Journal of Economics and Management
2026, Vol. 4, No. 3, 950-959
https://doi.org/10.70716/ecoma.v4i3.509

Social Capital in the Circular Economy: Community-Based Waste Recycling Practices at Bantar Gebang Landfill

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Received: 27/04/2026 | Revised: 05/06/2026 | Accepted: 20/08/2026 | Published: 29/08/2026

Abstract: This study explores social capital practices in the circular economy within the waste picker community at Bantar Gebang Landfill, focusing on informal credit systems and cooperation mechanisms. Employing a qualitative approach with an intrinsic case study design, the research involved 22 participants through in-depth interviews and participant observation. The findings reveal that the waste picker community has developed three patterns of informal credit systems (horizontal among waste pickers, vertical between middlemen and waste pickers, and group-based or rotating savings) with a low default rate (<10%) enforced through social sanctions. Cooperation operates in material forms (daily contributions, physical assistance) and non-material forms (price information exchange), functioning as informal social security. Social capital serves as a substitution mechanism for formal institutional failures, yet remains ambivalent, protective yet restrictive toward economic mobility. This study contributes to social capital theory in the context of the informal circular economy in developing countries.

Keywords: *Social Capital, Circular Economy, Informal Credit System, Mutual Cooperation, Waste Pickers, Bantar Gebang*

How to Cite: Sandopart, D. A. I. I. L., & Sandopart, D. P. Y. A. L. (2026). Social Capital in the Circular Economy: Community-Based Waste Recycling Practices at Bantar Gebang Landfill. *Journal of Economics and Management, 4*(3), 950–959. https://doi.org/10.70716/ecoma.v4i3.509

INTRODUCTION

The plastic waste crisis has become one of the most pressing environmental challenges of the 21st century, particularly for developing countries facing limited waste management infrastructure. In Indonesia, national waste volume reaches 56.63 million tons per year, with the Jabodetabek area contributing approximately 7,000-7,400 tons daily to the Bantar Gebang Landfill (Regional Knowledge Center for Marine Plastic Debris, 2023). The landfill, located in Bantar Gebang District, Bekasi City, is the largest final disposal site in Southeast Asia, spanning more than 108 hectares with waste piles reaching heights of 50 meters (Regional Knowledge Center for Marine Plastic Debris, 2023).

The circular economy has emerged as an alternative paradigm to address the waste dilemma by transforming the linear "take-make-dispose" system into a model that emphasizes reducing, reusing, and recycling resources. The circular economy constitutes an economic system designed to be regenerative and to decouple economic growth from the consumption of finite natural resources (Kirchherr, Reike, & Hekkert, 2017). In the Indonesian context, the informal sector plays a significant yet often overlooked role in this system, a pattern also documented globally by Wilson, Velis, and Cheeseman (2006) in

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

their review of informal recycling in developing countries. In developing countries, waste pickers are key actors in the recycling value chain. Data indicate that on Java Island, waste pickers collect 83% of total plastic waste that is successfully recycled (Regional Knowledge Center for Marine Plastic Debris, 2023). At Bantar Gebang Landfill itself, approximately 3,000 individuals work as waste pickers who form an integral part of the informal recycling network, contributing to 9.3% of the recycling rate for all non-organic waste at the landfill (Sasaki et al., 2019).

At Bantar Gebang Landfill, the process begins when garbage trucks arrive. Before disposal at the final location, trucks containing high-value waste composition are informally purchased by waste picker "bosses" (wholesalers). At the same time, the remainder (approximately 75%) becomes unclaimed waste sought by other waste pickers (Sasaki et al., 2019). Research by Sihaloho and Rusliadi (2025) examined collaborative governance in plastic waste recycling in Medan City and found that low household participation in waste sorting (only 20%) and limited integration of the informal sector are major obstacles to sustainable waste management. However, the informal sector collects approximately 30% of recyclable materials.

However, this substantial contribution contrasts sharply with the concerning socio-economic conditions of waste pickers. Research indicates that the average income of waste pickers at Bantar Gebang is approximately IDR 1,200,000 (US$78) per month, still below the minimum wage (Regional Knowledge Center for Marine Plastic Debris, 2023). They face hazardous working conditions due to exposure to medical waste and sharp objects, as well as health risks from air pollution where particulate concentrations exceed WHO standards by three to four times (Regional Knowledge Center for Marine Plastic Debris, 2023). Access to healthcare and education is also limited, and gender wage gaps exist whereby female waste pickers earn approximately 50% less than their male counterparts (Sasaki et al., 2019). These conditions mirror a broader regional pattern, as the World Bank (2025) reports rising informal employment risks across East Asia and the Pacific, with Indonesia among the most affected economies.

