Crowdfunding for Environmental Projects: A Sustainable Approach to Community-Led Initiatives

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Abstract—Crowdfunding has emerged as a powerful and innovative method for individuals, startups, and organizations to raise funds for their projects, causes, and creative endeavors. Managing crowdfunding campaigns efficiently and securely is crucial to ensuring the success of these initiatives. This project proposes the development of a robust Crowdfunding Management System powered by a Database Management System to streamline the entire crowdfunding process.

By leveraging a powerful DBMS, this Crowdfunding Management System will efficiently handle data storage, retrieval, and management, ensuring scalability, data integrity, and high performance. The DBMS will support structured data storage for user profiles, campaign details, transaction records, and more.

The proposed Crowdfunding Management System aims to simplify the crowdfunding process for campaign creators and contributors alike, fostering a supportive and transparent crowdfunding ecosystem. It will enable innovative projects to reach their funding goals while providing contributors with a user-friendly and secure platform to support causes they are passionate about.

The development of this Crowdfunding Management System represents a significant step towards enhancing the crowdfunding experience and empowering individuals and organizations to bring their creative ideas and initiatives to life.

Keywords—Crowdfunding, Donor engagement, Fundraising, Project financing.

I. INTRODUCTION

The internet's interactive nature, particularly through social crowdfunding, has become a catalyst for startup innovation in business, channeled by financial technology for collective fundraising towards social causes. With global crowdfunding transactions predicted to rise from US$1,141 million in 2022 to US$1,209 million by 2025, and Indonesia anticipating a value of US$6.2 million in 2022, this study delves into donor motivations using the UTAUT framework, filling a research gap and elucidating intentions in digital storytelling for social causes within crowdfunding[1].

Crowdfunding, a dynamic form of entrepreneurship, involves gathering small contributions from a diverse group to fund projects via platforms like Kickstarter and Indiegogo. Success depends on creators accurately anticipating contributors' behaviors, a challenge compounded by the cognitive complexities often overlooked in traditional crowdfunding literature. Despite the proven efficacy of the cognitive hierarchy (CH) theory in diverse applications, its untapped potential in understanding crowdfunding dynamics underscores the need for focused exploration in this evolving field [2].

Startup companies, with the potential for growth, attract investors, enabling them to enhance infrastructure and contribute to economic growth. Despite positive trends in Indonesia's startup ecosystem, hesitancy among investors persists due to knowledge gaps and fraud concerns, highlighting the need for accessible information and robust internal procedures in crowdfunding platforms [3].

Innovation, a crucial driver for sustainable development, faces challenges as sustainability innovators grapple with heightened complexities and obstacles from profit-oriented investors. Crowdfunding emerges as a potential solution, tapping diverse knowledge and financial resources, yet navigating this landscape requires addressing challenges such as justifying environmental impacts and combatting "greenwashing," highlighting the need for comprehensive guidance in both research

and practice for sustainable innovation through crowdfunding [4].

The growing significance of digitalization in modern society underscores its crucial impact on the economy and social sectors, driven by intelligent information technologies that reshape the financial landscape. At the core of the digital economy, crowdfunding enables individuals and small businesses to obtain early-stage support online. Scientific insights are sought in exploring a theoretical framework that delves into crowdfunding's essence, global and national platform functionalities, crowdfunding definitions, financing potential, diversification possibilities, and its relevance for financial support in Ukraine [5].

The rising trend among makers, designers, and entrepreneurs is turning towards online crowdfunding platforms, notably Kickstarter and Indiegogo, to validate design concepts and garner early user support for innovative products. However, the unique challenges within the technology category, marked by high interest but low success rates, prompt the need for a data-driven approach. This article addresses this challenge by developing a crowdfunding prediction model, utilizing publicly available campaign data, with a focus on crucial success factors like product maturity, team expertise, and market dynamics, offering valuable guidance for innovators navigating the complexities of crowdfunding in the realm of design [6].

Employing smart contracts on the decentralized Ethereum blockchain, the proposed system ensures secure and transparent transactions, with funds managed through a novel approval mechanism, offering a transformative and trustworthy platform for crowdfunding projects[7].

