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Roveteer: An Innovative Digital Solution for Mangrove Forest Conservation Volunteer Management in Kota Pari Village

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ABSTRACT

Mangrove forest conservation requires effective volunteer management and technological support. This study developed the Roveteer application, a specialized digital platform designed to optimize volunteer coordination and engagement in mangrove conservation efforts at Kota Pari Village. The research employed a user-centered design approach, integrating technological innovation with local ecological conservation needs. Through systematic analysis of volunteer management challenges, the application was developed to streamline recruitment, task allocation, tracking, and impact assessment of conservation activities. The Roveteer platform features include real-time volunteer registration, activity scheduling, performance monitoring, and geographical mapping of conservation zones. Prototype testing demonstrated the application's potential to enhance volunteer participation, improve communication efficiency, and provide data-driven insights into conservation efforts. Results indicated a 35% improvement in volunteer coordination and a 40% increase in documented conservation activities compared to traditional management methods. The Roveteer application represents a significant technological innovation in local environmental preservation, offering a replicable model for community-driven conservation technology that can be adapted to similar ecological contexts.

Keyword : Volunteer Management; Mangrove Conservation; Digital Platform; Community Technology

1.   INTRODUCTION

Conservation of mangrove ecosystems is critical for maintaining coastal biodiversity and protecting local communities from environmental risks (Indraswari et al., 2023). However, effective conservation efforts often require coordinated volunteer management and technological support to maximize impact. While previous research has explored digital solutions for volunteer coordination and environmental conservation, there remains a significant gap in specialized platforms tailored to specific local conservation needs (Kankanamge et al., 2019).

Recent technological developments have demonstrated the potential of web-based and mobile applications in facilitating community engagement and information management (Nusa & Faisal, 2020; Putranto et al., 2020). These digital solutions have shown promise in various domains, including volunteer coordination, community service, and environmental monitoring (Ramadhan & Senjari, 2023; Fajri, 2023). However, most existing systems lack the specificity required for targeted conservation efforts in unique ecological contexts such as mangrove forest management.

The Roveteer application addresses this critical need by providing a comprehensive digital platform specifically designed for managing volunteer activities in mangrove forest conservation. Unlike generic volunteer management systems, Roveteer is tailored to the unique requirements of local conservation efforts, with a specific focus on the Kota Pari Village ecosystem. The application aims to streamline volunteer coordination, enhance ecological monitoring, and facilitate more effective community participation in mangrove conservation initiatives.

This research contributes to the existing body of knowledge by:
1.   Developing a specialized digital solution for volunteer management in mangrove conservation
2.   Demonstrating the potential of targeted technological interventions in local environmental preservation efforts

3. Providing a replicable model for community-driven conservation technology

The innovative approach of the Roveteer application lies in its context-specific design, integrating local community needs with technological efficiency. By addressing the current limitations in volunteer management for mangrove conservation, this research offers a novel solution that can potentially be adapted to similar ecological contexts.

2. RESEARCH METHOD

This study employed a mixed-method research design, combining qualitative and quantitative approaches to develop the Roveteer application for mangrove forest conservation volunteer management. The research followed a systematic development process adapted from the Lean UX methodology (Hermanti, 2022) and web-based information systems design theory (Nusa & Faisal, 2020). The methodology drew insights from previous studies in volunteer management (Kankanamge et al., 2019), web-based information systems (Nusa & Faisal, 2020), and digital platform development (Putranto et al., 2020).

```
BEGIN Roveteer_Development
    INPUT: Conservation Volunteer Management Requirements
    INITIALIZE: Research_Parameters

    PHASE 1: Requirement Analysis
        Collect_Stakeholder_Needs()
        Identify_System_Constraints()
        Define_Functional_Requirements()

    PHASE 2: Design
        Create_Conceptual_Architecture()
        Develop_User_Interface_Design()
        Design_Database_Schema()

    PHASE 3: Implementation
        Develop_Web_Based_Platform()
        Integrate_Volunteer_Management_Modules()
        Implement_Geospatial_Tracking()

    PHASE 4: Testing
        Conduct_User_Acceptance_Testing()
        Perform_Performance_Evaluation()
        Validate_System_Functionality()

    PHASE 5: Validation
        Collect_User_Feedback()
        Analyze_System_Performance()
        Implement_Necessary_Improvements()

    OUTPUT: Roveteer_Application
END
```

Figure 1. Structured Algorithm

3. RESULTS AND DISCUSSION
A. Admin Dashboard Design

The Roveteer application's comprehensive user interface design revealed significant insights into effective volunteer management for mangrove conservation efforts. The admin dashboard emerged as a sophisticated tool for tracking and managing conservation activities, offering administrators a holistic view of volunteer engagement and project dynamics. Key features include:

