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Community Empowerment Through Android-Based Herbal Plant Education Application Training for Traditional Medicine Information Access

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Abstract

Limited public access to accurate information about herbal plants remains a barrier to the proper use of traditional medicine. Some communities still rely on inherited knowledge that is not always accompanied by scientific information regarding the benefits, processing methods, dosages, and potential side effects of medicinal plants. This community service activity aims to improve access to information on traditional medicine by training and mentoring participants in using an Android-based herbal plant education application. The activity partners are communities in Makassar City, around herbal cultivation sites, who still use medicinal plants in their daily lives. The implementation method includes identifying partner needs, compiling educational content, developing an Android-based application using an Agile approach, providing application training, mentoring, and evaluating through functional testing and user questionnaires. The introduced application has key features, including a list of herbal plants, information on benefits and processing methods, an image-based plant scanner, educational videos, and details on cultivation locations. Black Box testing results indicate that all application features operate as designed. An evaluation of 15 respondents showed a feasibility level of 88.2%, categorized as very feasible. The results of the activity indicate that this application can serve as a digital educational tool, helping the public access information about herbal plants in an easier, more engaging, and more structured way. Furthermore, training and mentoring help the public use the application's features more effectively. Therefore, this application has the potential to support public access to more structured, easily understood information about herbal plants.

Keywords: Android Application; Herbal Plant Education; Community Service; Traditional Medicine; Information Access

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Introduction

The use of herbal medicines has long been an important part of Indonesian life. Traditional healing practices grew out of people's empirical experience in utilizing natural resources to maintain health, boost immunity, and help address various minor ailments in everyday life (Eff et al., 2020; Rahayu et al., 2020; Salman Ikrar Musyaffa et al., 2023). In the context of Indonesian society, herbal plants are understood not only as natural ingredients for medicine but also as part of the cultural heritage, family practices, and local wisdom passed down from generation to generation. Knowledge about plant types, their benefits, the parts used, and how to process them is generally passed down through oral tradition and direct practice within families and communities. This process of inheritance has been going on long before the development of modern medical systems and has become a form of local knowledge embedded in community life (Awoke & Cosendey, 2025; Hossain et al., 2020; Khan & Rashid, 2006; Manisha et al., 2025; Monib & Monib, 2024; Pokharel et al., 2026; Wanjohi et al., 2020). This shows that herbal medicine is not only seen as an alternative, but also as part of a traditional health system that has social, cultural, and practical value in people's lives (Aubin et al., 2023; Liu, 2011; Twala & Sokani, 2025).

Indonesia boasts vast biological wealth, including a wide variety of plants with potential as family medicinal plants. This biodiversity is supported by Indonesia's geographical location as an archipelagic nation, its tropical climate, and the diversity of ecosystems that allow for the growth of a wide variety of medicinal plants. Furthermore, this biodiversity is enhanced by the diversity of cultures and local practices in the use of herbal plants across various regions (Navia et al., 2022; Novaryatiin & Indah, 2019; Soimin & Marilyna, 2024). Each region has distinct characteristics of herbal plants, including plant types, uses, local terms, and processing methods adapted to local environmental and cultural conditions (Febriyanti et al., 2026; Nazara et al., 2024; Nikmatullah et al., 2024). The diversity of herbal plants and local knowledge offers great potential for developing community-based traditional medicine (Dewi & Zaliluddin, 2021). There are over 9,000 plant species in Indonesia that have potential medicinal uses. This potential needs to be managed properly so that it not only remains inherited knowledge but also can be developed into an educational resource for the

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community. With proper information management, the public can more easily identify plant types, understand their benefits, learn appropriate processing methods, and use them more cautiously.

In areas such as Sulawesi, some people still rely on traditional medicine, including the use of herbal plants in their daily lives (Alang et al., 2022; Arini, 2017). These practices demonstrate that herbal plants still hold a significant place in public health culture. However, the use of herbal plants in the community is not always accompanied by an adequate understanding of their benefits, usage limits, processing methods, and potential side effects. Some people still rely on oral information, family experiences, or traditional customs that may not be in line with current scientific information (Atarodi & Atarodi, 2025; Rankoana, 2024). Limited access to scientific information is a significant issue in the use of herbal plants. People often know that a plant can be used for a specific purpose, but they don't necessarily understand which parts of the plant are appropriate, which safe processing methods to use, or which conditions to watch for. In this context, public education is crucial so that the use of herbal plants is not based solely on habit but is supported by more structured, accurate, and easily understood information. Good education can help people distinguish between useful traditional knowledge and information that requires further study.