The surge in crowdfunding, particularly during the COVID pandemic, has highlighted challenges such as security issues and transparency concerns on existing platforms. This study advocates for a solution by integrating blockchain technology into crowdfunding, offering heightened security and transparent fund tracking, thereby addressing critical issues prevalent in traditional crowdfunding systems. As the global cryptocurrency market expands, the transformative potential of blockchain in crowdfunding becomes increasingly evident, promising improved financial viability and enhanced trust for fundraising endeavors [8].

Entrepreneurs, seeking funding for their groundbreaking ideas, often encounter obstacles in traditional centralized crowdfunding systems operating on Web 2.0 technology. To overcome issues of centralization and enhance trust, the emergence of Web 3.0, coupled with blockchain technology, provides a decentralized solution exemplified by platforms like Together on the Ethereum blockchain. This decentralized approach not only empowers investors, ensuring secure contributions and minimizing fraud risks, but also expedites global support for innovative projects [9].

In the face of economic challenges exacerbated by the COVID-19 pandemic, crowdfunding has become a crucial avenue for startups, NGOs, and charities in India, with a notable increase in startups entering the unicorn club in 2021. However, existing crowdfunding technologies suffer from transparency issues, high fees, and a lack of contributor guarantees, making the integration of blockchain and smart contracts a proposed solution to establish a decentralized, transparent, and trustworthy platform for contributors in supporting innovative projects [10].

The Blockchain-Based Crowdfunding Application revolutionizes fundraising by merging blockchain technology with crowdfunding, leveraging decentralized principles and smart contracts for secure fund storage. With funds held in smart contracts rather than directly transferred, the application ensures transparency, monitored by an Admin, offering startups a unique platform to attract funding from Backers, facilitated by seamless interactions through MetaMask and web3 API on the Ethereum platform [11].

Crowdfunding, a practice reliant on centralized payment systems, undergoes a transformative shift with the integration of blockchain technology. This innovation introduces transparency and immutability through a decentralized ledger, fostering trust by ensuring precise fund distribution and employing smart contracts for automated transactions. In exploring a hybrid crowdfunding model embracing equity, reward, donation, and profit-sharing, this research provides fundraisers flexibility, while smart contracts streamline the allocation process, minimizing the need for manual intervention [12].

II. RELATED WORKS

In [1], the significance of digital storytelling in the context of social crowdfunding is emphasized by this study. Through the application of the UTAUT framework, the study not only establishes a relationship between UTAUT constructs and digital storytelling, but it also emphasizes the subsequent

impact on donors' purposes to make contributions via crowdfunding platforms. The results offer significant perspectives for professionals and scholars who aim to improve the performance of social crowdfunding projects, which are in the Jakarta region and Bali areas.

In [2], through modelling that takes into account the limits of contributors, the article improves our understanding of and ability to optimise crowdfunding campaigns. Insights into the nature of crowdfunding decisions can be obtained by applying the cognitive hierarchy theory and a two-stage model. With regard to project creators hoping to succeed on crowdfunding platforms, the findings provide insight into the relationship between contributors' actions and the creator's attempt to increase revenue.

In [3], the paper presents a Web-based Crowdfunding Platform model designed to cater to the specific needs of investors engaging in crowdfunding. The emphasis is on creating a user-friendly interface that enables investors to search for, select, and organize investment portfolios based on their preferences. The study contributes to the ongoing development of crowdfunding platforms by addressing the practical requirements of investors in the design process.

In [4], this article offers insights into the intersection of crowdfunding and sustainability innovation. It emphasizes the importance of addressing trust issues and communication challenges faced by sustainability innovators in the crowdfunding space. The systematic literature review provides a comprehensive overview of the existing research landscape, and the article concludes by proposing a research agenda to further explore the dynamics of crowdfunding in the context of sustainability.

In [5], this paper contributes to the understanding of crowdfunding within the digital economy, offering theoretical insights into its definition, potential, and applications. The focus on both global and national platforms provides a comprehensive perspective, with implications for the financial support of businesses and sectors, particularly in the case of Ukraine. The study suggests the potential for further research to expand the understanding of crowdfunding on a global scale.

In [6], this article offers a practical and data-driven methodology for predicting crowdfunding success for innovative products. By identifying critical factors through regression analysis, the approach provides valuable insights that can guide the development of crowdfunding campaigns, ultimately increasing the chances of success in raising funds for innovative ventures.