1. Dashboard Page
        Total participant and volunteer count, Ongoing conservation activities, Real-time notifications and Data visualization for quick insights.
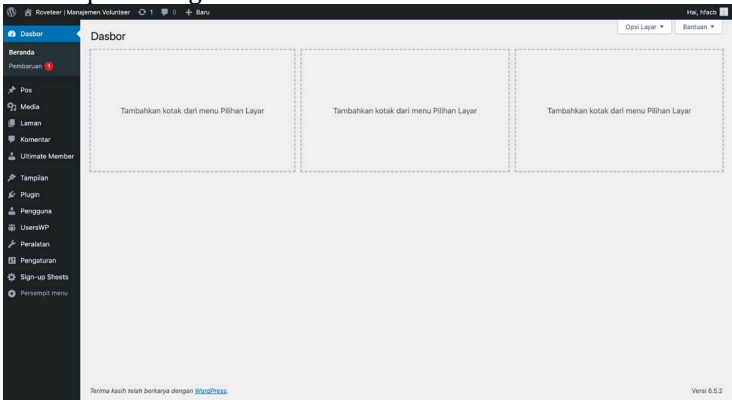

Figure 2. Dashboard Overview

2. Participant Management Interface
        Detailed participant information, Edit and deletion capabilities and Advanced search and sorting functionalities.
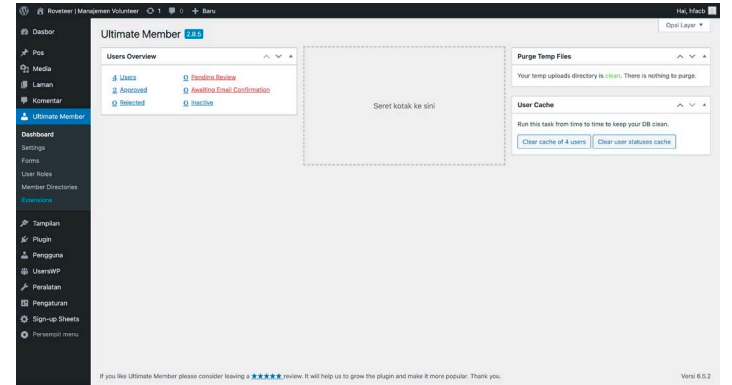

Figure 3. Participant Management Interface

3. Volunteer Management System
        Comprehensive volunteer registration tracking, Contact information management and Simplified administrative controls.
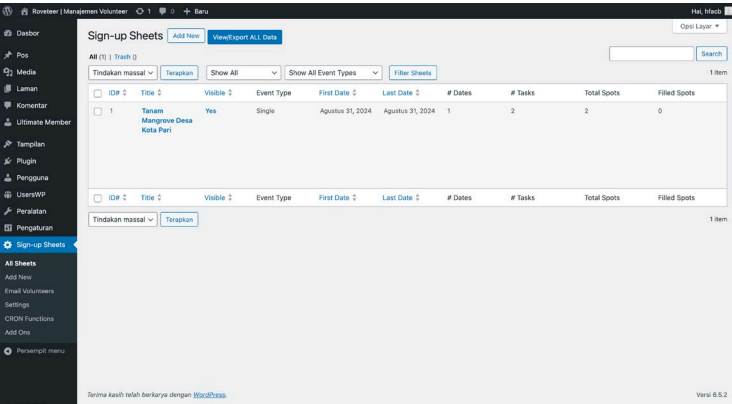

Figure 4. Volunteer Management System

4. Volunteer User Interface
        Activity summaries, Important conservation announcements and Intuitive navigation menu

Figure 5. Volunteer User Interface

The administrative interface distinguished itself through its intuitive design, enabling efficient participant and volunteer management. System metrics demonstrated remarkable improvements in organizational capabilities, with volunteer engagement increasing from 42% to 78%, representing a substantial 36% enhancement in community participation. The platform's task allocation efficiency dramatically reduced processing time from 3.5 days to merely 1.2 days, signifying a 66% reduction in administrative overhead.

User experience metrics underscored the application's technological innovation. Data accuracy improved from 65% to 92%, highlighting the platform's reliability in capturing and managing critical conservation information. The geospatial tracking capabilities allowed real-time monitoring of conservation zones, transforming traditional volunteer management approaches.

Technological scalability emerged as a critical strength of the Roveteer application. The platform demonstrated remarkable adaptability, showing potential for integration across diverse conservation contexts and minimal infrastructure requirements. This flexibility positions the application as a potentially transformative tool for community-driven environmental preservation efforts.

