APPLIED INFORMATION TECHNOLOGY AND COMPUTER SCIENCE
e-ISSN: 2773-5141

AITCS

Vol. 5 No. 2 (2024) 1141-1159
https://publisher.uthm.edu.my/periodicals/index.php/aitcs

DonoSync: A Mobile App for Efficient Donations

Mukhtar Abdulkarim Sani[1], Mazidah Mat Rejab[1]*

[1] *Fakulti Sains Komputer dan Teknologi Maklumat,*
Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA

*Corresponding Author: mazidah@uthm.edu.my
DOI: https://doi.org/10.30880/aitcs.2024.05.02.060

Article Info

Received: 30 July 2024
Accepted: 30 October 2024
Available online: 15 December 2024

Keywords

Donation Management, Impactful donations, Iterative Software Development.

Abstract

DonoSync addresses the pressing challenge of inefficient donation management by introducing an innovative system. This project endeavors to overhaul donation tracking, ensuring transparent and efficient philanthropic efforts. Employing an iterative software development approach, it emphasizes user-centric features and rigorous phases of planning, analysis, design, and user acceptance testing. Findings showcase DonoSync's potential to significantly enhance donation management across diverse sectors. Discussions center on refining the system for sustained effectiveness, highlighting the need to further explore its implementation nuances and scalability in various philanthropic environments. The study sets the stage for future research aimed at optimizing and expanding DonoSync's impact.

1. Introduction

The landscape of donation management within philanthropy faces pervasive challenges rooted in fragmented coordination and a lack of transparency. Charities struggle to foster donor trust due to unclear collection processes, resulting in diminished support and communication [1]. Uncertainties regarding donation utilization contribute to skepticism, compounding donor apprehension and hindering effective fundraising [2].

In response to these challenges, mobile applications have emerged as critical facilitators of charitable donations, offering convenient and accessible channels for individuals to engage philanthropically through their smartphones [3]. DonoSync, a mobile application poised to revolutionize donation management, embodies these principles by offering a user-friendly interface and innovative features.

Notably, DonoSync's advantage lies in its ability to send push notifications, enabling rapid outreach to users upon the creation of donation programs or when donations are needed. This feature ensures a swift and extensive reach, effectively connecting donors with causes and streamlining the donation process.

Moreover, DonoSync's functionality extends to efficient donation tracking, empowering donors with informed decision-making capabilities. Through features highlighting top donors and acknowledging their contributions, DonoSync enhances donor engagement, fostering a stronger sense of community involvement and impact.

The pivotal role of mobile donation apps in enhancing user participation through streamlined features like registration, scheduling donations, and influential design elements has been emphasized [3]. Key attributes, such as type-cause fit and perceived effectiveness, significantly influence user engagement with these apps.

This paper aims to explore the methodologies and implications of DonoSync, showcasing its potential to enhance transparency, accountability, and efficiency in donation management practices. The findings presented herein intend to provide actionable insights for refining the system, ensuring sustained effectiveness, and broadening its applicability within diverse philanthropic environments.

2. Related Work

This section will analyze current donation management systems, highlighting their limitations, and introducing DonoSync as an innovative and efficient solution.

2.1 Donation Management Platforms

Donation management platforms stand as the fundamental pillars underpinning the intricate tapestry of contemporary philanthropy, serving as dynamic conduits that seamlessly connect a broad spectrum of donors and organizations across an expansive landscape of causes and initiatives [4]. These platforms operate within an expansive and sophisticated framework, orchestrating a multifaceted ecosystem that orchestrates multifarious activities such as fundraising initiatives, meticulous donation tracking mechanisms, fostering dynamic user engagement, and meticulously evaluating the tangible outcomes and discernible impacts of the contributions made [5].

Digital arenas bring together diverse individuals and entities, creating inclusive, transparent, and accessible platforms for charitable endeavors. They represent the modern-day nexus where philanthropic aspirations intersect with practical actions, reshaping altruism by amplifying the reach and efficacy of benevolent contributions in an era of digital connectivity and collective consciousness.

2.2 Analysis of Existing Platform

It is critical to investigate popular donation management platforms to understand their functional dynamics, strengths, and inherent limitations. This examination includes a thorough examination of GoFundMe, JustGiving, and DonorsChoose. Each platform has its own set of features that cater to various philanthropic endeavors and foster community-driven initiatives. This in-depth investigation aims to shed light on the platforms' strengths, weaknesses, and underlying operational mechanisms, providing a nuanced understanding to guide the development and improvement of this project.

GoFundMe, a prominent crowdfunding platform founded in 2010, has revolutionized charitable giving by normalizing peer-to-peer fundraising, restricting support to monetary donations, and placing the onus on donors to verify the legitimacy of appeals [6]. However, there are concerns about the platform being used to spread disinformation, with actors leveraging crowdfunding to amplify false narratives and sustain misinformation campaigns [7]. GoFundMe stands as a leading crowdfunding platform with a global reach, facilitating diverse campaigns ranging from personal causes to charity fundraisers. Its strengths lie in providing a centralized space for donation management, allowing donors and campaign organizers to efficiently monitor contributions and campaign progress. However, concerning the proposed project, GoFundMe primarily focuses on individual and global causes, lacking specific tools tailored for local charities or community-based initiatives. The platform's high fees for campaign organizers and payment processors might deter potential donors, which could be a key advantage for the proposed system, ensuring a fee-friendly structure that encourages more contributions. Additionally, the decentralized nature of GoFundMe poses challenges in ensuring complete transparency and mitigating fraudulent activities. The proposed project aims to address these concerns by implementing rigorous measures for donor trust and emphasizing transparent utilization of funds.

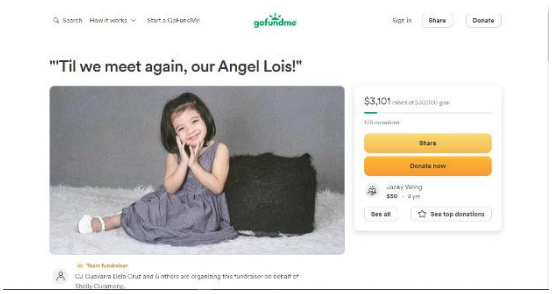

Fig. 1 *GoFundMe platform*

Another platform is JustGiving, a UK-based crowdfunding platform, excels in its user-friendly interface and simplicity in campaign creation, providing a seamless fundraising experience. However, in comparison to the proposed system, JustGiving primarily focuses on global charities and might overlook smaller, localized causes that the proposed project aims to support. Its reliance on charity partnerships and outreach limits its potential outreach, contrasting with the proposed system's emphasis on inclusivity and community involvement. The proposed project intends to bridge this gap by fostering collaborations with local organizations, thereby

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

broadening its reach and impact among community-based initiatives. Furthermore, JustGiving's limitation in catering to localized causes might serve as a compelling opportunity for the proposed system to distinguish itself by actively engaging with and supporting smaller, localized charitable projects.