Until now, information about medicinal plants has largely been presented in printed books, brochures, or through in-person outreach. These media still have their benefits, but they are often impractical, less interactive, and not always easily accessible to the general public, especially younger generations who are more familiar with digital technology. Long, text-based information also tends to be less appealing to users accustomed to quickly accessing information via smartphones (Adi et al., 2022; Fernandarisky et al., 2020). Therefore, educational media are needed that are more aligned with technological developments and the habits of modern society. The development of digital technology presents a significant opportunity to disseminate community-based health information. Smartphones, particularly Android devices, have become widely used by people of all ages and backgrounds. This situation creates an opportunity to use mobile applications as a more practical, visual, and interactive educational medium for herbal plants. Through Android applications, information about herbal plants can be presented as images, short descriptions, educational videos, search features, plant scanners, and cultivation location details. This presentation can make the learning process more engaging and easier to understand.

Study (Suputra et al., 2024) emphasizes the importance of delivering information in an interactive and modern manner in traditional medicine education through the design of an interactive multimedia application as a means of introducing family medicinal plants (Mukti & others, 2024). This study demonstrates that digitally based education on herbal plants can achieve positive public acceptance. These findings reinforce the view that digital media can serve as a supportive tool for public education, particularly in introducing herbal plants and their uses in a more targeted manner. However, providing apps alone is not enough to guarantee successful public education. Differences in digital literacy levels, age, smartphone experience, and ability to understand information are all factors to consider. While some people may already be familiar with using apps, others still need guidance and support. Therefore, the use of herbal plant education apps needs to be accompanied by training and support so that people understand the app's functions, how to access information, and how to use its features properly.

In this activity, an Android-based educational platform was developed to present information on medicinal plants in the family in a visual, interactive, and easy-to-understand manner. The app is designed not only as a list of herbal plants but also as a self-learning tool, containing information on plant names, benefits, processing methods, educational videos, a scanning feature, and locations for herbal cultivation. With this app, the public is expected to obtain information more quickly and in a structured manner using devices they are already familiar with in their daily lives. To ensure the application is relevant to user needs, an Agile approach is used in the development process. The Agile approach was chosen because it is iterative, flexible, and responsive to changing user needs. This approach allows application development to be carried out in stages, from planning and design to development, testing, implementation, and ultimately, improvements based on user feedback (Tsamiroh, 2021), demonstrating that Agile methods can be used effectively to develop web-based medicinal plant applications. Given these characteristics, Agile is considered suitable for developing educational applications that require adjustments based on conditions and community input.

Given these issues, this community service activity focuses on training and mentoring on the use of an Android-based herbal plant education application. This activity aims to help the community access clearer, more engaging, and better-structured information on herbal plant types, benefits, processing methods, educational videos, and herbal cultivation locations. Through this activity, the community is not only introduced to the digital application but also assisted in using it as an educational tool to support more informed traditional medicine literacy.

Method

This community service activity employs a technology-based community empowerment approach alongside a quantitative descriptive evaluation. This approach emphasizes active community involvement in all stages of the activity, from needs identification and solution implementation to application use evaluation. This approach aligns with the concept of community empowerment, which positions the community as the primary agent in social change driven by local needs. The development of the herbal plant education application utilizes an iterative and flexible Agile Development method, allowing for system adjustments based on user input and needs (Al-Saqqa et al., 2020; Al-Zewairi et al., 2017; Tripon, 2025; Williams, 2010). Meanwhile, a quantitative evaluative approach was used to measure the level of user acceptance of the application more objectively through a Likert-scale-based questionnaire (Hajesmaeel-Gohari et al., 2022).

Activity Design

The activity design adopts a participatory community engagement model, integrating active community participation with technology in the educational process. This model is considered effective in increasing the success of community-based programs because it directly involves the community at every stage of the activity (Lee et al., 2026). The activities are implemented through several main stages, including identifying community needs, developing educational applications, training on application usage, user mentoring, and evaluating and analyzing user responses. These stages are designed to ensure that the solutions provided meet community needs and can be used effectively.

