AJAD
JURNAL PENGABDIAN KEPADA MASYARAKAT

Received: 7 Jun 2026 | Revised: 17 Jun 2026 | Accepted: 6 Jul 2026 | Published: 1 Aug 2026 E-ISSN: 2797-2356, P-ISSN: 2797-2364

DOI: 10.59431/ajad.v6i2.866

COMMUNITY ENGAGEMENT ARTICLE

Strengthening Construction, Asset Management, and Revitalization of Social Infrastructure at TPST 3R Gadingkulon

Indra Lukmana Putra [1*] | Annisa Fatimah [2] | Moch. Khamim [3] | Novi Nugrahani [4] | Nindia Rizky Ismawa [5] | Andi Kusuma Indrawan [6] | Nugraha Wijayanto [7]

[1*,2,4,6,7] Department of Accounting, Politeknik Negeri Malang, Malang City, East Java Province, Indonesia.

[3,5] Department of Civil Engineering, Politeknik Negeri Malang, Malang City, East Java Province, Indonesia.

Correspondence
[1*] Department of Accounting, Politeknik Negeri Malang, Malang City, East Java Province, Indonesia.

Email: indra.lukmana@polinema.ac.id.

Funding information
Politeknik Negeri Malang.

Abstract
Community-based waste management systems in developing economies often suffer from fragmented asset governance, reactive maintenance, and underutilized social infrastructure, limiting operational efficiency and sustainability. This study addresses these inefficiencies through a community service intervention at TPST 3R Gading Kulon, Malang City, integrating construction asset management with social infrastructure revitalization. The program adopts a socio-technical systems perspective, repositioning infrastructure as both a functional asset and a platform for community empowerment. The intervention included infrastructure reconfiguration, systematic asset inventory, standardized maintenance protocols, and accountable financial-asset recording systems. Results show significant improvements in infrastructure functionality, asset traceability, and governance quality, while reactivated educational spaces, meeting areas, and waste bank facilities strengthened community participation. The study proposes a scalable, integrative model linking technical asset governance with socio-economic outcomes, supporting SDG 9, SDG 11, and Indonesia's RPJMN 2025–2029.

Keywords
Construction Asset Management; Social Infrastructure Revitalization; Integrated Governance; Community-Based Waste Management; Sustainability.

Abstrak
Sistem pengelolaan sampah berbasis masyarakat di negara berkembang sering menghadapi tata kelola aset terpecah, pemeliharaan reaktif, dan infrastruktur sosial kurang dimanfaatkan, sehingga membatasi efisiensi operasional dan keberlanjutan. Penelitian ini mengatasi masalah tersebut melalui intervensi pengabdian masyarakat di TPST 3R Gading Kulon, Kota Malang, dengan memadukan manajemen aset konstruksi dan revitalisasi infrastruktur sosial. Program ini mengadopsi perspektif sistem sosio-teknis, menempatkan infrastruktur sebagai aset fungsional sekaligus wadah pemberdayaan masyarakat. Intervensi meliputi penataan ulang infrastruktur, inventarisasi aset sistematis, protokol pemeliharaan standar, dan sistem pencatatan keuangan-aset yang akuntabel. Hasil menunjukkan peningkatan signifikan pada fungsi infrastruktur, keterlacakan aset, dan kualitas tata kelola, sementara ruang edukasi, area pertemuan, dan bank sampah yang diaktifkan kembali memperkuat partisipasi masyarakat. Penelitian ini mengusulkan model integratif yang dapat diskalakan, menghubungkan tata kelola aset teknis dengan capaian sosial-ekonomi, mendukung SDG 9, SDG 11, dan RPJMN 2025–2029.

Kata Kunci
Manajemen Aset Konstruksi; Revitalisasi Infrastruktur Sosial; Tata Kelola Terpadu; Pengelolaan Sampah Berbasis Masyarakat; Keberlanjutan.