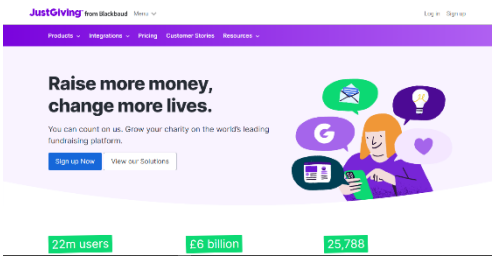

Fig. 2 *JustGiving platform*

DonorsChoose.org is an online charity platform that connects donors with U.S. school projects proposed by teachers, aiming to alleviate funding inequalities in education [8] [9]. DonorsChoose specializes in connecting donors with educational projects, emphasizing transparency and direct engagement between contributors and classrooms. While its focus on educational impact is commendable, the platform's narrow scope could limit its applicability to broader charitable initiatives, unlike the proposed system, which aims for a more versatile application across various philanthropic causes. DonorsChoose's potential limitations in ensuring consistent project quality and impact could be addressed in the proposed system by implementing stringent vetting mechanisms and comprehensive impact assessment tools. By offering a more expansive platform accommodating diverse causes, the proposed project seeks to establish itself as a versatile and impactful solution for a wide range of charitable endeavors.

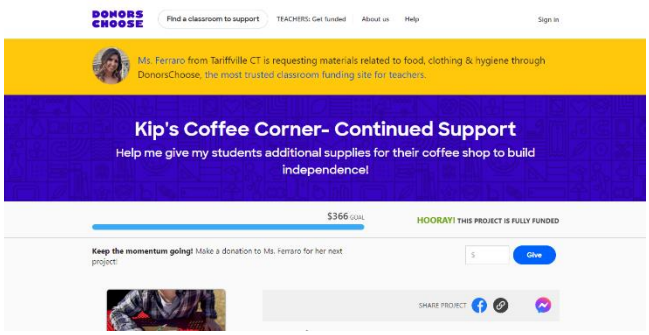

Fig. 3 *DonorsChoose platform*

The comparison between the existing and proposed systems is shown in Table 1.

Table 1: *Comparative Analysis of Three Existing Systems and the Proposed System*

Features	GoFundMe	JustGiving	DonorsChoose	DonoSync
User Registration	Yes	Yes	Yes	Yes
User Profile	Yes	Yes	Yes	Yes
Beneficiary Profile	No	No	No	Yes
Donation Tracking	Yes	Yes	Yes	Yes
Donor Ranking	No	No	No	Yes
Map-Based Donation Tracking	No	No	No	Yes
Notifications & Reminders	Yes	Yes	Yes	Yes
Goods Donation Support	No	No	No	Yes
Types of Donations Supported	Monetary Contributions, Crowdfunding	Monetary Contributions, Crowdfunding	Educational Projects	Monetary and Goods Donations, Educational Support
System Type	Web	Web	Web	Mobile App + Web Dashboard

2.3 Significance for DonoSync

DonoSync is a groundbreaking philanthropic platform that revolutionizes donation management systems by bridging the gap between existing platforms and modern donor demands. It offers a holistic approach that integrates monetary and goods donations, educational support, and diverse functionalities, catering to a broader spectrum of charitable endeavours and empowering users to engage comprehensively with various causes.

DonoSync's geolocation feature enhances user engagement and transparency by providing precise tracking and visualization of donation locations. This innovation elevates accountability by providing a comprehensive overview of geographical distribution and donation types, instilling trust among donors and beneficiaries in a more transparent donation ecosystem.

Additionally, DonoSync mobile application format broadens accessibility, transcending the limitations imposed by web-based platforms. The mobile-centric approach ensures seamless engagement, facilitating easy access to donation programs and features anytime, anywhere. This accessibility amplifies user engagement, allowing for increased participation and interaction with the donation initiatives.

DonoSync's significance lies in its technical advancements and transformative impact on user experience and philanthropy. It reimagines donation management by enhancing transparency, inclusivity, and engagement, fostering a robust and effective donation ecosystem.

3. Methodology

The development of DonoSync embraces an iterative model, carefully selected to facilitate comprehensive functionality, user-centric design, and robustness in the creation of this donation management platform. The iterative model stands as the chosen methodology due to its inherent advantages in handling complex and evolving project scopes.

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

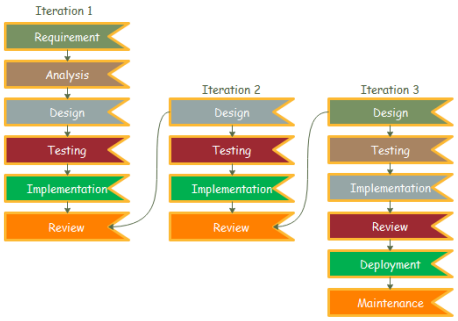

Fig. 4 *Iterative Model [10]*

3.1 System Requirement Analysis

System Requirement Analysis is a meticulous process that involves identifying, documenting, and managing the comprehensive needs and expectations for a software system. This vital phase encompasses analyzing the multifaceted requirements of diverse stakeholders while prioritizing functional and non-functional elements essential for optimal system performance [11]. The primary aim is to guarantee the software product's alignment with desired objectives, ensuring its ability to deliver high-quality, user-centric experiences.

Table 2 *Functional Requirements*

Modules	Requirement
User Registration	• Beneficiaries should be able to create account through the web dashboard. • Donors should be able to create an account using the mobile app.
Profile Management	• Administrators, beneficiaries, and donors should be able to update their profile details.
Donation programs	• Administrators and beneficiaries should be able to create, manage and delete donation programs. • Administrators and beneficiaries should specify whether the program is monitory or goods donations or both. • Donors should be able to view donation programs through the mobile app.
Donation	• Donors should be able to donate to a particular donation program. • Administrators and beneficiaries should be able to view and manage donations.
Location-based feature	• The system should be able to send notifications to users. • Donor should be able to have option to turn notification on or off.
Notifications	• The system should be able to send notifications to users. • Donor should be able to have option to turn notification on or off.
Reporting	• The system should be able to generate comprehensive reports on donation activities specifically for administrators and beneficiaries.

Table 3 *Non-functional Requirements*

Requirement	Description
Performance	• The system should work quickly, especially when lots of people are using it. • It should manage many users without slowing down

Reliability	• The system should always be available, with little time when it is not working. • It should be able to get back information if something goes wrong.
Security	• The system should keep everyone's information safe and only let people see what they are supposed to. • It should control who can access sensitive data.
Usability	• The system should be easy to use for everyone, like how it looks and works. • It should be accessible for people who might have trouble using regular systems.

3.2 Design

The design phase in software development serves as the foundation for translating system requirements into a structured blueprint. This crucial phase involves conceptualizing, planning, and detailing the architecture, interfaces, and functionalities of the software system. The primary objective is to establish a robust framework that aligns with the specified requirements while ensuring scalability, efficiency, and user-friendliness. This section elucidates the design considerations, architectural decisions, and strategies adopted in crafting the DonoSync application.