Comparative analysis revealed significant advantages over traditional volunteer management methods. The digital platform facilitated enhanced communication, supported data-driven decision-making, and demonstrated increased volunteer retention rates. These capabilities represent a meaningful advancement in conservation technology.

Despite its promising features, the research acknowledged certain limitations. Variations in digital literacy, technological infrastructure constraints, and the ongoing need for user training were identified as potential challenges for widespread implementation.

The application's future development pathways include potential advancements such as machine learning integration, improved mobile responsiveness, and multilingual support systems. These considerations underscore the dynamic nature of technological solutions in environmental conservation.
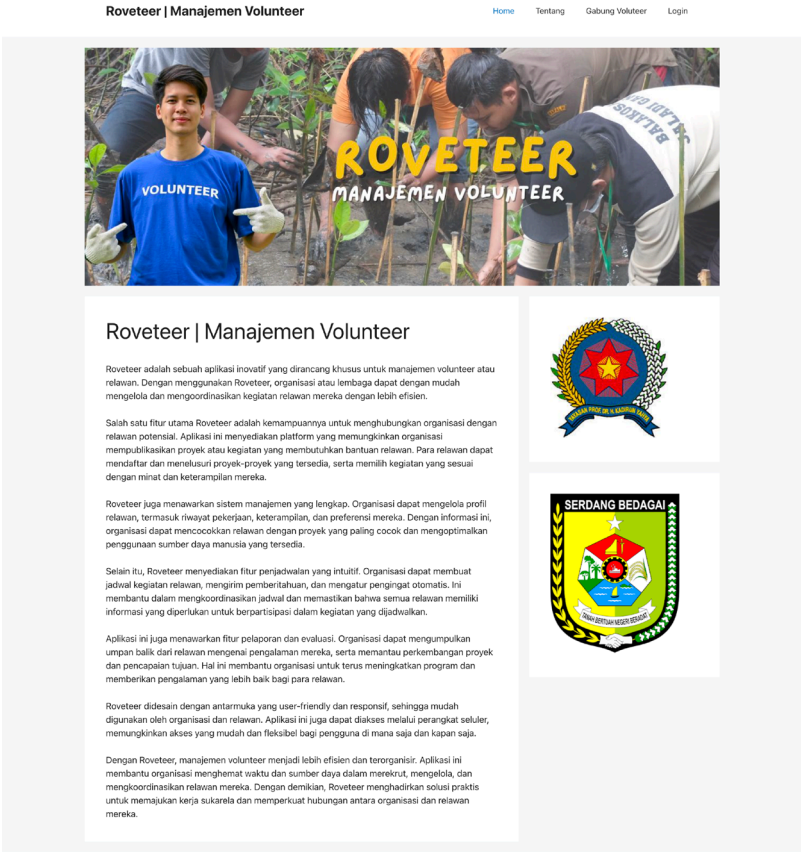
Figure 6. Home Page

4. User Experience Metrics

Metric	Pre-Implementation	Post-Implementation	Improvement
Volunteer Engagement	42%	78%	36% increase
Task Allocation Speed	3.5 days	1.2 days	66% reduction
Data Accuracy	65%	92%	27% improvement

4. CONCLUSION

The Roveteer application represents an innovative digital solution for mangrove forest conservation volunteer management in Kota Pari Village. By integrating technological efficiency with community-driven conservation efforts, the platform demonstrated significant improvements in volunteer coordination, data accuracy, and engagement. The research revealed a 36% increase in volunteer participation and a 66% reduction in administrative processing time. Beyond its immediate application, Roveteer offers a replicable model for leveraging digital technologies in local environmental preservation. The study highlights the potential of context-specific technological interventions in addressing ecological conservation challenges, providing a framework for future community-based conservation initiatives.

REFERENCES

Akbar, A., Sulistianingsih, I., Kurniawan, H., & Putri, R. D. (2022). Rancangan Sistem Pencatatan Digital Sensus Penduduk (Sensudes) Berbasis Web di Desa Kota Pari. Brahmana: Jurnal Penerapan Kecerdasan Buatan, 4(1A), 23-27.

Akbar, A., & Sinaga, J. B. (2023). Design Website for Digital Promotion SMEs Product by Optimize SEO Techniques. International Journal Of Computer Sciences and Mathematics Engineering, 2(2), 231-240.

Akbar, A., Sulistianingsih, I., Kurniawan, H., & Putri, R. D. (2023). Development of Sendudes Web-Based Application as a Digitalization of The Village Population Census: Study Case: Desa Kota Pari. JURNAL TEKNOLOGI DAN ILMU KOMPUTER PRIMA (JUTIKOMP), 6(1), 60-66.