In [7], the growth of crowdfunding and its significant role in supporting entrepreneurial activities are discussed in the article. It highlights the difficulties that exist in the present crowdfunding environment, focusing on problems with maintenance expenses, honesty, and trust. By promoting the use of blockchain technology and smart contracts, the suggested solution presents a progressive approach. The paper describes a transparent crowdfunding system where each transaction is safely recorded on the blockchain through the use of these technologies. This application aims to address current issues and promote a crowdfunding environment that is more accurate, practical, and productive.

In [8], the paper addresses the transformative impact of crowdfunding on entrepreneurship, facilitated by the accessibility provided by social media and crowdfunding websites. It underscores the limitations of the current crowdfunding model, particularly in terms of investor assurances and control. The proposed solution introduces a novel approach by leveraging blockchain technology to establish a secure and decentralized crowdfunding platform. This approach aims to instill confidence among investors by providing transparency in transactions and empowering them with control over their contributed funds. The paper emphasizes the potential of this blockchain-based crowdfunding model to address critical challenges in the existing system, fostering a more reliable and investor-friendly environment for crowdfunding initiatives.

In [9], the paper addresses the formidable challenge of fundraising for new initiatives and entrepreneurial ventures. It recognizes the skepticism surrounding traditional crowdfunding due to frauds and data manipulation. The proposed solution involves the integration of blockchain technology, specifically an advanced version of Ethereum-based crowdfunding. The key focus is on developing a smart contract that ensures a secure and transparent investment experience for contributors supporting innovative projects. The paper advocates for the transformative potential of blockchain in revitalizing crowdfunding, offering a solution that aligns with the evolving needs of investors and entrepreneurs in the digital era.

In [10], this paper addresses the critical role of crowdfunding in project evolution, particularly in the context of the COVID-19 pandemic. It identifies the challenges and risks associated with crowdfunding, emphasizing the need for a secure and efficient solution. The proposed model integrates blockchain technology, leveraging its characteristics for creating a trustworthy environment. Smart contract protocols are introduced to enhance security and establish a tamper-proof crowdfunding ecosystem. The practical implementation and testing demonstrate the model's viability, efficiency, and resilience against existing solutions, providing a robust foundation for secure crowdfunding initiatives in the face of evolving cyber threats.

In [11], this paper introduces a novel approach to crowdfunding by integrating blockchain technology, specifically Ethereum smart contracts. The focus is on addressing the challenges of security, transparency, and fraud in global crowdfunding. The proposed system allows for the development and support of campaigns through interactive forms, with all transactions recorded on the blockchain. By leveraging smart contracts, the platform ensures that campaigns adhere to specified time limits, reducing the risk of fraudulent activities. This innovative application of blockchain in crowdfunding has the potential to enhance the credibility and reliability of crowdfunding initiatives globally, offering a secure and transparent environment for both campaign creators and donors.

In [12], this research underscores the significance of trust in crowdfunding and proposes the integration of smart contracts and blockchain technology as a solution to fortify this trust. Blockchain, with its characteristics of securely holding digital assets and providing transparency, forms a robust foundation for crowdfunding processes. The advantages of smart contracts, such as expedited transactions and heightened security, further enhance the efficiency of crowdfunding. Additionally, the research emphasizes how this integration improves project visibility, benefiting creators, backers, and platform administrators. By providing a comprehensive analysis of these technologies, the paper contributes to advancing secure and transparent crowdfunding practices in the digital era.

III. DESIGN

The Crowdfunding Management System is composed of 4 major modules, those are:

1. User Management Module
2. Project Management Module
3. Funding and Transaction Module
4. Review and Feedback Module

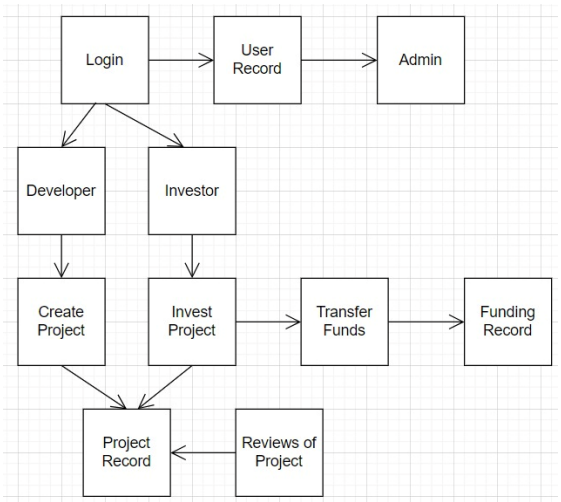


Fig.1 .Dataflow diagram of Crowdfunding Management System

User roles and permissions:

1. Developer: create, edit and manage projects.
2. Investor: Review and invest the project.
3. Admin: Manage all the data.

