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FINANCIAL INCLUSION : TRANSFORMING INORGANIC WASTE INTO INCOME FOR WASTE BANK CUSTOMERS IN MAKASSAR CITY

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Abstract

Makassar City faces critical waste management challenges, with daily volumes reaching 800–900 tons. This condition threatens the environment due to increasingly limited handling capacity. As an innovative solution, digital financial inclusion has been introduced to help the community manage income generated from plastic waste collection. Although community participation in waste management is quite high, the main obstacle lies in the lack of understanding and adaptation to formal and digital financial systems. This study uses a qualitative approach with a case study design to deeply explore the experiences of waste bank actors in transforming waste into economic value through digital financial management. The research focus includes community dynamics, transaction governance, price-setting mechanisms, and the transition from manual to digital systems. The research results show that the waste bank program in Makassar has a positive impact on digital financial inclusion and the economic empowerment of marginal communities. Through collaboration with Bank Sulselbar, customers now use digital savings books to store the proceeds from their waste sales. It is recorded that more than 458 tons of plastic waste were successfully managed and paid for through the digital system. Furthermore, digital financial literacy training has proven effective in increasing customers' understanding of modern financial management, thereby creating economic independence while supporting environmental sustainability in Makassar City.

Key Words : Waste Bank, Financial Inclusion, Inorganic Waste Products, Income, Customer

Abstrak

Kota Makassar menghadapi tantangan pengelolaan sampah yang kritis dengan volume harian mencapai 800–900 ton. Kondisi ini mengancam lingkungan karena kapasitas penanganan yang semakin terbatas. Sebagai solusi inovatif, inklusi keuangan digital diperkenalkan untuk membantu masyarakat mengelola pendapatan dari hasil pengumpulan sampah plastik. Meskipun partisipasi masyarakat dalam pengelolaan sampah cukup tinggi, hambatan utama terletak pada kurangnya pemahaman dan adaptasi terhadap sistem keuangan formal maupun digital. Penelitian ini menggunakan pendekatan kualitatif dengan desain studi kasus untuk mendalami pengalaman para pelaku bank sampah dalam mentransformasi sampah menjadi nilai ekonomi melalui manajemen keuangan digital. Fokus penelitian mencakup dinamika komunitas, tata kelola transaksi, mekanisme penetapan harga, hingga transisi dari sistem manual ke digital. Hasil penelitian menunjukkan bahwa program bank sampah di Makassar berdampak positif terhadap inklusi keuangan digital dan pemberdayaan ekonomi masyarakat marginal. Melalui kolaborasi dengan Bank Sulselbar, nasabah kini menggunakan buku tabungan digital untuk menyimpan hasil penjualan sampah mereka. Tercatat lebih dari 458ton sampah plastik berhasil dikelola dan dibayarkan melalui sistem digital. Selain itu, pelatihan literasi keuangan digital terbukti efektif meningkatkan pemahaman nasabah mengenai pengelolaan keuangan modern, sehingga menciptakan kemandirian ekonomi sekaligus mendukung kelestarian lingkungan di Kota Makassar.

Kata Kunci: *Bank Sampah, Inklusi Keuangan, Produk Sampah Anorganik, Pendapatan, Pelanggan*

INTRODUCTION

The city of Makassar is facing increasingly serious pressure in waste management. Several news reports and statements from local officials indicate that the daily waste generation is in the range of 800–900 tons per day, and this condition is positioned as an environmental threat due to the increasingly critical handling capacity (Dwi Ayu Parmitasari *et al.*, 2024). The condition indicates that the "collect-transport-dispose" strategy is no longer adequate without strengthening efforts to reduce waste at the source (households and communities) . In the national context, the urgency of the plastic issue is also clearly evident. Data based on SIPSN referenced by KLHK indicates that Indonesia's waste generation in 2023 is around 69.9 million tons, with plastic waste composition at 18.71% and the largest source coming from households (around 44.37%) (Abdillah, 2023). This means that waste management interventions including plastic are very strategic if started at the household level, where housewives play a central role in sorting, storing, and making decisions about daily waste management (Maulana, Nurhayati and Firman, 2026). Makassar has promoted a citizen participation-based approach thru the waste bank ecosystem.