1 | INTRODUCTION

Rapid urbanization and infrastructure expansion in developing regions have intensified the need for sustainable approaches to construction asset management and social infrastructure development. These challenges are closely associated with environmental degradation, inefficient resource utilization, and governance complexities, particularly in waste management and infrastructure planning. Integrating sustainability principles into construction practices, governance systems, and community engagement has thus become essential for achieving long-term development goals (Min *et al*., 2024). A critical component of sustainable development lies in construction asset management, especially through effective construction waste management. The implementation of systematic frameworks such as the 6R approach—refuse, reduce, reuse, recycle, recovery, and reflect—offers a structured mechanism to minimize waste generation and improve resource efficiency. In addition, integrating local wisdom into green construction practices strengthens environmental sustainability while ensuring cultural relevance and community acceptance. This approach supports circular economy principles, improves cost efficiency, and contributes to better living standards (Sri Kristinayanti *et al*., 2024).

Beyond technical considerations, the revitalization of social infrastructure requires integrated governance that harmonizes ecological, social, and economic dimensions. Stakeholder-centric governance frameworks emphasize the involvement of multiple actors—including governments, private sectors, and local communities—to ensure inclusive and sustainable infrastructure development. Addressing governance challenges such as policy cognition gaps, compensation inequities, and limited transparency is essential to foster social equity and resilience. The adoption of digital technologies further enhances real-time decision-making, improves stakeholder collaboration, and strengthens accountability in infrastructure governance (Xu *et al*., 2025; Tumpa & Naeni, 2025). Development in infrastructure and environmental management increasingly requires integrated approaches that combine governance, community participation, and resource efficiency. The growing complexity of urban and regional challenges has highlighted the importance of aligning policy frameworks with practical implementation strategies, particularly in developing contexts. Effective governance systems must bridge institutional gaps, ensure stakeholder inclusivity, and promote adaptive policies that respond to environmental and socio-economic dynamics. Strengthening coordination between government entities, private sectors, and local communities is thus a key factor in achieving sustainable outcomes and long-term resilience (Puluhulawa *et al*., 2023).

At the community level, sustainable waste management depends heavily on public participation and behavioral change. Community-based waste management systems, supported by social interaction and digital connectivity, encourage waste sorting and environmental awareness. These practices demonstrate the synergy between technological advancement and social engagement in promoting sustainable waste management. When combined with circular economy strategies and inclusive governance, such approaches improve environmental health, reduce emissions, and enhance climate resilience (Cosio Borda *et al*., 2024; Yusria *et al*., 2025). Sustainability initiatives within social infrastructure sectors, such as public health, likewise demonstrate a strong linkage between environmental responsibility and economic performance. Practices including waste reduction, energy efficiency, and stakeholder engagement not only improve operational efficiency but also generate long-term financial and social benefits, with strong leadership commitment and active organizational participation serving as key drivers in sustaining these initiatives (Saillaja *et al*., 2024).

Existing community-based waste management interventions predominantly focus on waste processing technologies and operational equipment. However, many programs risk failing to sustain long-term performance when they overlook asset lifecycle governance, preventive maintenance systems, financial accountability mechanisms, and social infrastructure utilization. Consequently, the critical challenge is not merely technological adequacy but the absence of integrated socio-technical governance that ensures the sustainability of waste management facilities. Synergy between institutional governance and grassroots participation forms a critical foundation for sustainable infrastructure development and environmental stewardship (Garoghan *et al*., 2025), providing a pathway toward resilient, efficient, and equitable urban and regional development (Pambudi *et al*., 2025; Yusria *et al*., 2025).

Prior to program implementation, TPST 3R Gadingkulon faced several operational and governance challenges. Asset documentation was incomplete, preventive maintenance procedures were absent, financial records were maintained inconsistently, and several social infrastructure facilities—including the waste bank and environmental education room—were underutilized. As a result, operational efficiency, accountability, and community participation remained below expected levels. These conditions indicate that sustainable waste management requires not only physical infrastructure but also an integrated framework encompassing asset lifecycle governance, maintenance planning, financial administration, and community empowerment.