3.3 Implementation

The implementation phase is a pivotal stage where meticulous planning and an iterative design approach converge to establish a resilient and adaptable system. Within this phase, the amalgamation of programming languages such as Flutter for the frontend and PHP for the backend serves as the bedrock for constructing a highly versatile platform. This strategic utilization of programming languages enables the creation of a system that seamlessly integrates both functional prowess and user-centric appeal. Through these languages, the project endeavors to achieve a scalable, efficient, and engaging application that caters to the diverse needs of users and stakeholder Iterative methodologies, encompassing prototyping and rigorous user testing, play a pivotal role in refining features based on user feedback, thus enhancing the overall usability and effectiveness of the system.

3.4 Testing

In the testing phase, the system undergoes rigorous evaluation and validation to ensure its reliability, functionality, and adherence to predefined requirements. Various testing methodologies, including unit testing, integration testing, and system testing, are employed to scrutinize the system's performance across diverse scenarios. This phase aims to detect and rectify any anomalies, bugs, or inconsistencies present in the system's functionality. Robust testing protocols are established to guarantee a seamless and error-free user experience, enhancing the system's overall reliability and efficiency. Through meticulous testing, the project endeavors to deliver a high-quality and robust platform that meets the intended objectives and user expectations.

3.5 Review

In the review phase, the comprehensive evaluation of the developed system takes precedence before the deployment process. This critical phase involves meticulous scrutiny and validation of the system's functionalities, user interface, and overall performance. Rigorous testing procedures, including functionality tests, user experience assessments, and security audits, are conducted to ensure adherence to predefined benchmarks and standards. User feedback garnered from beta testing also plays a pivotal role, offering valuable insights for fine-tuning features and addressing potential issues. This phase acts as a pivotal checkpoint, allowing for refinements and necessary adjustments to be made before the deployment stage. A thorough and systematic review process is imperative to guarantee a seamless and robust deployment, enhancing the system's readiness for optimal performance and user satisfaction.

3.6 Deployment

Upon completion of development, the app is slated for publication on two major platforms: the Google Play Store and the Apple App Store. This deployment initiative aims to maximize the app's accessibility across a wide spectrum of users, catering to both Android and iOS audiences.

Furthermore, the system architecture includes two key components: the administrator interface and the beneficiary dashboard, both hosted on a dedicated web server. This arrangement consolidates the backend

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

operations and serves as the central repository for managing administrative tasks and facilitating beneficiary interactions. Hosting these components on a web server not only ensures a centralized and secure environment but also enables seamless access and real-time updates for both administrators and beneficiaries.

4. Result and Discussion

This section presents the outcomes of the project, encompassing various visual representations and analyses of the system's structure, functionality, and user interface design. It includes use case diagrams, activity diagrams, and user interface designs, providing a comprehensive view of the system's architecture and user interaction models. These visual aids serve as critical components in understanding the system's behavior, user interactions, and overall functionality. Through a detailed discussion and analysis of these results, this section aims to elucidate the project's achievements, highlight key design decisions, and evaluate the system's alignment with the specified requirements and objectives.

4.1 Use Case Diagram

The DonoSync system operates through distinct user roles: Administrators, Donors, and Beneficiaries. Administrators play a pivotal role in the system, responsible for program creation, donor and beneficiary management, report generation, and accessing analytical data. Their multifaceted responsibilities ensure the effective management and oversight of the entire donation lifecycle.

Donors are the foundation of the platform's contribution mechanism, actively participating in various causes, exploring initiatives, and accessing impact reports to ensure continuous flow of contributions.

Beneficiaries actively participate in the donation system by monitoring donations, confirming receipts, providing feedback, and receiving notifications, ensuring transparency, acknowledging support, and fostering gratitude within the donation ecosystem.

The Use Case Diagram visually illustrates the distinct roles and contributions of each user category within the DonoSync system, enhancing understanding of their role in donation management.

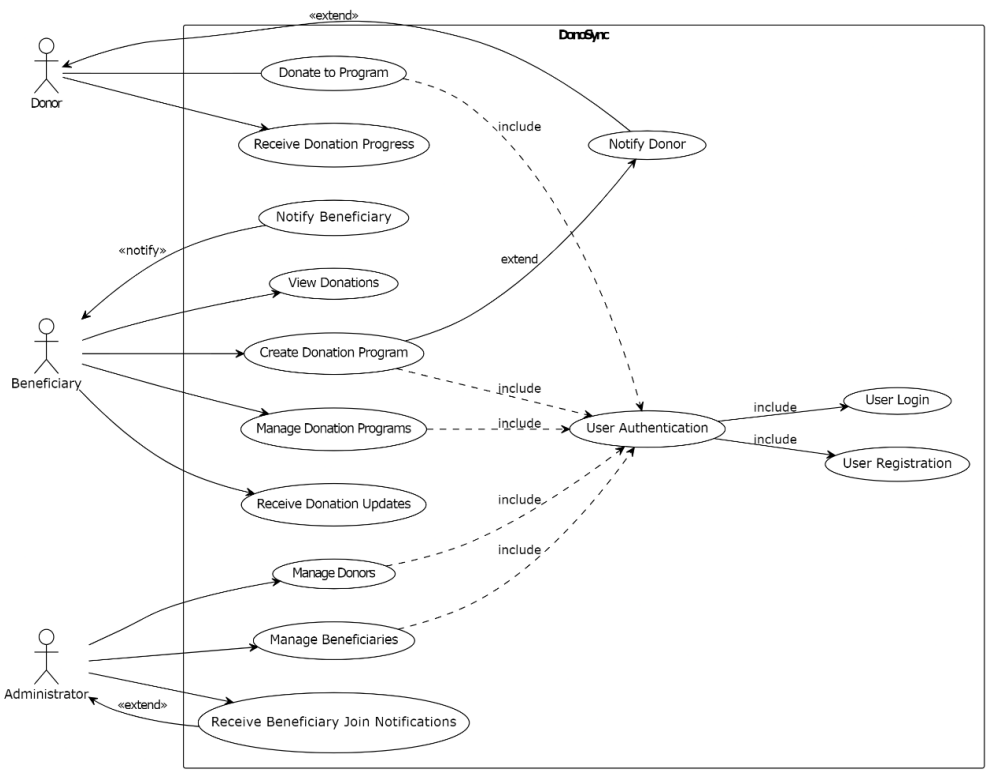

Fig. 5 *Use Case Diagram*

4.2 Activity Diagram

The activity diagram illustrates the sequential steps a Donor undergoes while interacting with the DonoSync platform.

The process initiates with the Donor logging into the system. The system validates the Donor's credentials, prompting a check for whether the user is a new registrant or an existing user.

The system creates a new account for new users on the DonoSync platform, allowing donors to view available donation programs and initiate the donation process by selecting a program.

The system verifies donation success, allowing donors to opt for notifications about the donation process, ensuring transparency and engagement. This loop continues until the donor logs out or encounters specific conditions.

The diagram provides a detailed explanation of the Donor's interaction with the DonoSync system, ensuring a thorough understanding of user interactions and system responses.

