of the application overview can be seen in Fig. 4.

D. Application Feasibility Test Results

The development of the ATOBAT application requires a feasibility test to determine whether the application is suitable for use by the community of Pagebangan Village. Before conducting the feasibility test with the residents of Pagebangan Village, a

validation test of the ATOBAT application will be carried out by media experts to ensure that the application is ready for use.

1) *Media Expert Validation Results:* The media expert validation was conducted with two faculty members from the Department of Computer Science at Muhammadiyah University of Gombong. The purpose of this validation was to assess whether the ATOBAT application is suitable for use prior to its implementation in the Pagebangan community. According to research conducted by Nafiah, expert media validation is essential to assess the feasibility of the developed application, requiring a minimum of two expert validators [30].

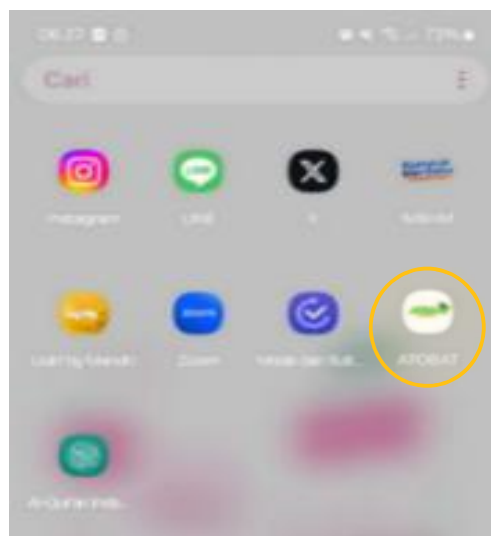


Fig. 3 Result of the installed ATOBAT app

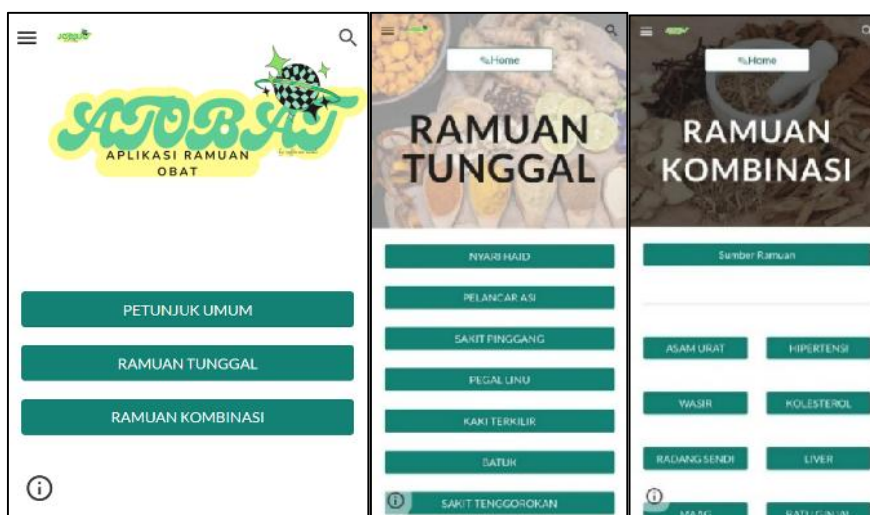


Fig. 4 ATOBAT application overview

Based on the validation results from Media Expert 1, as presented in Fig. 5, the percentage for the design aspect is 74%, categorized as "agree/suitable". The percentage for the access and functionality aspect is 60%, categorized as "somewhat agree/somewhat suitable". The percentage for the usability aspect is 75%, categorized as "agree/suitable", and the percentage for the general application guidelines is 67%, also categorized as "agree/suitable". The validation results from Media Expert 2, as shown in Fig. 5, indicate a percentage of 74% for the design aspect, categorized as "agree/suitable". The percentage for the access and functionality aspect is 85%, categorized as "strongly agree/very suitable". The percentage for the usability aspect is 80%, categorized as "agree/suitable", and the percentage for the general application guidelines is 80%, categorized as "agree/suitable". From these results, an average percentage of 74% is derived, falling within the "agree/suitable" category. This outcome demonstrates that the media experts express a favorable view towards the development of the ATOBAT application, indicating that the application is deemed suitable for use.

The research findings obtained are consistent with the study conducted by Sunaryo and Syafril on the development of an Android application using MIT App Inventor. Their feasibility testing with media experts indicated that the developed Android application is suitable for use [31-32].