2 | METHODS

2.1 Location and Subject of the Activity

This community service program was conducted at TPST 3R Gading Kulon, Malang City, with the primary objective of addressing structural inefficiencies through an integrated socio-technical intervention. The program adopted a multidisciplinary approach by combining construction asset management principles with social infrastructure revitalization to reposition infrastructure not only as a functional asset but also as a medium for community empowerment. Unlike conventional community service initiatives that emphasize purely technical improvements, this intervention applied a socio-technical systems perspective, integrating engineering, management, and social dimensions into a unified framework. The methodological approach employed was participatory and action-oriented, involving key stakeholders including local operators, community members, and institutional representatives. The intervention framework consisted of four main stages: (1) baseline assessment, (2) planning and design, (3) implementation and mentoring, and (4) evaluation and monitoring. During the baseline assessment phase, data were collected through direct field observations, stakeholder consultations, and operational performance reviews to identify existing inefficiencies in infrastructure utilization, asset management, and governance practices.

The program was implemented over a period of three months (12 weeks), involving 25 participants consisting of TPST managers, operational staff, waste bank administrators, and community representatives. Participant knowledge, attitudes, and skills were measured using pre-test and post-test questionnaires. The assessment instrument covered cognitive, affective, and psychomotor dimensions using a five-point Likert scale. Program effectiveness was evaluated using Key Performance Indicators (KPIs) related to asset documentation, maintenance compliance, financial reporting, and community engagement activities.

In addition, spatial and workflow analyses were conducted to optimize facility layout, improve user circulation, and enhance the functional efficiency of TPST 3R operations. The implementation phase involved infrastructure reconfiguration, including spatial reorganization of operational zones, revitalization of underutilized facilities, and the establishment of functional areas such as educational spaces, community meeting areas, and waste bank units. Simultaneously, a structured asset management system was introduced, supported by standardized documentation, maintenance scheduling, and financial recording mechanisms to ensure transparency and accountability.

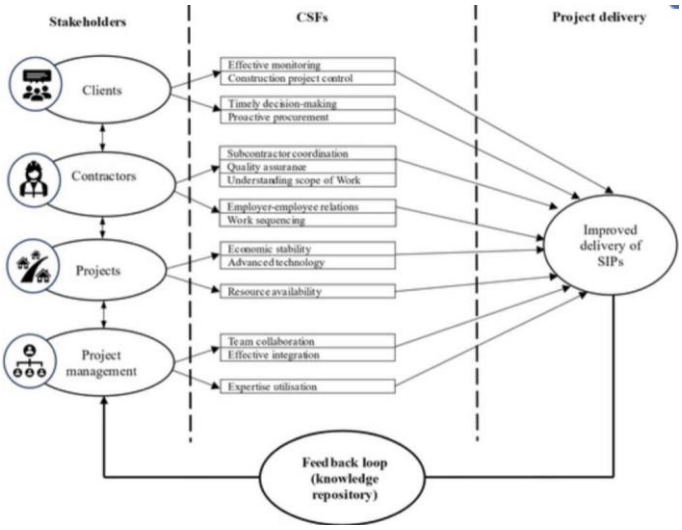

Figure 1. Framework of Community Service Activities

Evaluation was conducted using a before-and-after comparative approach, measuring changes in infrastructure functionality, asset traceability, operational efficiency, and governance quality. Data were analyzed both qualitatively and quantitatively to assess the impact of the intervention. Indicators included reduction in operational disruptions, improvement in maintenance practices, increased community participation, and enhanced accuracy in financial and asset reporting. Results demonstrate that integrating construction asset management with social infrastructure functions generates synergistic value in community-based waste management systems. The transition from reactive to structured maintenance significantly extended asset service life, while the activation of social infrastructure strengthened community engagement and service inclusivity. Furthermore, the implementation of accountable financial and asset systems improved governance transparency and decision-making processes. This methodological framework offers a scalable and adaptable model for decentralized infrastructure management in emerging economies, contributing to the advancement of management sciences through the integration of technical and socio-economic dimensions.

2.2 Implementation Stage

The community service program was implemented using a participatory, capacity-building approach that integrated interactive lectures, discussions, demonstrations, and hands-on practice to ensure both technical understanding and community engagement. Activities were structured into six sequential sessions to systematically address construction asset management, infrastructure revitalization, and institutional strengthening within TPST 3R Gading Kulon.