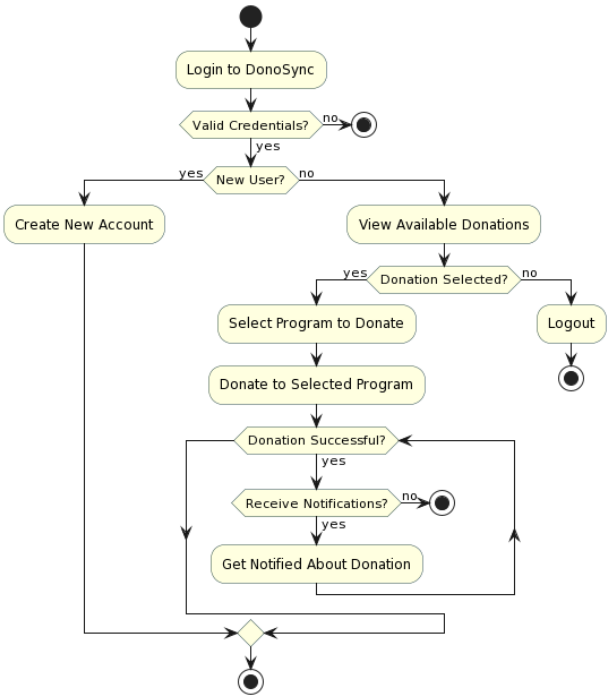

Fig. 6 *Activity Diagram*

4.3 Class Diagram

A class diagram is a UML diagram that illustrates the classes in a system and their relationships, crucial for software engineering competencies [12]. Class diagrams play a fundamental role in defining the structure of a system by showcasing the system's classes, attributes, methods, and the relationships between objects. This helps in visualizing the blueprint of a software application, making it easier for developers to understand and implement the system [13].

The class diagram for DonoSync offers a comprehensive depiction of the system's architecture, presenting the key classes, their attributes, methods, and relationships. This diagram serves as a vital tool for ensuring that every aspect of the system's structure is precisely defined and comprehended by the development team, aiding in effective implementation and maintenance of the platform.

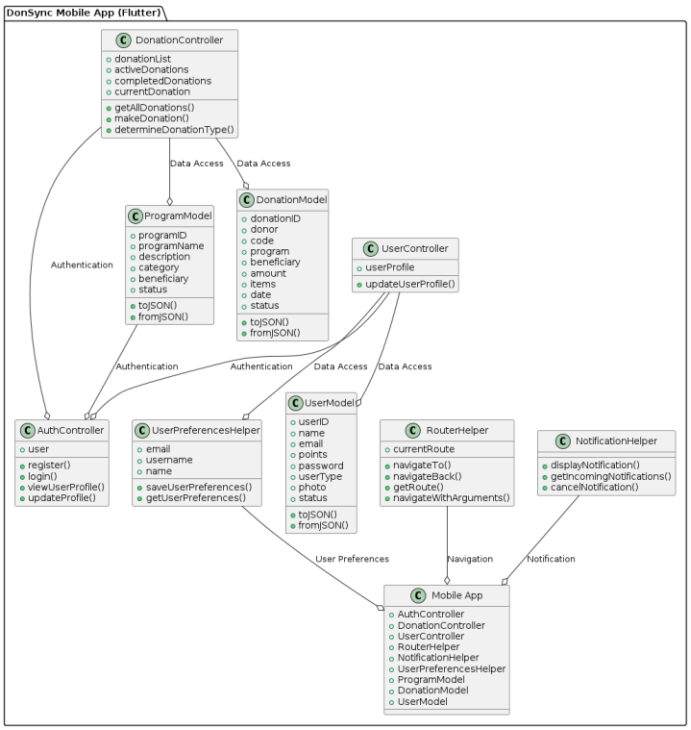

Fig. 7 *Class Diagram for the DonoSync mobile app*

Figure 7 above shows the UML class diagram for the mobile app. The following diagram shows the class diagram for the server.

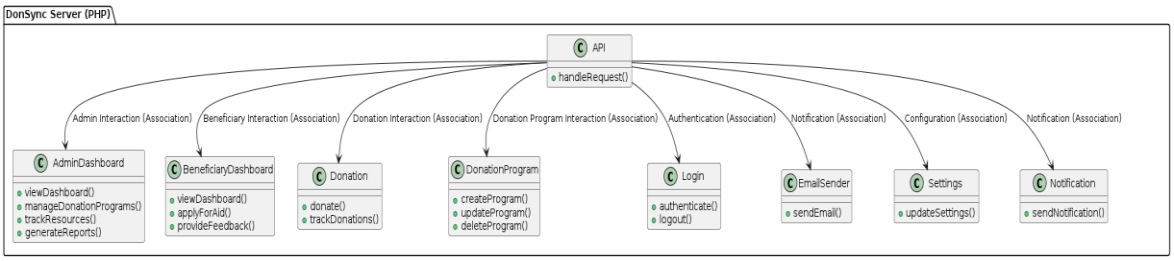

Fig. 8 *Class Diagram for the DonoSync server*

The above diagram is the class diagram for the server. As explained previously, the mobile app initiates the communication between the server and the app and each needs to handle this effectively. This is ensured throughout the system.

4.4 Implementation

The implementation of DonoSync encompasses the practical realization of the project's design and objectives, translating conceptual ideas into a functional and user-friendly mobile application. This section provides a comprehensive overview of the technical steps and processes involved in developing DonoSync. By detailing the system architecture, front-end and back-end development, database design, and integration of security protocols, the project's theoretical framework is brought to life.

An iterative development model is followed, ensuring continuous enhancement and adaptation based on user feedback and testing. Each subsection within this section delves into specific components of the implementation process, including the choice of technologies, development methodologies, and the challenges faced during development. This detailed exposition showcases the technical rigor and strategic planning that underpin the successful realization of DonoSync.

4.4.1 Registration and Login

The Registration and Login subsystem is a critical component of DonoSync, ensuring secure and streamlined access for both donors and beneficiaries. This section outlines the implementation of user authentication and authorization mechanisms, which are foundational to protecting user data and maintaining the integrity of the

application. Key elements include the creation of user profiles, validation processes, and secure storage of credentials.

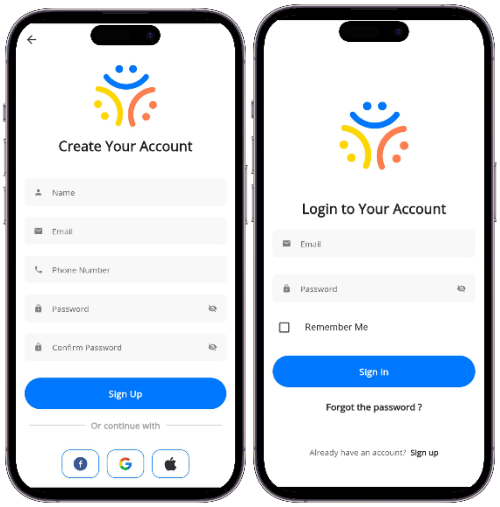

Fig. 9 (a) *Registration Interface, (b) Login Interface*

4.4.2 Donor Main Interface

The Donor Main Interface serves as the central hub for donors to interact with the DonoSync application. This section outlines the design and functionality of the interface, which provides an intuitive and user-friendly experience. Key features include browsing donation programs, making contributions, tracking donation history, and accessing personalized recommendations. The interface is designed to facilitate seamless navigation and engagement, ensuring donors can efficiently support causes that matter to them.

