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DOI : 10.32734/lwsa.v9i1.2708
Electronic ISSN : 2654-7066
Print ISSN : 2654-7058

Volume 9 Issue 1 – 2026 TALENTA Conference Series: Local Wisdom, Social, and Arts (LWSA)

LWSA Conference Series 09 (2026)
TALENTA Conference Series
Available online at https://talentaconfseries.usu.ac.id

Recyclepay Apps: Digital Platform Innovation to Support Green Economy and Sustainable Waste Management in North Sumatra

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Abstract

Waste problems in North Sumatra continue to increase, causing negative impacts on the economy, environment, and public health. Based on data from the National Waste Management Information System, by 2024, the volume of waste generated in North Sumatra will reach approximately 2,864.06 tons per day, with an annual amount of 1,045,381.35 tons. Therefore, an innovative technology- based solution is needed that can facilitate sustainable transactions and increase community participation in environmental conservation. This research proposes a digital platform designed to integrate the concept of green economy with the circular economy system, to support waste reduction, resource optimization, and increase the economic value of goods that still have potential uses. Using a literature study approach, secondary data analysis, and a survey of potential users, this research resulted in the design of a RecyclePay model that includes a collection mechanism, exchange system, and processing of waste into value-added products, which is expected to increase public awareness, reduce waste, create economic benefits and support the achievement of SDGs, especially in sustainable consumption and production (SDG 12), inclusive economy (SDG 8), and environmental protection (SDG 13). The results show that RecyclePay can be an innovative solution in overcoming waste management problems, and has the potential to become a major catalyst in encouraging a green economy in North Sumatra, but its effective implementation requires infrastructure readiness, supporting regulations, and collaboration between the government, private sector, and communities to ensure a sustainable positive impact in building a green economy in North Sumatra.

Keywords: Circular Economy; Green Economy; North Sumatra; RecyclePay Apps; Sustainable Development Goals (SDGs);

1. Introduction

Waste management, especially inorganic waste, has become a serious issue in North Sumatra due to the increasing amount of waste along with population growth and human activities. The volume of waste in North Sumatra reaches 2,864.06 tons per day or 1,045,381.35 tons per year, with most of it yet to be successfully recycled. The accumulation of inorganic waste that does not decompose has an impact on environmental pollution, a decrease in the quality of public health, and a decrease in economic potential, especially in the tourism sector. A technology-based solution is needed that encourages effective inorganic waste management while providing economic impact to the community. RecyclePay is a digital application that offers a system for exchanging inorganic waste into virtual balances and a place to buy and sell recycled products. The app aims to increase community participation, create economic value, and build a green economy ecosystem in North Sumatra.

2. Literature Review

2.1. Green Economy

Green economy is a development model that emphasizes environmentally friendly investments, carbon emission reduction, and resource efficiency, including through circular economy practices in waste management. This concept has become a global focus, as seen in the Rio+20 conference and Goal 8 of the Sustainable Development Goals (SDGs). The RecyclePay application supports the green economy by facilitating recycling and providing incentives for communities to engage in environmental sustainability.

Selection and peer-review under responsibility of Event of Young Researcher and Economics Students (EVEREST) IX
p-ISSN: 2654-7058, e-ISSN: 2654-7066, DOI: 10.32734/lwsa.v9i1.2708

2.2. Circular Economy

The circular economy is a model that emphasizes waste reduction and resource reuse to extend the lifecycle of products. Its core principles include reducing pollution, reusing materials, and regenerating natural systems. RecyclePay Apps supports this concept by leveraging technology to promote plastic waste recycling.

2.3. Digital Innovation in Waste Management

Digital innovation provides effective solutions for modern waste management to achieve “zero waste, zero emissions.” Digital technology enables efficient monitoring and management of waste through data- driven applications. Digitalization also enhances transparency, optimizes the recycling supply chain, and encourages public participation in waste management.