The official platform "Makassar Free from Waste" showcases operational achievements including 323 Waste Bank Units (BSU), 7,252 customers, and support facilities for TPS3R. These figures illustrate important social and institutional capital: waste banks are not only positioned as environmental instruments but also as drivers of the circular economy at the community level. However, the next challenge is how the plastic exchange activities can truly become a tangible and sustainable source of income . In practice, the waste bank operates thru a series of processes: sorting–weighing– recording–bookkeeping savings–distribution of sales proceeds, as the waste bank mechanism is also reflected in the metadata document of UPT Waste Bank activities in Makassar City (Kristiyanti *et al.*, 2024). At this point, financial management issues become crucial: orderly record-keeping, transparency of balances or savings, cash control, and accuracy in profit distribution will affect customer trust and participation consistency (Indriyani Rachman, 2021). The results showed that each stakeholder had different goals, competency limits, and responsibilities for developing a community-based waste bank in Makassar. (Indirwan, Riskiyani and Syafar, 2024)

The waste bank program in the city of Makassar has become one of the initiatives that transforms plastic waste into a source of income for the community. The success of this program does not only depend on the number of waste bank units and the number of registered customers, but also on the sustainability of financial management, which includes transparency in recording and managing transactions digitally (Komalaningsih *et al.*, 2025). In this case, digital financial inclusion plays an innovative role in facilitating the community's management of income derived from plastic waste management. Therefore, it is important to explore how this digital-based financial management innovation is received and implemented at the community level, particularly in alley environments that are often marginalized within the formal financial system (Sinaga, 2024). Innovation in digital financial management systems, which includes the use of digital savings books and income disbursement mechanisms thru more transparent systems, has proven to increase public trust in waste banks (Hs *et al.*, 2025). While the current study extensively addresses the role of community participation, financial management, and digital systems in Makassar's waste bank initiatives, there is a notable gap in examining how marginalized communities, particularly those in alley environments, engage with and benefit from these digital financial management systems. Although previous research has explored the impact of digital systems on community trust and waste bank operations, the specific challenges and barriers faced by marginalized communities in adopting and effectively using digital tools have not been comprehensively studied. Furthermore, there is limited understanding of how these communities perceive and use digital savings systems in the context of waste bank participation, which could provide crucial insights into the inclusivity and sustainability of the program. This gap suggests a need for further research on the barriers to digital financial inclusion and how these barriers affect the long-term success of waste banks as a circular economy model in urban areas.

THEORETICAL STUDY

Waste banks not only function to manage waste but also serve as a means to increase income thru the collection and recycling of waste (Miftahorrozi, Khan and Bhatti, 2022). This model provides an opportunity for the community, especially those in the informal and marginal sectors, to utilize plastic waste as an economic resource (Asih *et al.*, 2022). Digital financial inclusion in waste bank programs has proven to improve community welfare, especially among marginalized groups (Taufiq, 2025). State that waste banks that integrate digital systems allow customers to save and manage income from waste management more efficiently (Purwendah and Wahyono, 2022). In this case, the waste bank plays a role in empowering the community by providing access to digital financial services that are more easily accessible to low-income individuals (Agus Prasetya *et al.*, 2024). Local governments can strengthen sustainability by providing continuous financial support, capacity-building programs, and market linkages for recyclable materials (Ariani and Salahudin, 2025). The engagement improving accounting literacy in informal community institutions can enhance organizational performance and strengthen institutional sustainability (Bulutobing Lince *et al.*, 2025). This theory emphasizes three main dimensions: access, usage, and quality.

Access relates to the availability and ability of individuals to obtain financial services, usage refers to the extent to which these services are actively utilized, and quality reflects how well these services meet users' needs in terms of efficiency, security, and reliability. In the context of this study, financial inclusion theory is used to analyze how waste bank programs facilitate community engagement with digital financial services. This narrative hypothesis emphasizes the interactive relationship between access, use, and quality of digital services with the active role of the community in waste bank programs, while also opening opportunities to explore the experiences, perceptions, and challenges faced by participants in the context of financial inclusion.