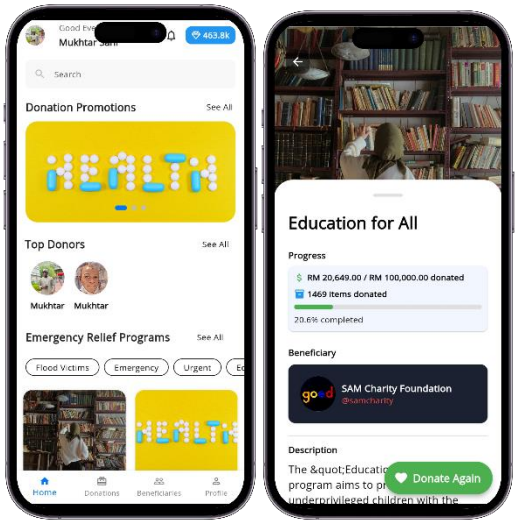

Fig. 10 (a) *Donor Main Interface, (b) Program Details Interface*

Fig 10 above shows the main interface for the donor. It showcases the donation programs with quick navigation to various sections of the application. Part a of the figures shows the home page, while b shows the program description page which has the option to donate to the program.

4.4.3 Donation

In this donation section, users manage contributions through three main parts: the donation page, donations overview, and donation details. The donation page lets users select programs and contribute money, items, or both. The overview shows past contributions and their impact, while the details page provides in-depth information for each donation.

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

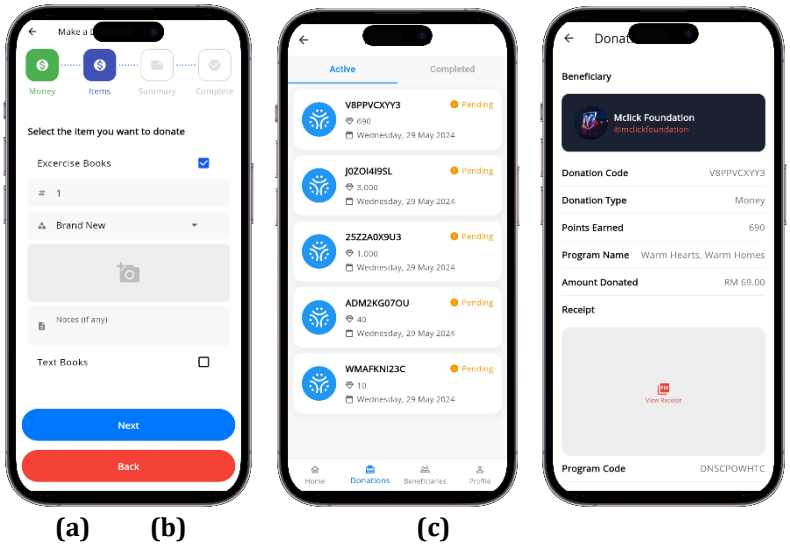

Fig. 11 (a) *Make Donation Page, (*b) *My Donation Page,* (c) *Donation Details Page.*

Fig. 11 above shows three pages for making donations as well as viewing donation history. Figure 11a is for making the donation while b is for viewing the donations a donor makes and finally, c is for viewing the details.

4.4.4 Donor Profile

The Donor Profile section provides users with a platform to manage their personal information and preferences within DonoSync. Users can update their profiles, including contact details and donation preferences, ensuring a personalized experience. This feature enhances user engagement and facilitates effective communication between donors and the DonoSync platform.

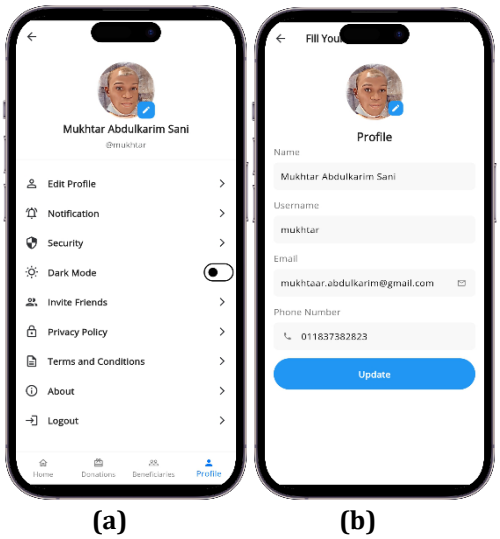

Fig. 13 (a) *Donor Profile interface,* (b) Edit Profile Interface

Figure 13 shows the profile interfaces for the donor. Part a show multiple options for users which includes editing profile information, viewing notifications, managing security features of the app.

4.4.5 Admin and Beneficiary

This section offers a glimpse into the dashboard interfaces for selected sections pertinent to both administrators and beneficiaries. Covering essential areas such as program management and donation oversight, these interfaces serve as centralized hubs for efficient management and coordination. Through intuitive design and comprehensive functionalities, administrators and beneficiaries alike can navigate seamlessly, ensuring smooth operations and enhanced engagement within the DonoSync platform.

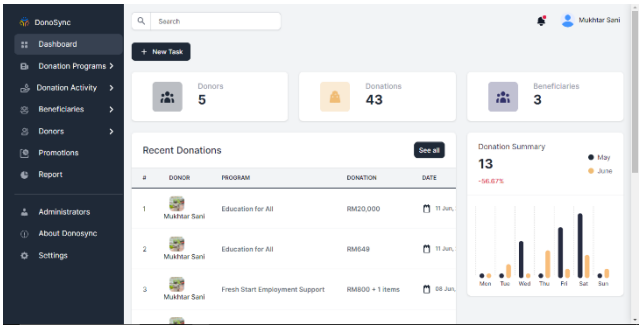

Fig. 14 *Admin and beneficiary dashboard*

Fig. 14 shows the main page being shown after successful login to the system by admin and beneficiaries. It gives a quick summary of the system including numbers of donations received. It even shows a summary and comparison between the current month's donations and last month's donations as well as shows decline or growth.

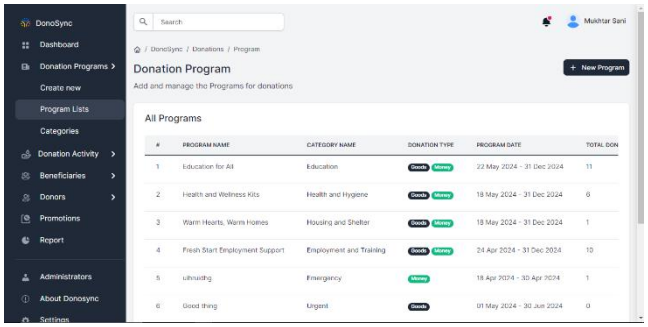

Fig. 15 *Donation programs management*

Fig. 15 shows the interface for managing donation programs. It includes options such as creating a new donation program as well as managing individual programs.