Partners and Subjects of Activities

The partners in this activity were the community around the herbal plant cultivation site in Makassar City. The participants included members of the general public who utilize herbal plants, herbal plant cultivators, and Android smartphone users with varying levels of digital literacy. The evaluation involved 15 respondents selected using purposive sampling. This technique allows for the selection of respondents based on specific criteria relevant to the activity's objectives (Sousa Basto & Ferreira, 2025). The respondent criteria included experience with herbal plants, ownership of an Android smartphone, and willingness to participate in training and evaluation activities.

Implementation Stages

The implementation phase begins with needs identification through field observations and semi-structured interviews. This method is used to obtain in-depth data on community conditions, the types of herbal plants used, and the challenges in obtaining accurate information (Mala et al., 2025). The results of this stage are used as the basis for application development and training materials. Furthermore, application development is carried out using Agile Development methods, which are iterative, flexible, and collaborative (Al-Saqqa et al., 2020; Al-Zewairi et al., 2017; Williams, 2010). This approach allows for continuous system adjustments based on user feedback. The development stages include planning, design, development, testing, implementation, and evaluation. The developed application's main features include a list of herbal plants, information on their benefits and processing methods, an image-based plant scanner, educational videos, and information on herbal cultivation locations.

After the application was developed, training was conducted for the community on how to use it. The training used a learning-by-doing method, where participants directly practiced using the application after being given an explanation (Long et al., 2025). The training materials included an introduction to the application, system navigation, use of the scanner feature, access to educational videos, and utilization of the location feature. This method was chosen because it allows participants to understand how to use the application through hands-on practice. The next stage is community mentoring, which aims to ensure that participants can use the application independently. Mentoring is carried out by providing technical assistance, re-explaining material that is not yet understood, and helping participants explore the application's features. This mentoring is a crucial part of the community empowerment strategy to ensure sustainable technology use (Hussain et al., 2025).

Data Collection Instruments and Techniques

The instruments used in this activity included observation sheets, interview guides, and a Likert-based questionnaire. The Likert scale was used to measure user perceptions and satisfaction levels with the developed application (South et al., 2022). The questionnaire was structured with five assessment categories: strongly agree, agree, somewhat agree, disagree, and strongly disagree. Aspects measured included ease of use, application functionality, interface appearance, and overall system performance.

Data Analysis Techniques

Data analysis was conducted quantitatively and descriptively by calculating the percentage of eligibility based on questionnaire scores. The calculation was performed using the following formula:

$$p = \frac{\sum x}{\mathrm{N} \times X_{\max}} x\ 100\%$$

Where P is the percentage of eligibility, is the total score obtained, N is the number of respondents, and Xmax is the maximum score. The calculation results are then categorized into eligibility levels, namely very feasible, feasible, sufficient, less, and not feasible (Chatzigeorgiou et al., 2025; Maftuh et al., 2025).

System Functional Test

System testing is carried out using the Black Box Testing method, namely, a testing method that focuses on system functions without paying attention to the internal structure of the code (Dashti & Basin, 2020; Maspupah, 2024; Wicaksono, 2022). This testing aims to ensure that each application feature operates in accordance with the design specifications, so the application can be used optimally by the public.

Results and Discussion

The results of this community service activity indicate that integrating digital technology through an Android-based herbal plant education application, combined with a training and mentoring approach, has potential as a digital educational medium that helps the public access information about herbal plants in an easier, more engaging, and more structured way. This finding aligns with the concept of digital health literacy, which emphasizes the use of technology to provide educational media that is easily accessible, structured, and supports the public's understanding of health information (Hajesmaeel-Gohari et al., 2022). This section not only presents the results of the system implementation but also examines the effectiveness of the approach used, user responses, and the application's contribution to the transformation of technology-based learning in society. Systematically, the results and discussions are classified into six main aspects, namely: (1) implementation of the application as a digital educational medium, (2) the role of training and mentoring in application implementation, (3) system testing results, (4) evaluation of user responses, (5) contribution to public information access, and (6) scientific discussions and activity contributions.

Implementation of Applications as Digital Educational Media

The implementation of an Android-based herbal plant education application demonstrates that mobile technology can serve as a supportive medium for community learning. The developed application serves not only as an information provider but also as an interactive learning platform, enabling users to acquire knowledge independently. This aligns with research showing that mobile applications can increase information accessibility and accelerate technology-based learning processes in the community (Sousa Basto & Ferreira, 2025).