RESEARCH METHODS

This research uses a qualitative approach because the main objective of the study is to deeply understand the practices, processes, and experiences of waste bank actors in transforming plastic waste into income thru financial management innovations (Prasanti and Yudhastuti, 2023). The design used is a case study, as the research focuses on phenomena occurring within the real context of the community in Makassar City, including the dynamics of waste bank management, transaction recording governance, plastic valuation mechanisms, and service changes when the recording system begins to be digitized (Mahmudah and Jamaludin, 2024).

Case studies allow researchers to trace how the innovation is implemented, accepted, and interpreted, while also identifying supporting and inhibiting factors at the community level (Hidayah et al., 2025). The research informants were determined thru purposive sampling (Nisa and Saputro, 2021), meaning they were selected based on their knowledge and direct involvement in the management and use of the waste bank services.

There are 10 key informants include 3 personal the waste bank managers, 2 personal the Environmental Agency UPTD Waste Bank, and 5 personal active customers of the Makassar City Waste Bank. Data collection was conducted thru semi-structured in-depth interviews, field observations, and document studies (Allsop et al., 2022). Data analysis in this study was conducted thematically using a data analysis approach adapted from Huberman & Miles. Data that has been collected thru interviews, observations, and documentation is then analyzed by organizing and categorizing the information into relevant themes. This process begins with the data reduction stage, which involves selection, focusing, and organizing data in accordance with the research focus. Source and Method Triangulation are used to maintain data validity.. Source triangulation is carried out by comparing information from bank managers, stakeholders, and active customers as well as recording documents/artifacts.

Method triangulation is conducted by combining interviews, observations, and documentation (Durrani *et al.*, 2024). The research can also conduct member checking, which involves confirming the initial findings summary with several key informants to ensure the researcher's interpretation aligns with their experiences. Additionally, the researcher maintains an audit trail in the form of field notes, coding decisions, and analysis summaries to ensure the research process is transparent and traceable (Wallwey and Kajfez, 2023).

RESULT AND DISCUSSION

The findings confirm that waste banks in the city of Makassar have access to digital financial services. In this study, this is conducted thru the waste bank units, where customers can activate and manage their financial accounts. Every customer involved in the waste bank program must first

register and activate the Sulselbar savings book, which is integrated with digital wallet services. The activation process of this savings book is the initial step for customers to access the available digital financial services. Based on the theory of financial inclusion, particularly on the access indicator, this condition indicates that the community has gained ease in accessing formal financial services. This access is reflected in account ownership and the availability of digital financial services that can be used by the community, including previously unserved (unbanked) groups. This finding is also in line with (Sinaga, 2024) research, which states that digital financial inclusion plays an innovative role in facilitating the management of community income derived from plastic waste processing. Thru this activation, customers can conduct digital transactions, save their income from waste management, and utilize other financial products offered by the waste bank. The registered active waste banks in the city of Makassar served by the Central Bank Sampah UPTD Waste Recycling Management amount to 357 units, which manage inorganic waste including plastic, metal, paper, glass, and others.