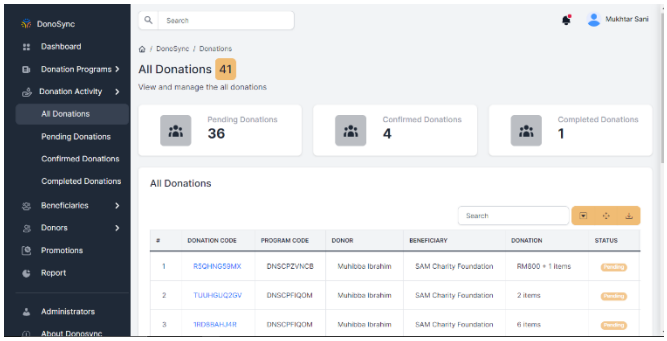

Fig. 16 *Donations management interface*

Fig. 16 shows the interface for managing donations. This interface is for admin and beneficiaries. Admin will view all the donations, but beneficiary's views only are those specific to them, meaning, their own programs. It shows a quick overview of the donation system.

4.4.6 Report

The Report section provides users with access to detailed analytics and insights regarding donation activities within DonoSync. Users can generate comprehensive reports on various aspects such as donation trends, program performance, and beneficiary feedback. These reports offer valuable data-driven insights to administrators and donors, enabling informed decision-making and strategic planning. By leveraging reporting functionalities, users can gain a deeper understanding of the impact of their contributions and track the effectiveness of donation programs over time.

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

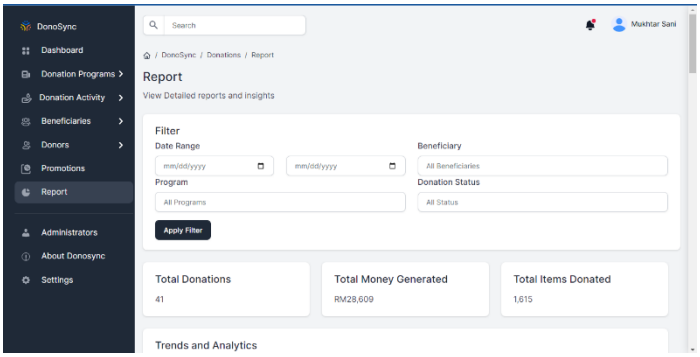

Fig. 17 *Report page; filtering section and overview*

Fig. 17 shows the interface for report filtering. It provides an option to filter results based on range, beneficiary, program and or status. It then filters the results and provides the generated report.

Fig. 18 *Report page; trends and analytics, top programs and top donors*

Fig. 18 shows the section in the report page that shows graphical representation of the results. This includes the trends and analytics across the donations, top programs having the most donations as well as the top donors with the best contributions. This helps the administration and the beneficiaries to have real-time updates about the progress of donations. It is also easy to filter results to view the analytics for programs or programs with some status as well as results from certain range of time.

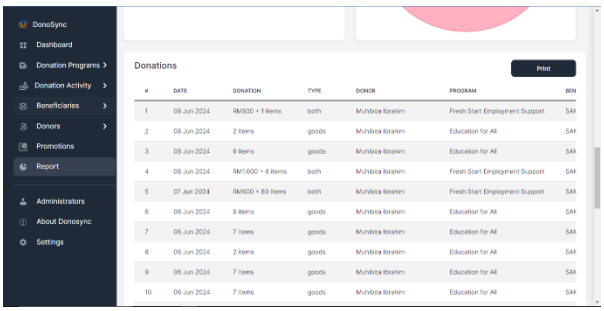

Fig. 19 *Report page; donation list*

Fig. 19 shows the final section which is the list of the donation based on the filter applied. In the case of no results returned, a warning message is shown to instead of making it empty.

4.5 Testing

Testing plays a crucial role in various fields, including software development, education, and design processes. In software development, testing is essential for verifying requirements, validating software behavior, and catching regressions in products [14].

The Testing section is dedicated to ensuring the reliability, functionality, and security of the DonoSync platform. Through rigorous testing methodologies including unit testing, integration testing, and user acceptance testing, the integrity of the application is verified across various levels. This section outlines the testing procedures employed to identify and rectify any potential issues or bugs, ensuring a seamless and robust user experience. By prioritizing testing protocols, DonoSync aims to deliver a high-quality, dependable platform that meets the needs of its users effectively.

4.5.1 Alpha Testing

Alpha testing in software development serves the crucial purpose of evaluating the functionality and quality of a software application before it undergoes beta testing and is released to real-world users. This testing phase, as highlighted in the research papers, involves direct testing of the software output to ensure it aligns with expected results [15]. The table below showcases the test cases designed and executed for this project.

Table 4 *Test cases*

Functional Module	Test Case	Description	Expected Result	Test Result (Pass/Fail)
Registration	Enter a valid name, email address, phone number and password.	Enter correct data for name, email, phone number and password.	System accepts all entered information without any issues	Pass
	Enter mismatched passwords during registration	Provide a password that does not match the confirmation password	System displays an error message indicating password mismatch	Pass
	Attempt to register with existing email and phone number.	Input details that are already registered by other users	System displays an error message indicating details are taken	Pass
	Submit registration with incomplete fields	Leave some required fields blank	System displays an error message prompting completion of all fields	Pass
Login	Login with correct email and password	Enter valid username and password.	System successfully logs the user in, redirecting to the dashboard	Pass
	Login with incorrect email	Enter an email that does not exist in the system	System displays an error message indicating invalid email	Pass
	Login with incorrect password	Enter correct username but incorrect password	System displays an error message indicating incorrect password	Pass

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

	Login with both incorrect email and password	Enter a username and password combination that do not exist	System displays an error message indicating both username and password are incorrect	Pass
	Attempt to login with empty email and password fields	Leave both email and password fields blank	System displays an error message prompting completion of both fields	Pass
Forgot Password	Forgot password with a valid email address	Enter a valid email address and request to reset password	System sends a password reset OTP to the provided email address	Pass
	Check the email inbox for the password reset link and click on the link provided	Check the email inbox for the password reset OTP and copy the OTP.	System verifies the OTP and allows the user to proceed to password reset	Pass
	Change password after verification	Enter a new password and confirm the new password	System successfully updates the password and redirects the user to login	Pass
	Attempt to verify an invalid OTP.	Use an invalid OTP	System displays an error message indicating invalid OTP	Pass
	Submit password reset request with an invalid or non-existent email	Enter an email address that is not registered in the system	System displays an error message indicating that the email address is not registered	Pass
Manage Donation Programs	View selected Donation program	View selected donation program details.	The system shall retrieve and display the details of the selected donation program accurately	Pass
	Add donation program	Enter program's banner, name, date, time, drop off location and description on the Add New donation Program form.	The new donation program shall be stored correctly in the system's database.	Pass