The first session focused on program introduction, including objectives, the implementation team, and the importance of integrating construction asset management with social infrastructure revitalization. Participants were introduced to the concept of lifecycle-based asset management, emphasizing inventory, condition assessment, preventive maintenance planning, and transparent reporting systems. A pre-assessment was conducted to evaluate baseline knowledge and institutional practices related to asset management, operational workflows, and governance systems. The second session addressed the integrated construction asset management framework in greater detail. Participants were guided through systematic asset inventory and classification, including asset tagging, condition evaluation, and prioritization based on functional importance and risk level. Principles of lifecycle management were discussed, including their impact on extending asset service life and optimizing maintenance costs. Interactive discussions and case-based examples were used to contextualize the framework within the operational conditions of TPST 3R. The third session focused on spatial reorganization and workflow optimization based on occupational health and safety (K3) principles and accessibility standards. Participants analyzed existing facility layouts, identified inefficiencies in user circulation and operational flow, and redesigned functional zones such as sorting areas, composting zones, hangars, and waste bank units, with emphasis on safety, operational efficiency, and inclusivity—including access for vulnerable groups. The fourth session introduced the development and implementation of an integrated asset and financial recording system. Participants were trained to transition from manual recording practices to structured digital systems, such as spreadsheet-based or locally adapted applications, alongside the development of standard operating procedures (SOPs) for asset management and financial accountability aimed at enhancing transparency, audit readiness, and data-driven decision-making. The fifth session emphasized strengthening social infrastructure functions through community engagement and educational activities. Participants designed and implemented community-based programs such as waste literacy education, environmental awareness campaigns, composting workshops, and waste bank operations, aimed at repositioning the TPST facility as a community hub that fosters participation, social value creation, and sustainable behavioral change. The sixth session served as the monitoring, evaluation, and capacity-reinforcement stage.

Table 1. Intervention Duration

Activity Phase	Description	Duration
Baseline Assessment	Asset inventory, interviews, and observations	2 weeks
Planning	Program design and stakeholder consultation	1 week
Implementation	Training, mentoring, and revitalization activities	8 weeks
Evaluation	Post-test and KPI measurement	1 week
Total Program Duration		12 weeks (3 months)

As part of the intervention, supporting facilities and tools were provided, including asset inventory formats, maintenance scheduling templates, financial recording systems, and monitoring logs. Participants received practical training on the use of these tools to ensure consistent documentation and the sustainability of the implemented systems. Overall, this structured implementation approach enabled the transition from reactive to preventive management practices, improved operational efficiency, strengthened governance, and enhanced community participation within the TPST 3R system.

Figure 2. Observation of Asset Management and Capacity-Building Approach

2.3 Evaluation Instruments and Techniques

The effectiveness of the community service intervention was evaluated using a structured, multidimensional assessment approach integrating technical, managerial, and socio-institutional aspects. The evaluation instrument was designed to measure improvements in construction asset management, infrastructure functionality, governance systems, and community engagement. Instrument validity was assessed using Pearson correlation, yielding statistically significant results ($p < 0.05$) for all indicators, confirming that the instrument was valid and reliable for evaluating program outcomes. The instrument was developed as a structured questionnaire combined with performance-based indicators, using a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). It consisted of four primary domains adapted to the socio-technical characteristics of the intervention.

2.4 Instrument Indicators and Ethical Procedures

The first domain, technical and infrastructure performance, comprised indicators related to spatial reorganization, workflow efficiency, occupational safety (K3) compliance, accessibility, and functional utilization of facilities such as sorting areas, composting zones, and waste banks. The second domain, construction asset management, included indicators measuring asset inventory completeness, condition assessment accuracy, implementation of preventive maintenance schedules, and asset traceability within the lifecycle management framework. The third domain, financial and governance systems, evaluated the effectiveness of digital asset and financial recording systems, the availability of standardized reports, adherence to standard operating procedures (SOPs), and transparency and accountability in decision-making processes. The fourth domain, social infrastructure and community engagement, assessed the extent to which TPST facilities functioned as community hubs, including indicators such as frequency of educational activities, community participation levels, and perceived social and economic benefits. In addition to the questionnaire-based assessment, objective performance indicators were used, including KPI achievement rates, reduction in operational disruptions, improvement in maintenance response time, availability of asset and financial reports, and increased utilization of facilities for social and educational activities. Scores for each domain were calculated as mean values, while KPI-based indicators were analyzed based on achievement percentages.