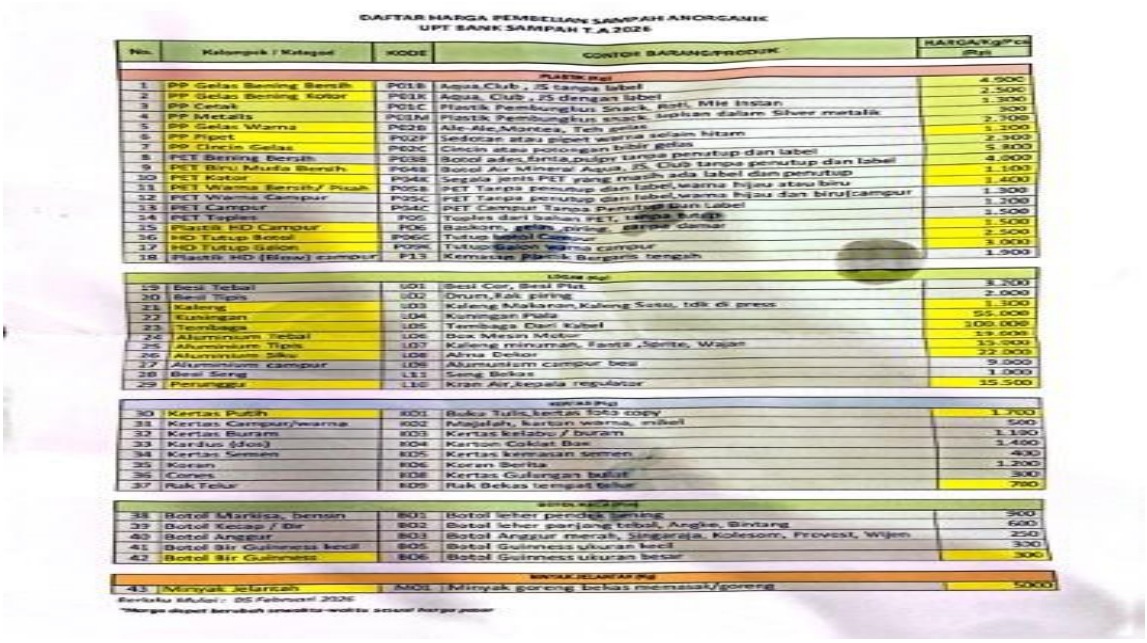
Figure 1. Waste Bank Products



***Source**: UPTD Central Makassar Waste Bank,2026*

The increase in the use of customer passbooks in this study is based on the number of transactions conducted over a certain period and how often customers use their passbooks as means of payment or storage of income from plastic waste management. All waste bank units in the city of Makassar collected a total of 468,758 kg of plastic waste, which was then processed and valued according to the categories of plastic waste. Each category has different prices; for example, the category PP Clear Plastic Cups Clean Code P01B (like Aqua, Club, JS without labels) is priced IDR 4,900/kg, while the category PP Clear Plastic Cups Dirty is priced at IDR 2,500/kg, and there are several other categories with different pricing as well.

Figure 2. Price List for Purchasing Inorganic Waste Products



DAFTAR HARGA PEMBELIAN SAMPAH ANORGANIC
UPT BANK SAMPAH T.A 2026

No.	Kelompok / Kategori	KODE	CONTOH BARANG/PRODUK	HARGA/Kg/Pcs (Rp)
	PLASTIK (Kg)			
1	PP Gelas Bening Bersih	P01B	Aqua,Club , 85 tanpa label	4.500
2	PP Gelas Bening Kotor	P01K	Aqua, Club , 85 dengan label	2.500
3	PP Cetak	P01C	Plastik Pembungkus Snack, Roti, Mie Instan	3.300
4	PP Metalis	P01M	Plastik Pembungkus snack, bahan dalam Silver metalik	300
5	PP Gelas Warna	P02B	Air-Aku,Marrees, Teh pelita	2.300
6	PP Pipet	P02P	Sedotan atau pipet warna selain hitam	2.300
7	PP Cincin Gelas	P02C	Cincin atau potongan bibir gelas	5.800
8	PET Bening Bersih	P03B	Botol aqua,tirta,pulpy tanpa penutup dan label	4.000
9	PET Biru Muda Bersih	P04B	Botol Merk Mineral Aqua, 85, Club tanpa penutup dan label	1.100
10	PET Kotor	P04K	Segala jenis PET yang masih ada label dan penutup	1.400
11	PET Warna Bersih/ Pudi	P05B	PET Tanpa penutup dan label,warna hijau atau biru	1.300
12	PET Warna Campur	P05C	PET Tanpa penutup dan label,warna hijau dan biru(campur	1.200
13	PET Campur	P06C	PET Campur Tanpa Penutup dan Label	1.500
14	PET Toples	P06	Toples dari bahan PET, tanpa tutup	1.500
15	Plastik HD Campur	P06	Baskom, gelas, piring, ember dsb	2.500
16	HD Tutup Botol	P06C	Tutup botol Campur	3.000
17	HD Tutup Galon	P06	Tutup Galon warna campur	3.000
18	Plastik HD (Biru) campur	P13	Kemasan pewarna bubuk Bergaris tengah	1.900
	LOGAM (Kg)			
19	Besi Tebal	L01	Besi Cor, Besi Plat	3.200
20	Besi Tipis	L02	Drum,Rak piring	2.000
21	Kaleng	L03	Kaleng Makanan,Kaleng Susu, tdk di press	1.300
22	Kuningan	L04	Kuningan Pada	55.000
23	Tembaga	L05	Tembaga Dari Kabel	100.000
24	Aluminium Tebal	L06	Body Motor	19.000
25	Aluminium Tipis	L07	Kaleng minuman, Fanta ,Sprite, Wajan	15.000
26	Aluminium Silki	L08	Atnu Dekor	22.000
27	Aluminum campur	L09	Aluminum campur bes	9.000
28	Besi Seng	L11	Seng Bekas	1.000
29	Penunggu	L10	Kran Air,kepala regulator	15.500
	KERTAS (Kg)			
30	Kertas Putih	K01	Buku Tulis,kertas HVS copy	1.700
31	Kertas Campur/warna	K02	Majalah, kertas warna, mibel	500
32	Kertas Buram	K03	Kertas kelabu / buram	1.100
33	Kardus (doz)	K04	Kartom Coklat Bax	1.400
34	Kertas Semen	K05	Kertas kemasan semen	400
35	Koran	K06	Koran Berita	1.200
36	Cones	K08	Kertas Gulungan bulat	300
37	Nuk Telur	K09	Nuk Bekas tempat telur	700
	BOTOL KACA (Pcs)			
38	Botol Marilica, bensin	B01	Botol leher pendek tebal	300
39	Botol Kecap / Bir	B02	Botol leher panjang tebal, Anglo, Bintang	600
40	Botol Anggur	B03	Botol Anggur merah, Sinergia, Kolesom, Provest, Wijen	250
41	Botol Bir Guinness kecil	B05	Botol Guinness ukuran kecil	300
42	Botol Bir Guinness	B06	Botol Guinness ukuran besar	300
	MINYAK JELANTAH (Kg)			
43	Minyak Jelarah	M01	Minyak goreng bekas memasak/goreng	5000