A noteworthy phenomenon worth investigating is how the waste picker community at Bantar Gebang Landfill has built informal credit systems and cooperation mechanisms that function as social safety nets. Previous research by Sasaki et al. (2019) identified eight social relationships and six labor modes at this location, along with two types of recycling markets: a primary market for large-volume, low-price commodities, and a niche market for rarely collected, high-price items. A study by Gall et al. (2020) found that economic incentives, trust-building measures, and willingness to learn and adapt are prerequisites for accountable supplier-buyer relationships between waste pickers and the formal recycling industry.

Social capital represents a central concept in economic sociology explaining how networks of social relationships, norms, and trust can function as collective resources (Portes, 1998; Son, 2020). Coleman (1988) defined social capital based on its function, encompassing six forms: obligations and expectations, information channels, norms and effective sanctions, authority relations, intentional organizations, and adaptable social organizations. This concept is relevant to the waste picker context where informal credit practices create "credit slips" that can be drawn upon when needed. Putnam (1993) emphasized horizontal networks and civic engagement, defining social capital as horizontal associations that influence societal productivity. Meanwhile, Bourdieu (as cited in Jenkins, 2004) offered a critical perspective by highlighting how social capital can

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

become an instrument for reproducing social inequality, whereby individuals or groups with broader network access can convert social capital into economic or symbolic capital.

This study adopts a synthetic conceptualization encompassing three dimensions of social capital: the structural dimension, referring to patterns of network relationships; the relational dimension, referring to relationship quality, including trust and reciprocity; and the cognitive dimension, referring to shared representations, identity, and collective narratives.

Previous studies further demonstrate the importance of social capital and informal relationships in waste management systems. Nesheim et al. (2024) studied bonding mechanisms in Myanmar's informal waste system. They found that relationships between waste pickers and middlemen are governed by social capital variables: trust, predictability, transparency, and openness. Gall et al. (2020) examined collaboration between formal recycling companies and waste picker cooperatives, demonstrating that high-quality plastic recycling is possible under informal conditions. Sasaki et al. (2019) identified the complexity of the informal recycling system at Bantar Gebang with eight social relationships and six labor modes, along with two types of recycling markets. Research by the Protoprint Project in India (Gandhar, 2025) revealed a fundamental dilemma: recycling alone is not financially viable under current market conditions, as models that pay living wages and comply with regulations incur losses, while models that externalize costs to waste pickers show profits.

Nevertheless, the identified research gap is the dominance of technical-economic approaches in circular economy studies. Most literature remains focused on technological efficiency, recyclate material quality, and financial feasibility, while social dimensions, particularly social logic, informal trust mechanisms, and social capital as primary drivers, remain underexplored. This study aims to fill this gap by exploring how social capital functions as a foundation for informal credit systems and cooperation within the waste picker community at Bantar Gebang Landfill.

Based on the theoretical foundation and previous research, this study proposes that in the context of formal institutional failures, social capital functions as an adaptive substitution mechanism. Informal credit systems and cooperation in waste picker communities serve not only transactional functions but also as holistic social safety nets. However, social capital remains ambivalent, protecting against extreme poverty while potentially hindering upward social mobility.

RESEARCH METHODS

This study employed a qualitative approach with an intrinsic case study design, chosen because the research focuses on understanding the particularity of the Bantar Gebang waste picker community in its own right rather than using it merely as an instrument to test a broader theoretical proposition (Stake, 1995). The research location was Bantar Gebang Landfill, Bekasi City, selected given its scale as Southeast Asia's largest final disposal site and the presence of an established informal waste picker community with organized economic practices. Participants were selected using purposive sampling to ensure informants held direct and varied experience of the informal credit and cooperation practices under study, combined with snowball sampling to reach individuals embedded within existing waste picker social networks. Recruitment continued until data saturation was achieved with 22 participants, consisting of 15 active waste pickers (10 males, 5 females), 3 small-scale middlemen, 2 family members, and 2 community leaders,

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

a composition intended to capture multiple positions within the informal credit and cooperation system rather than a single perspective.

Data collection included semi-structured, in-depth interviews (60-120 minutes per participant), participant observation of daily waste-picking, credit, and cooperation activities, and a document review of available community and administrative records. Data analysis employed thematic analysis following the six-phase procedure of Braun and Clarke (2006): familiarization with the data, generation of initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the final analysis, complemented by the interactive model of Miles, Huberman, and Saldaña (2014) for data condensation, data display, and conclusion drawing and verification. Data trustworthiness was ensured following the credibility, transferability, dependability, and confirmability criteria outlined by Lincoln and Guba (1985), operationalized through prolonged engagement in the field (3 months), source and method triangulation, member checking with participants, peer debriefing, and the maintenance of comprehensive audit trails documenting analytical decisions throughout the research process.