Unlike conventional media like books or one-way instructional materials, this application integrates various multimedia elements, including text, images, videos, and scanner-based interactions. This approach is supported by multimedia learning theory, which states that the combination of visual and interactive elements can help present information more engagingly and easily understood than text-only methods (Long et al., 2025). Thus, this application not only presents information but also builds a more contextual and engaging learning experience. Figure 1 shows the integration of the application's key features designed to support user-experience-based learning processes.

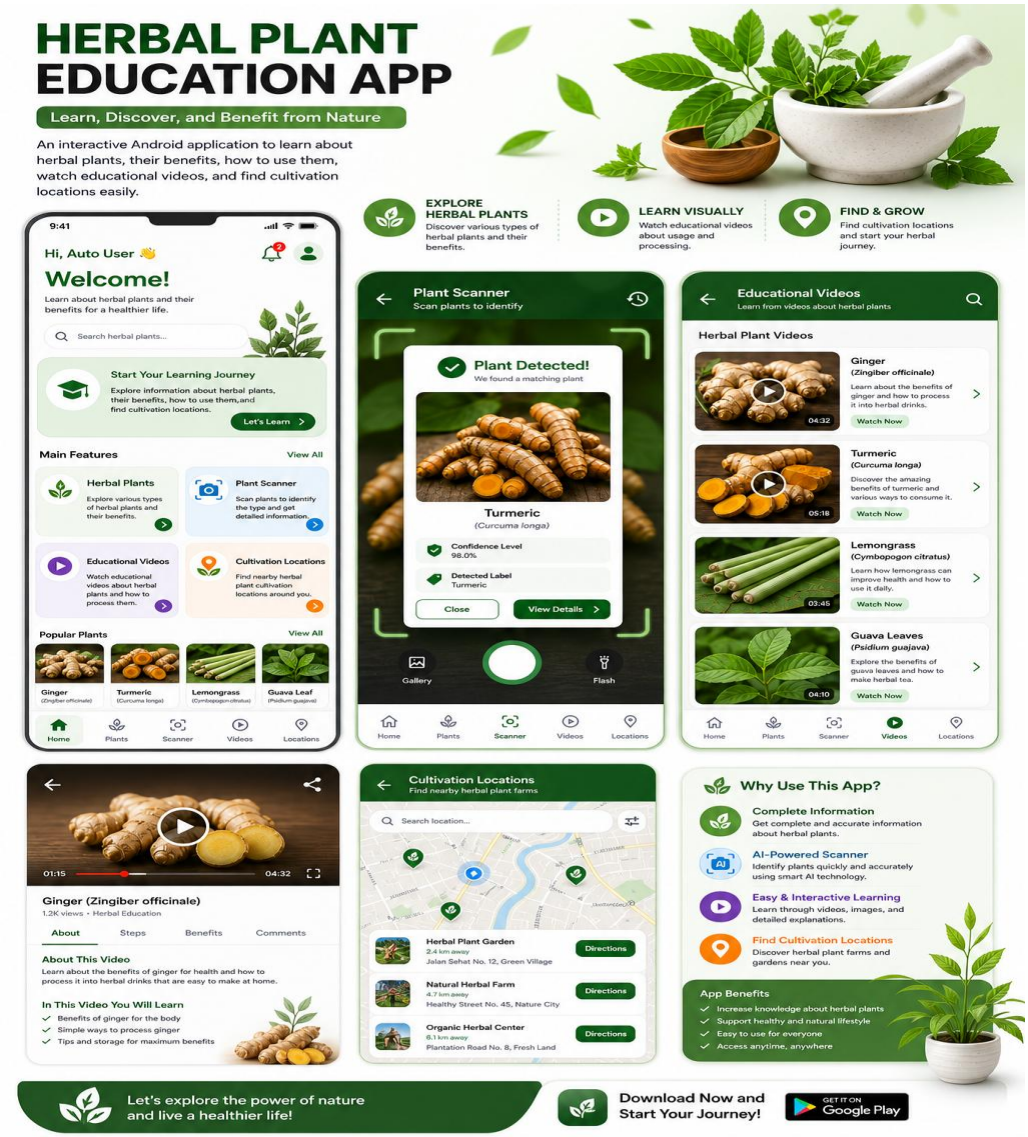

Figure 1. Main view and integration of educational application features

As shown in Figure 1, this application integrates four main features: Herbal Plants, Plant Scanner, Educational Videos, and Cultivation Locations. This structure reflects a user-centered design approach that focuses on ease of use and the relevance of features to user needs (Al-Saqqa et al., 2020). The plant scanner feature is one of the app's key strengths, allowing users to identify herbal plants directly through their device's camera. The plant scanner feature is one of the app's key strengths, allowing users to identify herbal plants directly through their device's camera. This feature connects real objects with digital information quickly and conveniently, supporting experiential learning, where users can learn through direct interaction with their surroundings (Tripon, 2025). In addition, the educational video feature provides an audiovisual-based learning alternative that has been proven to be more effective in conveying complex information compared to text (Suputra et al., 2024).

The Role of Training and Mentoring in Application Implementation

The results of the activity show that the success of application implementation is determined not only by the quality of the system, but also by the training and mentoring process. Without these interventions, community technology adoption tends to be low, especially among groups with limited digital literacy. This aligns with the technology acceptance theory, which posits that external factors, such as training and technical support, significantly influence users' acceptance of technology (Williams, 2010). The training was conducted using a learning-by-doing approach, in which participants practiced with the application after receiving an explanation. This approach has the potential to help participants understand the application's features by making the learning process active and contextual (Long et al., 2025).

Mentoring also plays a crucial role in ensuring the app's continued use. Through mentoring, users receive direct assistance in overcoming technical challenges and gaining a deeper understanding of the app's features. This approach aligns with the concept of technology-based community empowerment, which emphasizes active user involvement in the learning process (Hussain et al., 2025). Throughout the training, participants demonstrated high enthusiasm, particularly during hands-on practice with the application's features. This was evident in their active participation in trying out the available features and in the interactions during the training sessions. These findings demonstrate that the learning-by-doing approach is effective in providing more accessible educational media and engaging participants in technology-based educational activities.