2.4. Trash to Money

Trash to Money, as the phrase suggests, means turning waste into money. It carries the idea that waste, which was once considered worthless, can be transformed into something with economic value. This concept is realized through applications like RecyclePay, a digital platform that allows users to exchange their inorganic waste for money or other financial incentives. The waste collected through RecyclePay is then processed and recycled into useful, marketable products. In this way, RecyclePay not only helps reduce the amount of waste ending up in landfills but also encourages the public to actively sort and manage their waste responsibly.

This initiative is highly relevant to Sustainable Development Goal (SDG) 12: Responsible Consumption and Production. RecyclePay directly supports Target 12.5, which aims to: "By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse."

3. Research Method

3.1. Research Methods

This study employs a combination of qualitative descriptive and quantitative research methods. The qualitative method is used to describe the phenomena and develop the application concept based on literature reviews and user behavior analysis. The quantitative method is applied to process questionnaire data using simple statistical analysis.

3.2. Time and Place of Research

The research was conducted over a period of three weeks, from March 17 to April 4, 2025, primarily online using platforms like WhatsApp and Telegram. Coordination meetings were held both online and offline as needed.

3.3. Population and Sample

The research population includes North Sumatra residents, with purposive sampling focusing on productive- aged individuals. Data collection involved an online questionnaire with 8 questions, designed to evaluate user interest and responses. A total of 50 respondents participated, and their answers were analyzed through descriptive statistics using Google Sheets.

3.4. Data Collection Techniques

The data consists of:

1. Primary data from questionnaire responses.
2. Secondary data from journals, articles, and official reports regarding waste management and green economy.

3.5. Data Processing and Analysis Techniques

Data processing included calculating percentages and creating simple tables. These analyses helped:

1. essential application features,
2. Design user interaction flow,
3. Develop the user interface.

3.6. Materials and Tools

Materials and tools used include laptops/PCs, internet connection, Google Forms, Canva for UI prototyping, and Excel/Google Sheets for data processing.

3.7. Procedures for Making

The procedure to develop RecyclePay's prototype involved:

1. Literature study and data collection,
2. Questionnaire creation and distribution,
3. Data analysis to determine user needs and preferences,
4. UI/UX design using Canva,
5. Application feature development based on findings.

3.8. Details of Manufacturing Cost

The total cost was Rp 200.000,00, including internet access and Canva Pro use. The research was cost-efficient due to its online nature and the non-functional nature of the prototype.

3.9. Framework

The research framework outlines the digital ecosystem of RecyclePay: connecting users, collectors, and recycling businesses in a circular economy model.

4. Results and Discussion

The results of this research are focused on the development and design of RecyclePay, a digital platform aimed at promoting sustainable waste management and green economy practices in North Sumatra. This application prototype was designed using Canva and integrates both user needs and environmental goals through a simple yet comprehensive interface.

RecyclePay is built for two main user types: the general public and recycling businesses. The interaction mechanism begins when individual users upload waste collection requests via the application. A designated waste collector then retrieves the waste, which is weighed and converted into monetary value for the user. This transaction model not only incentivizes waste sorting and recycling at the household level but also provides a source of raw materials for recycling businesses.

4.1. User Interface Design

The application features include:

1. Splashscreen introducing the RecyclePay brand identity.
2. User Homepage displaying the user’s balance, waste sold, and total income, along with navigation to transaction history, withdrawal features, and pricing.
3. Businessman Homepage for recyclers to monitor their sales, revenue, and products sold.
4. Pickup Page where users post collection requests and collectors respond based on proximity and availability.
5. Schedule Page outlining transportation timelines from both public waste services and private collectors.
6. TPA Search Page allowing users to locate nearby waste processing centers with relevant details.
7. Help Page offering FAQs, chat, and email support features to guide users.
8. Market Page enabling users to purchase recycled products produced by businesses.