Figure 3. Instrument Indicators and Ethical Procedures

The community service program was conducted with formal approval from the TPST 3R Gading Kulon management as the primary partner. All participants were informed about the program's objectives, implementation procedures, and the use of collected data for evaluation and scientific publication. Participation was voluntary, and the confidentiality of all data was strictly maintained. The evaluation process adhered to ethical standards in community-based research, ensuring transparency, respect, and mutual collaboration between the implementation team and stakeholders.

2.5 Data Analysis

Data were collected through pre- and post-intervention assessments, field observations, documentation reviews, and system performance records. Quantitative data from the questionnaires were analyzed using descriptive and inferential statistics. Normality was assessed descriptively, followed by a comparison of pre- and post-intervention scores using dependent t-tests to determine significant improvements across evaluation domains. To strengthen the robustness of the analysis—particularly given the relatively limited sample size—additional statistical approaches were applied, including

parametric confidence intervals, bootstrap confidence intervals, and Monte Carlo permutation tests. KPI-based performance data were analyzed using trend and percentage-achievement analysis to assess improvements in operational efficiency, asset management performance, and governance quality. All statistical analyses were performed using appropriate analytical software, with a significance level of $\alpha = 0.05$. The results are presented as mean values, confidence intervals, percentage achievements, and p-values, and are interpreted descriptively to evaluate changes in infrastructure performance, asset governance, financial accountability, and community participation following the intervention.

3 | RESULTS AND DISCUSSION

3.1 Results

3.1.1 Participant Characteristics

The community service program, focusing on the integration of construction asset management and social infrastructure revitalization, was implemented at TPST 3R Gading Kulon, Malang City. The program involved active participation from local operators, management staff, and community representatives engaged in waste management activities. The number of participants involved in the evaluation was limited to core operational members who were directly responsible for asset management, financial administration, and facility operations. Findings reflect the program's impact on this specific institutional setting and are not intended for broad generalization. The program began with an introductory session to align understanding between the implementation team and participants regarding objectives, methods, and expected outcomes. This stage established a participatory foundation and encouraged active engagement throughout the program.

Table 2. Participant Characteristics and Intervention Profile

No	Participant Category	Role in Program	Participants
1	TPST Management Board	Asset governance and decision-making	5
2	Operational Staff	Daily waste processing operations	8
3	Waste Bank Administrators	Financial recording and reporting	4
4	Community Representatives	Social participation and monitoring	8
Total			25

3.1.2 Implementation of Community Service Activities

The program consisted of a series of structured training and mentoring sessions combining technical, managerial, and participatory approaches. Activities included training on construction asset management, spatial reorganization, financial system development, and community engagement strategies. Practical sessions were emphasized to ensure participants could directly apply knowledge in real operational contexts, particularly in asset inventory, maintenance planning, and workflow optimization. In addition to classroom-based sessions, on-site mentoring and demonstrations were carried out to support the reconfiguration of infrastructure and the implementation of asset and financial systems. These activities enabled participants to transition from theoretical understanding to practical application, particularly in organizing operational zones, applying safety standards (K3), and utilizing structured recording systems.

Figure 4. Implementation of Community Service Activities at TPST 3R Gading Kulon

3.1.3 Changes in Partner Conditions Before and After the Program

The program was evaluated through a comparative analysis of pre- and post-intervention conditions across key domains, including infrastructure performance, asset management, governance systems, and community engagement. The results indicate a consistent improvement across all domains, particularly in operational efficiency, asset traceability, and governance quality. Before the intervention, the TPST facility experienced disorganized spatial arrangements, inefficient workflows, and reactive maintenance practices. Asset documentation was incomplete, and financial recording systems were largely manual, limiting transparency and accountability. Social infrastructure functions were also underutilized, resulting in low levels of community participation.