RESULTS AND DISCUSSION

RESULTS

Informal Credit System

This study identified three patterns of informal credit systems within the Bantar Gebang waste picker community. First, horizontal loans among fellow waste pickers, typically in small amounts (Rp50,000-Rp500,000) for urgent needs such as medical expenses or tool repairs. One participant (P-L-02) explained: "When I'm in need, I borrow from friends. Usually those from the same village. No paperwork, just say 'borrow first, pay back next week'. I trust them because I know them. No one has ever run away."

This mechanism reflects what Coleman (1988) termed "obligations and expectations": an actor does something for another with the expectation of future reciprocity. Second, vertical loans from middlemen to waste pickers. Middlemen provide loans to regular waste picker suppliers in exchange for sales loyalty. A middleman (PK-02) stated: "I give loans to regular waste pickers, usually up to Rp1 million. No interest, but they must sell their collection to me until the loan is repaid. If they sell to another middleman, I won't give them loans again."

This practice embodies bonding mechanisms such as trust and predictability as identified by Nesheim et al. (2024). Third, group-based loans in the form of rotating savings associations operate on principles first documented by Ardener (1964) in her comparative study of rotating credit associations. Several informal waste picker groups organize weekly or monthly rotating savings. A female waste picker (P-P-03) recounted: "We have a women's rotating savings. Twenty thousand rupiah per week. Those who get their turn can use it for children's school needs or paying rent. It helps because borrowing from banks is complicated with no collateral."

The default rate in this system is low (<10%), enforced through social sanctions: ostracism, loss of future credit access, and in extreme cases, expulsion from the work area. The effectiveness of these sanctions depends on "social network closure" (Coleman, 1988); the more frequently members interact, the stronger the normative effectiveness.

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Mutual Cooperation Mechanisms

Cooperation within the waste picker community took two main forms. First, material cooperation includes the "jimpitan" system (voluntary daily money collection of Rp500-Rp2,000 per person) collected by the neighborhood head to assist sick community members or those affected by disasters. A community leader (T-01) explained: "Even though they are waste pickers with limited means, when someone faces a disaster, they contribute. Some give rice, some give money. It may not be much, but it shows caring."

Other forms of material cooperation include physical assistance to build or repair damaged members' homes. Second, non-material cooperation primarily involves information exchange about recyclable commodity prices, locations of new waste containers, and potential hazards at the landfill (landslides, fires). A waste picker (P-L-07) recounted: "When plastic prices drop, the word spreads quickly. From those selling to middlemen, they tell others. So we can strategize, maybe delay selling or look for other commodities."

This mechanism aligns with Coleman's (1988) concept of "information channels" whereby existing social relationships are utilized as efficient instruments for information acquisition. Observation data on cooperation frequency showed environmental clean-up activities 2-3 times per month with 20-30 participants, assistance for illness or death 1-2 incidents per month, and rotating savings 4 times per month with 15-20 participants.

Social Capital as a Foundation

This study identified three dimensions of social capital serving as foundations. The structural dimension is reflected in the density of relationship networks encompassing kinship ties (fellow migrants from the same village), neighborliness (living in dense settlements), and work ties (informal zoning arrangements). This density creates network closure conditions that enhance the effectiveness of social sanctions.

The relational dimension is manifested in high levels of trust among members who have interacted over long periods, as well as reciprocity principles operating in two forms: balanced reciprocity for short-term loans and generalized reciprocity for cooperation. A community leader (T-02) explained: "That's how people here are. When someone faces hardship, they help. Not thinking, 'What will I get in return? They simply trust that when they face hardship someday, others will help too."

The cognitive dimension is reflected in the collective identity as "fellow waste pickers" who mutually understand the hardships of life at the landfill, along with shared narratives about waste picking as "sustenance from trash" that provides meaning and dignity to socially stigmatized work.

Reinforcing and Inhibiting Factors

Factors reinforcing social capital effectiveness include: (1) long-term repeated interactions that build behavioral predictability; (2) social network closure limiting "exit" options for norm violators; and (3) homophily (shared regional origin or kinship ties) enhancing initial trust.