	Edit donation program	Edit the details of the donation program.	The details modified shall be correctly saved and updated in the system's database.	Pass
	Delete donation program	Delete the selected donation program detail.	Upon confirming the deletion action, the program details shall be permanently removed from the system's database.	Pass
Make Donation	Select a program and fill the donation form	Select a program and fill the form of the donation, choose either goods or money or both based on the donation type	The system should accept and store the entered information accurately.	Pass
Manage Donation Activity	View donations' details	Select a donation and view the details	The system should retrieve and display the details of the selected donation accurately.	Pass
	Update donation status	Select current donation status: "Pending", "Confirmed" or "Completed"	The status change should be accurately processed and reflected in the donation details	Pass
View Donation Report	Generate a general report for all donation activities	Select the option to generate a report for all donation activities	System generates a comprehensive report summarizing all donation activities	Pass
	Generate a report for individual donation programs	Select a specific donation program and request a report	System generates a detailed report specific to the selected program	Pass

Applied Information Technology and Computer Science Vol. 5 No. 2 (2024) p. 1141-1159

4.5.2 Beta Testing

Beta testing is a crucial phase in software development where the product is tested in real-world scenarios by external users before its official release [16]. This testing phase follows alpha testing and serves as a form of external user acceptance testing, allowing for the identification of bugs, performance issues, and user feedback to improve the software's quality and reliability [17]. The beta testing for DonoSync has been carried out for three user groups: donors, beneficiaries, and administrators. Detailed findings for each user group will be provided in the subsequent subsections.

4.5.2.1 User Acceptance Testing for Donor

During the beta testing phase, 15 participants provided feedback on the DonoSync application, highlighting its ease of use and functionality. All users successfully registered, logged in, viewed donation programs, made donations, and edited their profiles without issues. Notably, 100% of users found the error messages clear and helpful. The registration and login process were very easy for 93.3% of users, with the remainder finding it easy. Additionally, 100% of users could view donation programs and make donations without problems. Editing profiles and viewing donations were also seamless for all users. High satisfaction with the donation process was noted, with 93.3% rating it a 10 and 6.7% 8. Furthermore, 93.3% were highly likely (rated 10) to recommend DonoSync, with the rest rating it a 9. The overall ease of use was rated 10 by 93.3% of users and 9 by the rest. Navigation through the app was easy for 100% of users. This feedback highlights the high user satisfaction and intuitive design of DonoSync.

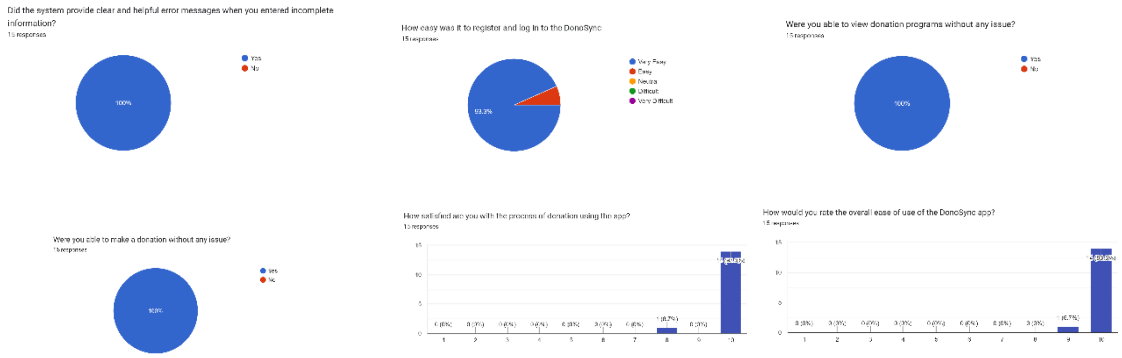

Fig. 20 *User acceptance testing results for donor*

Despite the overwhelmingly positive feedback, it is recommended to address the concerns of the few who gave lower ratings to ensure a consistently excellent user experience. Continuous improvement based on user suggestions will help maintain DonoSync's user-friendly design and ensure high satisfaction upon launch.

4.5.2.2 User Acceptance Testing for Beneficiary

During the beta testing phase, 11 beneficiaries provided feedback on the DonoSync application, offering insights into its usability and effectiveness. All beneficiaries found it easy to register and log in, with 81.8% responding "yes" and the remainder mostly affirming or being unsure. Error messages were consistently clear and helpful for all users. The effectiveness of handling donations received positive ratings, with 36.4% giving it a 10, 27.3% a 9, and 27.3% 8. The overall functionality of the system was rated highly, with 45.5% giving it a 9 and 45.5% a 10.

In terms of ease of use, 54.5% of beneficiaries rated it a 10, while the user interface received a 10 from 72.7% of respondents. Navigation through the system was found easy by 90.9% of beneficiaries. The likelihood of recommending DonoSync to other beneficiaries was high, with 45.5% giving it a perfect score and 35.4% rating it an 8. This positive feedback underscores the system's strong performance and user satisfaction, with room for minor enhancements based on user suggestions.

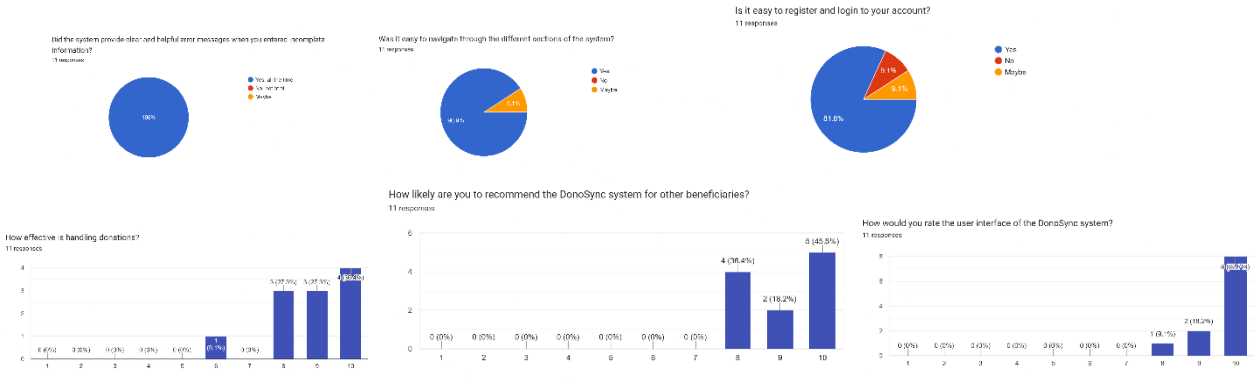

Fig. 21 *User acceptance testing results for beneficiary*

4.5.2.3 User Acceptance Testing for Admin

During the beta testing phase, three admin users provided feedback on the DonoSync application, offering insights into its dashboard and administrative functionalities. All admin participants found logging into the dashboard to be highly easy, rating it a 10. The system effectively handled errors when adding new beneficiaries, programs, and categories, with all admins confirming its reliability in this aspect. Feedback messages, including success and error notifications, were rated as very helpful by all participants, with each giving it a perfect score of 10.