Significant improvements were observed following the intervention. Spatial reorganization resulted in clearer functional zoning and improved workflow efficiency. The implementation of a structured asset inventory and preventive maintenance system enhanced asset reliability and reduced operational disruptions. Furthermore, the introduction of a digital financial recording system improved reporting accuracy and institutional transparency. Social infrastructure spaces were reactivated as community engagement hubs, contributing to increased participation in educational and waste management activities.

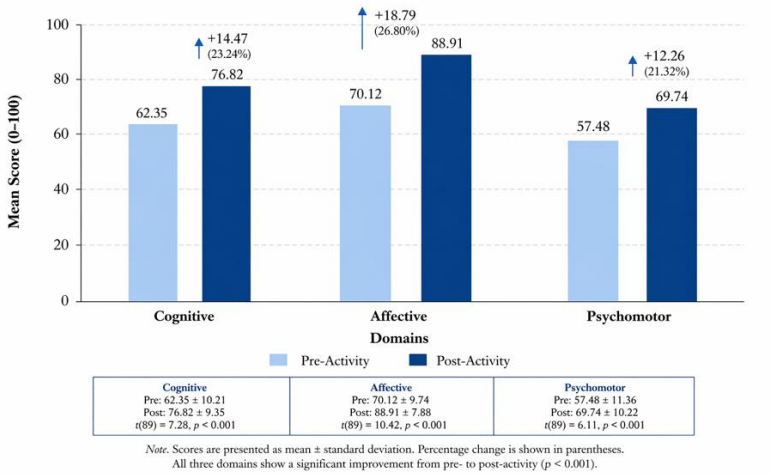

Figure 5. Changes in Pre- and Post-Activity Cognitive, Affective, and Psychomotor Scores

Based on Figure 5, results indicate a consistent improvement across the cognitive, affective, and psychomotor domains following the implementation of the community service program. The affective domain demonstrated the most prominent increase, reflecting a significant enhancement in participants' attitudes, awareness, and commitment toward infrastructure management, environmental responsibility, and community-based waste management practices. The participatory and socio-technical approach adopted in the program was particularly effective in influencing behavioral intentions and strengthening institutional awareness. In the cognitive domain, participants showed a noticeable increase in their understanding of construction asset management, infrastructure lifecycle concepts, financial governance systems, and operational optimization. Although the increase may not be statistically significant due to the relatively limited sample size and short intervention duration, the upward trend indicates that the training materials and delivery methods were effective in improving conceptual knowledge. This reflects the nature of community service programs, where knowledge acquisition often requires reinforcement through longer-term engagement. The psychomotor domain exhibited a more modest improvement, particularly in participants' ability to apply practical skills such as asset inventory recording, maintenance scheduling, workflow organization, and the use of financial and monitoring systems. The relatively smaller increase in this domain can be attributed to the limited duration of hands-on practice and the need for repeated application to fully develop technical competencies, as practical skill development in infrastructure and asset management typically requires continuous mentoring and real-world implementation over an extended period. Overall, the observed trends suggest that the program successfully established a strong foundation for capacity building, particularly in shaping attitudes and awareness, while also contributing to gradual improvements in knowledge and technical skills. These findings highlight the importance of integrating participatory learning with practical implementation to achieve balanced development across cognitive, affective, and psychomotor domains in community-based infrastructure programs.

3.1.4 Partner Capacity Changes

Initial observations indicated that institutional capacity prior to the program was relatively limited, particularly in asset management, governance systems, and operational efficiency. There was no standardized asset inventory, maintenance planning was reactive, and financial records lacked structure and transparency. After program implementation, several key improvements were identified. Participants demonstrated the ability to conduct systematic asset inventory and classification, implement preventive maintenance schedules, and utilize digital systems for financial and asset recording. Governance capacity improved through the adoption of standard operating procedures (SOPs) and KPI-based monitoring systems. The revitalization of infrastructure as a social platform led to increased community participation and enhanced utilization of facilities for educational and empowerment activities. These changes indicate a shift from a purely operational waste management system toward an integrated socio-technical system that combines infrastructure performance with social value creation.