Developer and Investor are the two types of users can login into the website. The login information will be stored in user record which can be managed by admin. Developer creates the project and posts it in the website. Investors invest in the projects which they are interested in. The project details, investment details and reviews will be stored in project record. Details of funding transactions will be stored in funding record.

IV. IMPLENTATION

User management module: User management module is fundamental to the functioning of a Crowdfunding Management System. It allow users to create accounts by logging in. Collects necessary information during the registration process such as username, email address, and password. Enable users to update their profiles and personal details. Validates user input. Interacts with the Database to store and retrieve user information. Interact with the Project management module to display user-associated projects. Interact with the Funding and Transaction Module for secure financial transactions. In Fig.1 dataflow diagram Login, User record, developer and investor are considered into user management module.

Project management module: Project management module allows developers to create new projects, posts it in the website and modify project details. Interacts with the database module to store and retrieve project data. Interacts with the funding and transaction module to display the real-time funding status of a project. Interacts with review and feedback module to display project-associated reviews. In Fig.1 dataflow diagram create project, invest project, project record are cosidered into project management module.

Funding and transaction module: Funding management module handles financial transactions associated with the projects .It allow investors to invest in the projects. Interacts with database to store and retrieve transaction details. Displays the funding status of each project by interacting with project management module. Provides a detailed transaction history for both project developers and investors. Interacts with user management module for user validation before processing transactions and to store user data in funding record. In Fig.1 dataflow diagram transfer funds, funding record are considered into funding and transaction module.

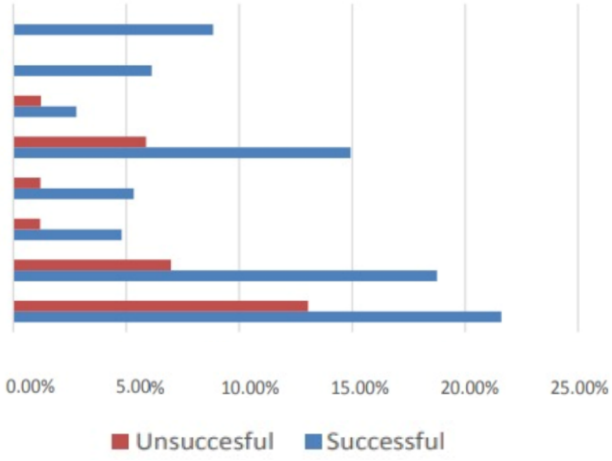
Review and feedback module: Review and feedback module allow users to share their opinions, provide feedback on the projects. Interacts with database to store and retrieve reviews of a project. It makes crowdfunding platform interactive. Interacts with user management module to display user-associated reviews. Interacts with project management module to display project-associated reviews. In Fig.1 reviews of project is considered into review and feedback module.

Algorithm:

1. User posts detailed plan of project, total amount needed and due date for funding.
2. Spreads word about the project on social media and in advertisements.
3. Investors explore and browse different projects.
4. Investors provides funds for the project they are interested in.
5. Displays the fund raised for a project.
6. The user engages with investors and embraces different points of view.
7. After reaching the funding goal project get implemented.
8. Manages the funds provided and completes the project execution.
9. User shares the outcome and impact achieved by the project.
10. Receives insightful evaluations and comments following project completion.

V. RESULTS

After execution of project, we can analyze the fund raised for a project. And we can compare the overall investment of the investors. The projects can be categorised based on the outcome. Investors can invest based on the previous history result of a project. Investment can be declared as profit or loss depending upon result of the project implementation. The graph given below describes successful and unsuccessful investment funded by the companies / NGOs.



VI. CONCLUSION

crowdfunding is a practice where an individual, a corporation, or an NGO can raise funds for a specific purpose. "A drop of water makes an ocean." The expression describes crowdfunding. Crowdfunding has become a accessible means to bring positive change. In the case of nature conservation, Money is needed for a variety of research initiatives, fieldwork, and public awareness programs that save and manage species and their habitats.

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