Inhibiting factors include: (1) conformity pressures limiting upward social mobility aspirations; (2) potential social envy toward members who successfully "move up"; and (3) implicit exploitation by middlemen through debt creating economic dependency. A waste picker (P-L-09) whose child attends the Free School recounted: "Some are happy, some are envious. My child now attends free school, but neighbors comment 'life is easy

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for you now, no more hardship'. However, I don't care; what matters is my child's future is better."

Limitations of Government Intervention Programs

An important emerging theme is the perception gap between government programs and waste pickers' actual needs. Although various social assistance programs have been implemented, including the Free Nutritious Meal Program, Direct Cash Assistance, and Free Schools, some waste pickers complained that the assistance is not always properly targeted or sustainable. One participant (P-P-05) stated: "Government assistance is usually one-time only. It helps, but it is not continuous. What matters is we can earn our own living. We need capital to start our own business."

This statement confirms the findings of Sihaloho and Rusliadi (2025) that intervention policies are often top-down and do not sufficiently consider local perspectives.

DISCUSSION

Social Capital as an Adaptive Mechanism

The findings consistently show that the waste picker community at Bantar Gebang Landfill has developed an informal economic system based on social capital in response to multidimensional institutional failures. In a context marked by the absence of access to formal financial institutions (due to collateral requirements, identity documents, and credit histories that cannot be met), the absence of social security and labor protection (due to unrecognized informal worker status), and the absence of legal recognition for waste picking as a profession, social capital functions as a substitution mechanism providing vital functions that formal institutions should provide.

This phenomenon can be explained through the lens of institutional theory in informal economy studies. As argued by Portes and Haller (2005), the informal sector is not merely a residual of modernization failures but rather a rational response to structural constraints faced by marginalized groups. For Bantar Gebang waste pickers, the informal credit system they have built is not a "second-best choice" because formal systems are inferior, but the only available option within the structural constraints they face. The low default rate (less than 10%) demonstrates that reputation-based mechanisms and social sanctions can achieve transactional efficiency comparable to, and in some aspects exceeding, formal contracts whose enforcement costs are prohibitively high for poor urban communities.

Furthermore, the findings of this study enrich the discourse on economic embeddedness in social structures as articulated by Granovetter (1985). The informal credit and cooperation practices at Bantar Gebang Landfill cannot be understood as economic phenomena detached from their social context. Rather, waste pickers' economic actions (when to borrow, from whom, under what conditions, and how repayment mechanisms operate) are always already embedded in specific social relationship networks. A waste picker does not borrow money from a middleman at random; they borrow from middlemen they have known for many years, who have good reputations in the community, and with whom they share kinship ties or a common regional origin. This social proximity reduces asymmetric information and moral hazard, two classic problems in transaction economics typically addressed through formal contracts and law enforcement institutions.

Nevertheless, this social capital is not costless. Waste pickers pay "membership costs" through compliance with community norms, participation in collective activities

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

(rotating savings, clean-up work, daily contributions), and loyalty to specific middlemen, even though spot markets might offer slightly higher prices elsewhere. In other words, there is a trade-off between security and flexibility: the social capital-based system provides safety nets and credit access unavailable in formal markets, but in return, waste pickers must limit their transactional autonomy and flexibility. This trade-off is rarely recognized in circular economy studies overly focused on technical efficiency, yet it reflects the daily reality of marginalized communities such as waste pickers.

The Ambivalence of Social Capital

The findings of this study reveal a fundamental ambivalence of social capital that rarely receives attention in mainstream literature, which tends to idealize the concept. On one hand, as elaborated above, strong bonding capital (characterized by high internal solidarity, binding shared norms, and dense social networks) provides life-saving resilience. When a waste picker falls ill and cannot work, the daily contribution system and cooperation ensure that they and their families can still eat. When a waste picker loses work tools due to theft, the community mobilizes assistance to replace them. In the context of the absence of health insurance, old-age security, and workplace accident protection, all enjoyed by formal workers, social capital functions as an emergency safety net preventing descent into deeper extreme poverty.

On the other hand, excessively strong bonding capital can become a "collective trap" that impedes upward social mobility. This phenomenon can be explained through the concept of "leveling mechanisms," rooted in Foster's (1965) classic analysis of the image of limited good in peasant communities, where perceived scarcity generates social pressure against individual accumulation. When a community member successfully "moves up" (for instance, their child is accepted into a free school or they manage to open a small business outside the waste-picking sector), they often face subtle yet powerful social pressure not to "stand out too much." This pressure may take the form of cynical comments ("life is easy for you now, no more hardship"), expectations of greater contributions to social activities (because they are considered "already capable"), or even subtle ostracism from daily interactions.