Through its digital design, RecyclePay fosters a circular economic model by connecting users and recyclers in a mutualistic relationship. The general public benefits from financial returns for waste, while recycling companies gain access to sorted materials for reprocessing. This model supports not only environmental sustainability but also the growth of green entrepreneurship in the region.

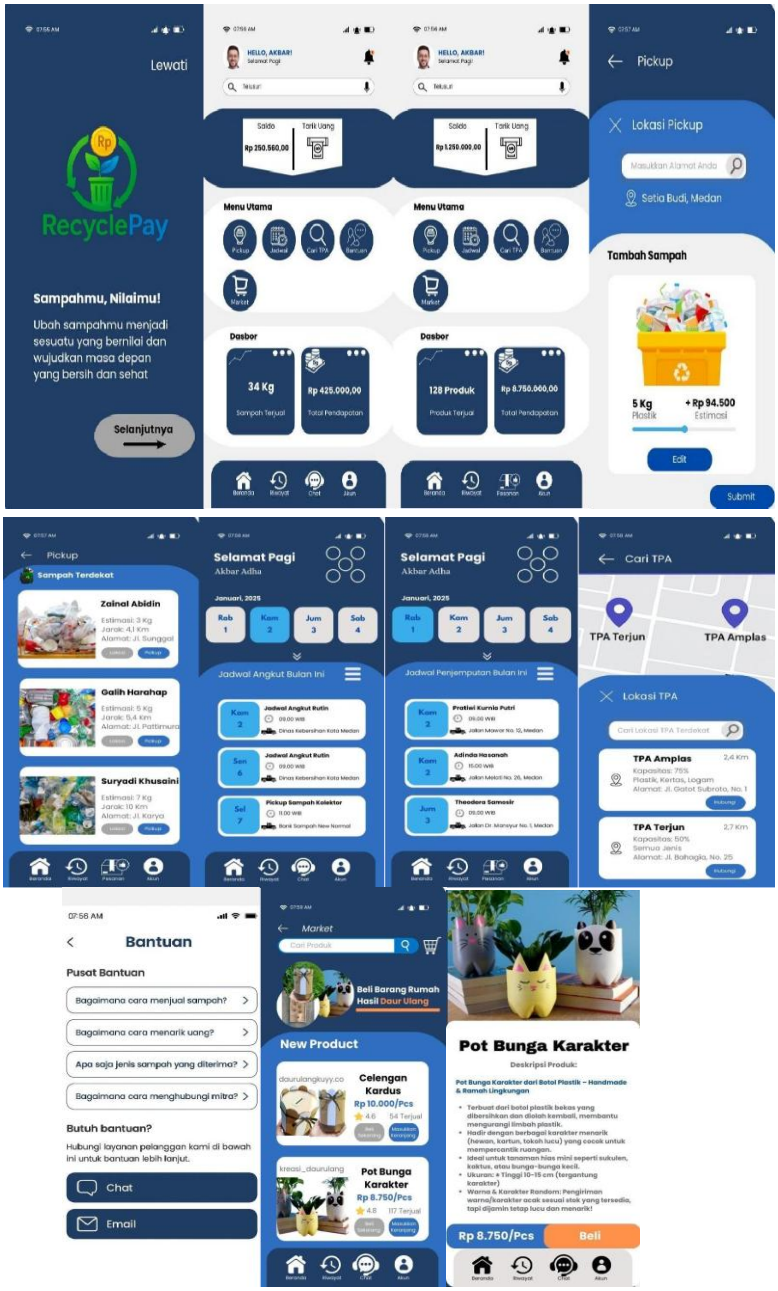

Figure 1. RecyclePay Application Prototype

5. Conclusion

RecyclePay is an innovative digital application design in North Sumatra that carries the concept of "Trash to Money" to support the green economy and sustainable waste management. This application encourages people to convert inorganic waste into economic value, while overcoming the low awareness of sorting waste and the lack of supporting facilities. RecyclePay has great potential to increase community participation and contribute to the achievement of SDGs.

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