System Test Results

System testing is conducted using the Black Box Testing method to ensure that all application functions operate in accordance with the design specifications. This method focuses on input and output testing without examining the system's internal structure, making it highly effective for testing applications from a user perspective (Dashti & Basin, 2020).

Table 1. Black Box Test Results

Component	Scenario	Output	Status
Main course	Open the application	The menu appears normally.	Valid
List of plants	Click the menu	Data displayed	Valid
Plant details	Select plants	Complete information	Valid
Search	Enter keywords	Results as per	Valid
Scanner	Plant scan	Identification successful	Valid
Video	Click on the video	Video running	Valid
Location	Click on the location	Maps appear	Valid

Test results show that all application features function as expected under the test scenario. This finding indicates that the application's main functions meet the basic needs of use in community training activities. This finding aligns with previous research indicating that the success of an information system is strongly influenced by the stability and reliability of its functions (Maspupah, 2024).

User Response Evaluation

User evaluations were conducted using a Likert-based questionnaire to measure user satisfaction and acceptance of the application. The Likert scale is a common method in user-based system evaluations because it can quantitatively measure perceptions (South et al., 2022).

Table 2. User Evaluation Results

Aspect	Score (%)	Category
Usability	92.0	Very Worthy
Functionality	90.6	Very Worthy
User Interface	86.6	Very Worthy
Performance	77.2	Worthy
Overall	88.2	Very Worthy

An average score of 88.2% indicates that this application is in the very usable category. The high usability score indicates that the application design has successfully met the principle of ease of use, which is a crucial factor in the success of technology-based systems (Hajesmaeel-Gohari et al., 2022). The functionality aspect also received high scores, indicating that the application's features meet user needs. This confirms that the user needs analysis approach implemented in the early stages of development has worked well (Al-Zewairi et al., 2017). However, the relatively low performance scores indicate potential improvements, particularly in system optimization across different user devices. This is common in mobile applications used on devices with varying specifications (Sousa Basto & Ferreira, 2025).

Contribution to Public Access to Information

One of the main contributions of this activity was providing the community with more structured access to information about herbal plants. Before the activity, community knowledge tended to be empirical and poorly documented. After the activity, the community began to become familiar with more systematic sources of information through the application used. Thus, this application serves as a bridge between traditional knowledge and modern digital information. This aligns with the concept of knowledge integration, where technology is used to strengthen and develop local knowledge (Navia et al., 2022).