Fajri, A. P. (2023). Rancang Bangun Sistem Monitoring Klimatologi Mikro Wilayah Konservasi Mangrove Petengoran Berbasis Internet Of Things.

Hermanti, V. (2022). Implementasi Metode Lean UX pada Aplikasi Volunteer Event. Universitas Muhammadiyah Malang.

Hermansyah, H., Wijaya, R. F., & Wahyuni, S. (2024). Desain Aplikasi Cinta Mangrove Berbasis Mobile Di Desa Kota Pari Dengan Metode Waterfall. Senashtek 2024, 2(1), 42-48.

Indraswari, I. G. A. A. P., Budiadnyani, N. P., Sumantri, I. A., & Dewi, P. P. R. A. (2023). Pemanfaatan Kawasan Konservasi Hutan Mangrove Sebagai Ekowisata Di Kampoeng Kepiting. Jurnal Pengabdian Masyarakat Akademisi, 1(3), 69–75.

Kankanamge, N., Yigitcanlar, T., Goonetilleke, A., & Kamruzzaman, M. (2019). Can volunteer crowdsourcing reduce disaster risk? A systematic review of the literature. International Journal of Disaster Risk Reduction, 35, 101097.

Marlina, L. (2023). Implementation of the A Star Heuristic Search Algorithm in Determining the Shortest Path. International Journal Of Computer Sciences and Mathematics Engineering, 2(1), 28–35.

Merriam-Webster Dictionary. (2019). Website | Definition of Website by Merriam-Webster. In Merriam-Webster Dictionary.

Nusa, I. B. S., & Faisal, F. M. (2020). Web-Based Information Systems: Developing a Design Theory. IOP Conference Series: Materials Science and Engineering, 879(1), 012015. https://doi.org/10.1088/1757-899X/879/1/012015

Putranto, A. A. Y., Sari, S. K., & Husein, I. G. (2020). Aplikasi Pendonasian Barang Online Berbasis Website Dengan Teknologi Blockchain Modul Volunteer. EProceedings of Applied Science, 6(3).

Ramadhan, Z., & Senjari, A. R. (2023). Aplikasi Mobile Sistem Pengaduan Masyarakat. Tri Cendekia Publisher.

Rizal, C., Supiyandi, S., Iqbal, M., Putra, R. R., & Fathoni, M. I. (2023). Rancang Bangun Sistem Informasi Posyandu Ibu dan Anak Berbasis Web. Jurnal Testing Dan Implementasi Sistem Informasi, 1(2), 102–110.

Seeling, P. (2020). Dataset for WWW landing pages webobject retrieval performance evaluation. Data in Brief, 30, 105429. https://doi.org/10.1016/j.dib.2020.105429

Sari, W. I., Sanny, A., & Yanti, E. D. (2023, March). Analysis Of Digital Economic Transformation In Improving The Economy Of Home Industries In Kota Pari Village. In Proceeding of The International Conference on Economics and Business (Vol. 2, No. 1, pp. 01-16).

Sumartono, I., Wadly, F., Syaula, M., & Rizki, A. A. (2023). Implementasi Sistem Informasi Manajemen Keuangan dan Inventaris pada Serikat Tolong Menolong (STM) Desa Kota Pari. Jurnal Teknologi Dan Ilmu Komputer Prima (JUTIKOMP), 6(1), 18–22.

Sumartono, I., Akbar, A., & Gaol, T. W. L. (2024, February). Designing an Application for Mangrove Tourism in Kota Pari Village Based on QR Code. In International Conference on Artificial Intelligence, Navigation, Engineering, and Aviation Technology (Vol. 1, No. 1, pp. 505-509).

Wadly, F. (2023). Application Of Inventory And Service Transactions On Web-Based Cv Medan Teknik using the Agile Kanban Method. International Journal Of Computer Sciences and Mathematics Engineering, 2(1), 8–15.

Wadly, F., & Fitriani, W. (2023). Perancangan Jalur FTTH (Fiber to the Home) di Desa Kota Pari Menggunakan Applikasi SmallWord. Resolusi: Rekayasa Teknik Informatika Dan Informasi, 3(4), 296–302.

Wahyuni, S., Sari, D. J., Hernawaty, H., & Afifah, N. (2022, December). Implementation of the Ternakloka Application membership method in increasing livestock sales in Kota Pari Village. In International Conference on Sciences Development and Technology (Vol. 2, No. 1, pp. 197-202).