Table 3. Partner Capacity Changes

Aspect	Before Program	After Program
Infrastructure & Layout	Disorganized layout; inefficient workflow; limited functional zoning	Optimized layout with clear zoning; improved workflow and operational efficiency
Safety (K3) & Accessibility	Limited safety measures; unsafe circulation; low accessibility	K3 standards implemented; safe pathways; improved inclusive access
Asset Management	No structured inventory; reactive maintenance	Complete asset inventory; lifecycle-based and preventive maintenance system
Financial & Governance System	Manual records; low transparency; no SOP	Digital recording system; SOP implemented; improved transparency and accountability
Operational Performance	Frequent disruptions; inefficient processes	Reduced disruptions; more efficient and reliable operations
Community Engagement	Low participation; limited social function	Increased participation; TPST functions as community hub (education & waste bank)
Organizational Capacity	Limited skills in asset, K3, and finance management	Improved staff capacity; able to operate systems independently
Monitoring & Sustainability	No KPI system; no long-term planning	KPI-based monitoring; preventive maintenance; sustainability plan established

Source: Field data, 2026.

3.1.5 Supporting Facilities and Technology

To support program implementation, several tools and systems were introduced, including asset inventory templates, maintenance scheduling formats, financial recording systems, and monitoring logsheets. Participants were trained in the use of these tools to ensure consistent data recording and system sustainability. In addition, infrastructure improvements such as spatial reorganization, safety pathways, and functional zoning were implemented to enhance operational performance. These interventions provided a practical foundation for improving both technical operations and governance systems within the TPST facility.

Figure 6. Dashboard for Asset Management and Supporting Facilities

3.1.6 Program Materials

Materials used in this program were developed based on construction management principles, asset lifecycle management frameworks, and community-based infrastructure development approaches. The content was adapted to the specific conditions of TPST 3R and designed to be practical and applicable for participants. The program focused on four main themes: (1) construction asset management, (2) spatial planning and infrastructure optimization, (3) financial and governance systems, and (4) community engagement and social infrastructure revitalization. Delivery methods included interactive lectures, discussions, case-based learning, and hands-on practice to ensure comprehensive understanding and application.

Table 4. Activity Schedule and Materials

Session	Activity	Goals
1	Program introduction, baseline assessment, and overview of asset management & social infrastructure	To introduce program objectives and measure initial capacity of participants
2	Training on construction asset management (inventory, classification, lifecycle approach)	To improve understanding of structured asset management and asset documentation
3	Spatial planning and workflow redesign (K3 &	To optimize layout, improve safety, and enhance

	accessibility principles)	operational efficiency
4	Development of asset and financial recording systems (digital & SOP)	To establish transparent, accountable, and standardized governance systems
5	Community engagement programs (waste education, composting, waste bank activities)	To strengthen social infrastructure function and increase community participation
6	Monitoring, evaluation, and training (KPI, maintenance, K3 & financial workshops)	To ensure sustainability, improve performance, and reinforce institutional capacity

Source: Field data, 2026.

The final session was conducted through a post-test and reflective discussion, aimed at assessing the program's effectiveness while gathering participants' experiences and feedback. This reflective discussion provided an overview of the program's benefits and identified potential directions for more sustainable community service development in the future.

3.2 Discussion

3.2.1 Integration of Construction Asset Management and Social Infrastructure Revitalization

Findings of this study demonstrate that integrating construction asset management with social infrastructure revitalization provides a significant improvement in both technical performance and socio-institutional outcomes. Unlike conventional approaches that treat infrastructure solely as a physical asset, this program repositions infrastructure as a socio-technical system that simultaneously supports operational efficiency and community empowerment. A major obstacle in community service program implementation is the gap between strategic planning and execution. Research indicates that many organizations struggle with slow, ineffective execution of community-oriented strategies. Best practices include establishing dedicated implementation management infrastructure, such as appointing program managers responsible for coordinating activities, monitoring progress, and ensuring accountability. This finding aligns with contemporary perspectives in infrastructure management, which emphasize the importance of combining technical systems with social value creation to achieve sustainable development outcomes. Lifecycle-based asset management proved effective in improving asset reliability and reducing operational disruptions. The transition from reactive to preventive maintenance represents a critical shift toward more sustainable asset governance. This finding is consistent with asset management literature, which highlights that structured maintenance planning and asset traceability are key determinants of long-term infrastructure performance and cost efficiency. Moreover, the establishment of a comprehensive asset inventory system enhanced decision-making accuracy by providing reliable and accessible data for operational planning. Robust strategic measurement and reporting systems further support implementation fidelity and adaptive learning; strategists are encouraged to adopt a foresighted approach that emphasizes both planning and diligent execution to realize full program potential (Galpin, 2023).