Scientific Discussion and Contribution

The findings from this community service activity indicate that an Android-based herbal plant education application, integrated with training and mentoring activities, has demonstrated positive user acceptance, providing a more accessible educational medium for the community on traditional medicine. Conceptually, these results reinforce several important theoretical frameworks in the literature, particularly those related to digital health literacy, mobile learning, and community empowerment.

From a digital health literacy perspective, the developed application serves as a medium that facilitates the public's access to, understanding of, and use of health information in a more independent and structured manner. This aligns with findings (Hajesmaeel-Gohari et al., 2022) which states that mobile-based applications can improve users' ability to understand health information, especially when it is presented interactively and is easily accessible. In the context of this activity, the contribution to public access to information is evident in the availability of more systematic, visual, and user-friendly information on herbal plants. Furthermore, the results of this activity reinforce the concept of mobile learning, in which smartphones serve as flexible, contextual learning media. The use of Android applications allows people to learn anytime, anywhere, without being limited by time or space. This aligns with research (Sousa Basto & Ferreira, 2025) which confirms that mobile learning can improve learning effectiveness by providing direct access to information and supporting independent learning. In this activity, features such as educational videos, plant scanners, and digital catalogs have proven to provide more accessible educational media, making learning more active and experience-based.

Furthermore, the approach used to implement this activity reflects the principle of community empowerment, in which the community acts not only as beneficiaries but also as active participants in learning and using technology. The training and mentoring activities provided are key factors in ensuring the optimal and sustainable use of the introduced technology. This aligns with (Hussain et al., 2025) which states that technology-based empowerment requires direct interaction and ongoing support to help users effectively adopt the technology. Therefore, the developed application serves not only as a tool but also as a means of community empowerment, facilitating the community's learning about herbal plants. In terms of contribution, the implementation of this activity has two main implications: practical and theoretical. In practice, this activity has resulted in an Android-based educational application that serves as a learning tool to help the public understand herbal plants in a more systematic, interactive, and structured way. This application has the potential to serve as an alternative to support public health education programs, particularly in the context of traditional medicine, which remains widely used in Indonesia.

Meanwhile, this activity theoretically contributes to the development of an integrative model that links digital technology and community empowerment approaches in health education. This activity demonstrates that the success of technology implementation depends not only on the quality of the system but also on accompanying social approaches, such as training and mentoring. Thus, this activity enriches the literature on integrating technology-based learning and community-based empowerment and provides a basis for further research and implementation efforts to develop more adaptive and sustainable technology-based education models.

Conclusions

This community service activity demonstrated that integrating an Android-based herbal plant education application with training and mentoring can provide herbal plant information that is more accessible, structured, and tailored to community needs. The developed application not only serves as an information medium but also as an interactive learning tool, making it easier for the public to identify plant types, understand their benefits, and learn proper processing methods. Functional testing using the Black Box method showed that all application features operated in accordance with the design specifications. This confirms that the developed system has met the reliability and functionality aspects as a digital educational medium. Furthermore, user evaluation questionnaires indicated a feasibility level of 88.2%, categorized as very feasible. These findings indicate that the application has strong community acceptance, particularly regarding ease of use, interface appearance, and overall system performance.

Furthermore, training and mentoring activities play a supporting role in the application's implementation. This approach helps bridge the digital literacy gap in the community, enabling users to understand and utilize technology optimally. Thus, this activity confirms that the success of technology utilization in society is determined not only by the quality of the system but also by implementation strategies that involve direct interaction with users. Overall, this activity contributes to the development of a technology-based education model that integrates mobile applications with a community-empowerment approach. This model can serve as an alternative to support community access to traditional health information, particularly on the use of herbal plants.

However, this activity has several limitations, including a small sample size and limited geographic coverage. Therefore, future activities are recommended to involve a larger number of respondents, cover a wider area, and integrate more advanced technologies, such as artificial intelligence, to improve the accuracy of the plant-scanning feature. Furthermore, a long-term evaluation is needed to measure the application's impact on changes in community behavior regarding the sustainable use of herbal plants.

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Author Contributions

Marsyah contributed to community needs analysis, herbal content preparation, and program implementation. Vivek Sharma contributed to application development, system testing, and technical evaluation. Shadi Kedah contributed to health information review, user evaluation design, and manuscript revision. All authors contributed to data analysis, discussion, and final manuscript preparation.

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