Berlaku Mulai : 05 Februari 2026
*Harga dapat berubah sewaktu-waktu sesuai harga pasar

***Source**: UPTD Central Makassar Waste Bank, 2026*

Customer knowledge regarding the use of savings books and digital financial management. The measurement is conducted thru a digital financial literacy test taken by customers, which is carried out before and after training on the use of savings books and digital financial management. The process of improving customers' financial literacy is carried out thru socialization conducted by the Environmental Agency, specifically the UPTD Central Makassar City Waste Bank and the Waste and Waste Management Division, involving partners from Bank Sulselbar. This socialization aims to provide knowledge on how to use savings books as a means to manage income from waste management, as well as to enhance customers' understanding of various available digital financial service features, such as money storage, transactions, and balance management. The partners of Bank Sulselbar play a crucial role in the success of this program by providing facilities for the activation and management. In the context of financial inclusion theory, these findings are closely related to the usage indicator, which emphasizes the extent to which financial services are actively utilized by individuals. Usage is not only reflected in account ownership, but also in how frequently and effectively customers conduct financial transactions and manage their finances digitally. The training and socialization processes indicate that customers are not only gaining access but are also increasingly in using financial services in their daily economic activities. Furthermore, the success of this program does not solely depend on the number of waste bank units or the number of registered customers, but also on the sustainability of financial management practices, including transparency in recording and managing transactions digitally. This is in line with the findings of (Komalaningsih *et al.*, 2025), which highlight that sustainable digital financial management and transparent transaction systems are key factors in strengthening the effectiveness of financial inclusion programs.

The Availability and Diversity of Financial Products in this study are measured based on the types of financial products available to

customers, such as digital savings, investments, or microloans. The measurement is conducted by examining the number of digital financial products offered to waste bank customers, as well as the level of customer participation in using these products. Currently, the availability and diversity of financial products for waste bank customers in Makassar City are limited to savings books issued by Bank Sulselbar. This savings book serves as the main means for storing the income obtained by customers from plastic waste management, as well as a tool for conducting digital transactions that facilitate customers in managing their finances. Although the only financial product currently available is the savings book, the role of Bank Sulselbar as a partner is very important in providing customers with access to safely store funds from waste management.