The results from Media Expert 1 and Media Expert 2 reveal a difference in their evaluations, with the percentage from Media Expert 1 being lower than that of Media Expert 2. This discrepancy arises because Media Expert 1 assigned a score of 2, categorized as "disagree," for statement 4 regarding the access and functionality aspect, which states that the application is easy to install. The ATOBAT application has not yet been officially uploaded to the Google Play Store, as it is still in the development phase and has not been made available for widespread use. Consequently, installing the ATOBAT application requires the .apk file. Installing an Android application in the form of an .apk file necessitates permissions and manual settings on the Android smartphone. According to Tama and Zulfikhar, installing applications from .apk files or those outside the Google Play Store requires careful attention and specific configurations; otherwise, the smartphone will automatically block such applications, preventing the installation of the .apk file [28-29].

2) *User Feasibility Testing Results:* The feasibility testing of the ATOBAT application was conducted with 92 participants from the Pagebangan Village community. The criteria for respondents used in this study include

individuals who are at least 17 years of age, legally recognized as adults, and capable of being responsible for themselves. Additionally, respondents must possess a smartphone and be able to operate it in their daily lives [33-34]. This testing was performed after the application was deemed suitable by media experts. The purpose of this evaluation was to ensure that the application is free from errors and ready for use by the community. Documentation of the ATOBAT application feasibility testing with the Pagebangan Village community is presented in Fig. 6.

The evaluation of the ATOBAT application's feasibility by the Pagebangan Village community encompasses the aspects of application usefulness, user satisfaction, ease of use, and ease of learning. The results of the assessment were subsequently converted and categorized according to the methodology established by Theovanus [35]. Based on Fig. 7, the feasibility percentage of the ATOBAT application across four aspects application usefulness, user satisfaction, ease of use, and ease of learning is reported as 85%, indicating that it is classified as "very suitable". The average percentage obtained across all aspects is also 85%. Consequently, the ATOBAT application is categorized as "very suitable" for use, as it is highly favored by the Pagebangan Village community.

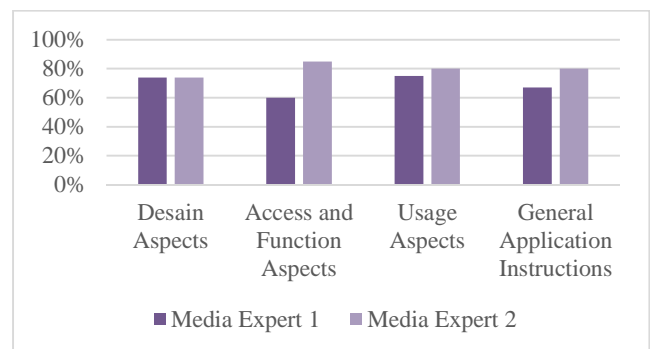


Fig. 5 Media expert validation result



Fig. 6 Documentation of the feasibility test for the ATOBAT application with the community in Pagebangan village

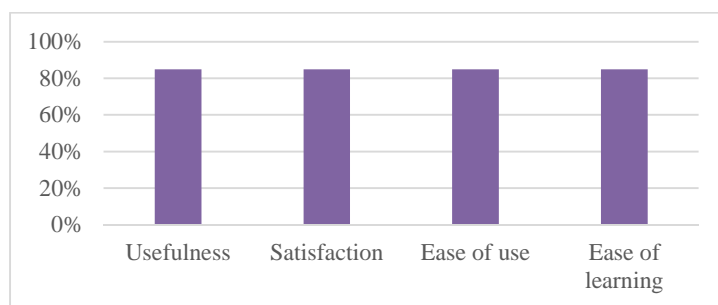


Fig. 7 User feasibility test result

The results obtained are consistent with the research conducted by Mailinda and Nafiah regarding the design of Android applications, which indicated that the applications developed were categorized as "very suitable" for use based on the feasibility testing results [20, 30]. This indicates that the ATOBAT application is highly suitable for use by the community as a guide for seeking alternative treatments using traditional plants.

IV. CONCLUSION

Website-based Android applications about medicinal herbs (ATOBAT) for Pagebangan Village can be developed using Google Sites and MIT App Inventor. The results of the application feasibility assessment conducted by media experts and users, specifically the community of Pagebangan Village, were 74% and 85%, categorizing the application as "suitable" and "highly suitable" for use, respectively. Research was conducted in accordance with scientific procedures; however, limitations remain. Specifically, application plant database includes only species found in Pagebangan Village, and its usage is restricted to local community. Further development is required to expand ATOBAT application's plant database to encompass all plant species in Indonesia. Additionally, application should be easily installable via Google Play Store to ensure broader accessibility for Indonesian population.

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