Data from participant P-L-09 quoted earlier vividly illustrates this phenomenon. Social envy is not merely an individual psychological problem but has deeper socio-economic functions: it serves as a mechanism of forced redistribution, preventing capital accumulation by a handful of community members. In communities living under conditions of scarcity, anxiety over conspicuous inequality is extremely high. Informal mechanisms such as social envy, gossip, and ostracism are ways communities maintain what scholars call the "moral economy of the poor" (Scott, 1976), a value system prioritizing collective survival over individual accumulation.

From the perspective of Bourdieu's social capital theory (as cited in Jenkins, 2004), this ambivalence can be understood as a consequence of social capital never being distributed equally. Waste pickers with broader networks (such as those with kinship ties to large middlemen or those considered informal "elders" in the community) have better access to credit resources, price information, and protection from outsiders. In other words, social capital itself is an arena of symbolic struggle, where certain actors can convert their positions within social networks into economic capital (money, credit access) or symbolic capital (prestige, recognition, informal power). This internal hierarchy (between "old" and "new" waste pickers, between those with protecting "bosses" and those without, between men and women) is often overlooked in studies

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

overly focused on the external solidarity of waste picker communities as a monolithic bloc.

This finding of ambivalence has significant implications for formulating empowerment policies. Interventions that focus solely on strengthening bonding capital, such as by facilitating the formation of cooperatives or self-help groups, without attending to internal power dynamics and the potential for leveling mechanisms, risk perpetuating the status quo of inequality or even strengthening already dominant local elites. Conversely, more effective interventions are those that simultaneously strengthen bridging capital (relationships with actors outside the community, such as NGOs, government, or the private sector) and linking capital (relationships with institutions holding formal power, such as banking institutions, social services, or the police), the distinction Woolcock and Narayan (2000) identify as central to translating social capital into development outcomes. With alternative access outside the community (for instance, microcredit from formal financial institutions with adjusted requirements, or skills training programs not controlled by local elites), waste pickers have a viable "way out" of internal conformity pressures without completely losing the social safety net provided by bonding capital.

Thus, the optimal empowerment strategy is not choosing between bonding or bridging capital but rather finding a dynamic balance between the two. Too little bonding capital leaves the community fragile and vulnerable to shocks; too much bonding capital locks the community into collective poverty. The policy task is to create conditions in which waste pickers can maintain protective internal solidarity while also having the freedom and capacity to exit poverty traps when opportunities arise. This represents a complex governance challenge, yet this study demonstrates that ignoring social capital's ambivalence is as dangerous as romanticizing it excessively.

Policy and Practical Implications

The findings of this research carry three main implications. First, inclusivity cannot be merely top-down: intervention programs that ignore local logic risk damaging existing social capital. A co-design approach that involves the community from the outset is more effective. Second, empowerment is more important than consumptive assistance. The most urgent needs are access to productive capital, legal recognition, and skills enhancement. Initiatives such as Inclusive Recycling, which has trained more than 2,500 waste pickers and helped 65% actively save (Danone Ecosystem, 2025), represent a good example. Similarly, the Women Waste Hero Alliance, initiated to empower female waste pickers at Bantar Gebang through financial literacy training and digital platforms, demonstrates the potential for community-based empowerment (Danone Ecosystem, 2025). Third, structural-level intervention is required. As long as just recycling models are inherently unprofitable due to market distortions, dependency on informal sector exploitation will continue. Policy incentives such as subsidies for just recycling, taxation on virgin plastic, or simplified licensing for small-scale recycling units could transform these structural incentives.

CONCLUSION AND RECOMMENDATIONS

This study concludes that social capital plays a fundamental role in community-based circular economy practices at Bantar Gebang Landfill. The informal credit system operates through three patterns (horizontal, vertical, group-based) with a low default rate enforced through social sanctions. Cooperation functions as informal social security

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

through material assistance and information exchange. Social capital in its three dimensions (structural, relational, cognitive) underpins both mechanisms.

However, social capital is ambivalent, protective yet simultaneously restrictive toward economic mobility. The gap between government programs and waste pickers' actual needs shows the need for sustainable empowerment approaches rather than one-time, consumptive assistance.

Research limitations include focus on a single location (Bantar Gebang Landfill), relatively short research duration (3 months), limited access to private quantitative data, inadequate representation of gender perspectives, and the absence of comparative data from other landfills. Future research should conduct longitudinal studies, cross-landfill comparisons, and action research to test the effectiveness of social capital-based empowerment interventions.

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Vol. 4 No. 3, September 2026 | E-ISSN: 2987-7407 | DOI: https://doi.org/10.70716/ecoma.v4i3.509

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