The improvement of Economic Accessibility for Marginalized Communities in this study is measured by the indicator of the ability of customers from marginalized groups or the informal sector to access and utilize digital financial services. The measurement is conducted by looking at the number of customers from marginalized communities, such as informal workers and low-income individuals, who can access and use savings books to manage their income. Based on existing data, the customers of the waste bank in Makassar City mostly come from marginalized communities, who often have difficulty accessing formal financial services. However, thru the waste bank program in collaboration with Bank Sulselbar, the community involved in waste management can utilize savings books as a tool to manage their income.

The existence of this savings book provides them with broader access to conduct transactions and save income, which they previously might not have had access to in the traditional banking system. Income and Welfare Improvement in this study is measured by the indicator of income changes obtained by customers after using savings books to manage their income from plastic waste management.

The measurement is conducted by comparing customers' income before and after participating in the waste bank program and using savings books to store and manage the proceeds from the waste they handle. This process allows the waste bank to receive funds, which are then forwarded to Bank Sulselbar. Once the funds are received by Bank Sulselbar, payments will be distributed back to active waste bank customers, who can then manage the income thru their savings books. The data collected during the year 2025 is as follows:

Table 2. Data on Inorganic Waste Purchases at the Waste Bank of the Makassar City Environmental Agency 2023-2025

NO.	YEAR	AMOUNT	
		Kg	IDR
1	2023	484.462	1.026.535.807
2	2024	469.336	1.073.369.150
3	2025	468.758	1.178.401.350

***Source**: Result Data,2026*

The displayed data illustrates the total amount of plastic waste collected thru the waste bank program in Makassar City over the past three years, along with its transaction value. In 2023, the total plastic waste collected reached 484,462 kg, with a total transaction value of IDR 1,026,535,807. In 2024, there was a slight decrease in the amount of waste collected, which was 469,336 kg, with a recorded total transaction of IDR 1,073,369,150. In 2025, the amount of plastic waste collected slightly decreased to 468,758 kg, but the total transaction increased to IDR 1,178,401,350. From the data, it can be seen that the amount of plastic waste collected each year has decreased, but the transaction value generated continues to increase. This indicates that the price or transaction value per kilogram of managed plastic waste is increasing, which may be due to improved processing or differences in the price of the categories of waste received. This waste bank program shows positive results in plastic waste management, which not only serves to reduce waste but also provides economic benefits to the community involved in waste management. This income includes the results from the collection of plastic waste valued according to categories, as well as payments made by vendors thru the Sulselbar regional treasury. In the future, the waste bank program in Makassar City plans to fully digitize by integrating QRIS (Quick Response Code transaction tool for customers. This step aims to simplify transactions, increase efficiency, and expand the accessibility of digital financial services for the community. With the implementation of QRIS, customers can conduct transactions more quickly, securely, and conveniently using their mobile phones, without having to rely on traditional payment systems. In the context of financial inclusion theory, these findings are closely related to the quality dimension (quality), which emphasizes the extent to which financial services are reliable, efficient, secure, and aligned with users' needs. The increasing transaction value alongside the integration of digital systems indicates that financial services provided by waste banks are becoming more effective and valuable for users. The planned full digitalization through QRIS integration further strengthens this dimension by enabling faster, more secure, and more convenient transactions, thereby improving the overall user experience. Furthermore, this finding is supported by previous research which states that innovation in digital financial management systems, including the use of digital savings books and income disbursement mechanisms through more transparent systems, has been proven to increase public trust in waste banks. Transparent and accountable digital financial management not only enhances efficiency but also strengthens user confidence in utilizing financial services.

CONCLUSION

In conclusion, this study demonstrates that the waste bank program in Makassar City has successfully promoted digital-based financial inclusion through three key dimensions. In terms of access, communities—including marginalized groups—have been able to reach formal financial services through the activation of savings accounts integrated with digital platforms. Regarding usage, customers not only own financial accounts but also actively utilize them to save, conduct transactions, and manage income derived from waste processing activities. Meanwhile, in the quality dimension, the increasing transaction value, improved

transparency in financial management, and the planned integration of QRIS indicate that financial services are becoming more efficient, secure, and aligned with users' needs. Furthermore, the program contributes to improving income and community welfare, even though the volume of waste managed shows a slight decline. These findings highlight that digital innovation and community-based approaches, such as waste banks, play a strategic role in expanding financial inclusion while enhancing public trust and participation, in line with previous studies.

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