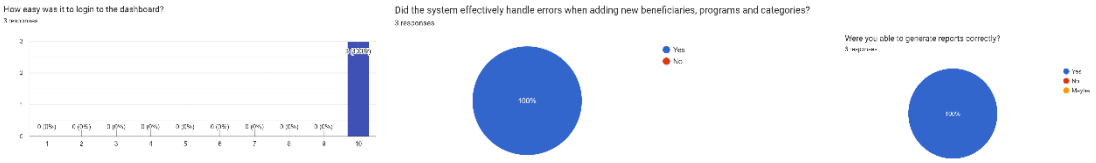

Fig. 22 *User acceptance testing results for admin*

Additionally, all admins successfully generated reports and rated the system's security as a 10. This consistent positive feedback from the admin users highlights the robustness and user-friendliness of the DonoSync system's administrative features, indicating strong performance and high satisfaction.

5. Conclusion

This study delves into donation management platforms, culminating in the creation of DonoSync. Through an analysis of existing systems and an iterative model, DonoSync emerged as a versatile and user-focused solution.

Employing an iterative approach and utilizing Flutter and PHP, the system's design ensures adaptability and resilience. The user interface designs, and activity flow promise seamless interactions for donors, beneficiaries, and administrators.

Moving ahead, there's potential to enhance geolocation integration for better program tracking and community engagement. Continual refinements to DonoSync will ensure its relevance in evolving philanthropy.

DonoSync stands as a significant step in optimizing donation management, merging technology with user-centric design for a more transparent and impactful philanthropic platform.

Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

The authors confirm contribution to the paper as follows: ***study conception and design:*** *Mukhtar Abdulkarim Sani, Mazidah Binti Mat Rejab;* ***data collection:*** *Mukhtar Abdulkarim Sani, Mazidah Binti Mat Rejab;* ***analysis and***

interpretation of results: *Mukhtar Abdulkarim Sani, Mazidah Binti Mat Rejab;* ***draft manuscript preparation:*** *Mukhtar Abdulkarim Sani, Mazidah Binti Mat Rejab; All authors reviewed the results and approved the final version of the manuscript.*

References

[1] S. Jadhav, S. Nawale, V. Loya, V. Gujarathi, and S. Wani, "Decentralized expert system for donation tracking and transparency," in Lecture notes in networks and systems, 2023, pp. 107–123. https://doi.org/10.1007/978-981-99-1745-7_8.

[2] M. S. Farooq, M. S. Khan, and A. Abid, "A framework to make charity collection transparent and auditable using blockchain technology," Computers & Electrical Engineering, vol. 83, p. 106588, May 2020, https://doi.org/10.1016/j.compeleceng.2020.106588.

[3] B. Choi and M. Kim, "Donation via mobile applications: A study of the factors affecting mobile donation application use," International Journal of Human-Computer Interaction, vol. 32, no. 12, pp. 967–974, Aug. 2016, https://doi.org/10.1080/10447318.2016.1220070.

[4] I. Bilyk, "Online fundraising as the main innovative tool of non-profit organizations," Menedžment Ta Pìdpriêmnictvo V Ukraïnì: Etapi Stanovlennâ Ì Problemi Rozvitku, vol. 2022, no. 1, pp. 200–205, Jun. 2022, https://doi.org/10.23939/smeu2022.01.200.

[5] N. Mota, A. Chakraborty, A. J. Biega, K. P. Gummadi, and H. Heidari, "On the Desiderata for Online Altruism," Proceedings of the ACM on Human-computer Interaction, vol. 4, no. CSCW2, pp. 1–21, Oct. 2020, https://doi.org/10.1145/3415197.

[6] M. Wade, "'The giving layer of the internet': A critical history of GoFundMe's reputation management, platform governance, and communication strategies in capturing peer‐to‐peer and charitable giving markets," Journal of Philanthropy and Marketing, vol. 28, no. 4, Oct. 2022, https://doi.org/10.1002/nvsm.1777.

[7] G. Elmer and S. Ward-Kimola, "Crowdfunding (as) disinformation: 'Pitching' 5G and election fraud campaigns on GoFundMe," Media, Culture & Society, vol. 45, no. 3, pp. 578–594, Nov. 2022, https://doi.org/10.1177/01634437221136009.

[8] J. V. Dirisam, D. Bein, and A. Verma, Predictive analytics of donors in crowdfunding platforms: a case study on donorschoose.org. 2021. https://doi.org/10.1109/ccwc51732.2021.9376094.

[9] S. Wolff and D. Carlson, "Who chooses DonorsChoose? submission and funding patterns on the nation's largest education crowdfunding platform," Educational Researcher, vol. 50, no. 6, pp. 355–367, Jan. 2021, https://doi.org/10.3102/0013189x21990002.

[10] "Iterative Model (Software Engineering) - javatpoint," www.javatpoint.com. https://www.javatpoint.com/software-engineering-iterative-model.

[11] A. Batta and D. K. Srivastava, "A Novel Approach in Requirement Engineering during Software Build-up," 2021 10th IEEE International Conference on Communication Systems and Network Technologies (CSNT), Bhopal, India, Jun. 2021, https://doi.org/10.1109/csnt51715.2021.9509724.

[12] F. Utami et al., "An investigation of class diagram builder system from the translation of BPMN and database," AIP Conference Proceedings, Jan. 2023, https://doi.org/10.1063/5.0103679.

[13] O. G. Fragoso-Diaz, J. A. Sandoval-Acosta, F. J. Alvarez-Rodriguez, J. C. Rojas-Perez, and R. Santaolaya-Salgado, "Systematic Review of quality in class diagrams for Software engineering competencies," IEEE-RITA, vol. 17, no. 4, pp. 351–357, Nov. 2022, https://doi.org/10.1109/rita.2022.3217169.

[14] S. Lawrence, "Testing," in Apress eBooks, 2023, pp. 365–391. https://doi/10.1007/978-1-4842-9234-1_12.

[15] T. Menora, C. H. Primasari, Y. P. Wibisono, T. A. P. Sidhi, D. B. Setyohadi, and M. Cininta, "Implementasi Pengujian Alpha dan Beta Testing Pada Aplikasi Gamelan Virtual Reality," Konstelasi, vol. 3, no. 1, pp. 48–60, Jun. 2023, https://doi.org/10.24002/konstelasi.v3i1.6625.

[16] A. Anand, N. Bhatt, D. Aggrawal, and L. Papic, "Software Reliability Modeling with Impact of Beta Testing on Release Decision," in Management and industrial engineering, 2016, pp. 121–138. https://doi/10.1007/978-3-319-48875-2_5.

[17] A. Anand, N. Bhatt, D. Aggrawal, and L. Papic, "Software reliability modeling with impact of beta testing on release decision," in Software Reliability Modeling with Impact of Beta Testing on Release Decision, https://doi.org10.1007/978-3-319-48875-2_5.