Active inclusion of patient and public involvement and engagement (PPIE) in program planning and research strengthens cultural appropriateness, acceptability, and sustainability of interventions. Engagement approaches vary from feedback sessions and committee membership to co-design roundtables, often resulting in improved alignment with community preferences and enhanced program uptake. Despite recognized benefits, formal evaluation and detailed reporting of PPIE practices remain limited, indicating a need for structured methodologies to embed and assess community involvement systematically (Mathieson *et al*., 2025). Effective community-based programs often rely on volunteers as key actors. Successful implementation includes rigorous volunteer recruitment, comprehensive training modules, and sustained volunteer support mechanisms. For instance, in health promotion programs targeting physical activity among older adults, peer-led community sessions conducted by trained volunteers demonstrated longevity and sustainability beyond initial research trials. Key enablers included a dedicated officer overseeing volunteer engagement, structured onboarding processes, and shared decision-making frameworks that gave volunteers an active role in planning and executing community activities. This collaborative model enhanced volunteer retention and fostered ownership, which is vital for long-term activity sustainability (Levinger *et al*., 2025).

3.2.2 Governance Strengthening and Institutional Transformation

A key contribution of this program lies in strengthening governance systems through the integration of digital financial and asset management tools. Prior to the intervention, governance limitations were characterized by fragmented data, manual recording systems, and limited transparency. The introduction of standardized operating procedures (SOPs) and digital recording systems significantly improved accountability, reporting consistency, and audit readiness. This transformation reflects a broader shift toward data-driven governance, where institutional performance is supported by structured information systems. Key Performance Indicators (KPIs) further reinforced this transformation by enabling measurable and continuous performance evaluation. These findings contribute to the growing body of research emphasizing the role of governance frameworks and digitalization in improving infrastructure management outcomes, particularly in decentralized and community-based systems.

Community service programs benefit from inclusive governance structures where multiple stakeholders—community members, local governments, organizations, and experts—actively participate in decision-making. Shared power and collaboration between external agents (e.g., volunteers or external organizations) and local receiving bodies ensure contextual sensitivity and equitable outcomes. In the context of volunteer tourism and social projects, power-sharing with host organizations enhanced mutual understanding, culturally responsive engagement, and overall sustainability of initiatives. This emphasizes the significance of understanding and integrating local socio-economic settings and fostering prosocial approaches within the community (Eckardt *et al*., 2021). The early stages of program implementation must clearly define the project purpose, identify relevant stakeholders, and establish organizational structures that support program goals. For example, the implementation of shared decision-making programs in healthcare settings showed that external pressures (such as state mandates) influenced project initiation, but aligning these with local necessities was crucial to ensure long-term viability and sustainability. Effective initiation stages lay the groundwork for coherent execution and evaluation phases (Bowen *et al*., 2021).

3.2.3 Socio-Technical Synergy and Community Empowerment

Beyond technical and managerial improvements, the revitalization of TPST infrastructure as a social platform significantly enhanced community engagement. Activation of educational spaces, community meeting areas, and waste bank facilities transformed the TPST from a purely operational facility into a multifunctional community hub. This reflects the successful integration of social infrastructure functions within a technical system, creating synergistic value that extends beyond operational efficiency. The increase in community participation indicates that infrastructure interventions are more effective when combined with participatory and empowerment-based approaches. This supports theories of community-based development, which argue that local engagement and ownership are critical for ensuring sustainability and long-term impact. By embedding social functions within infrastructure systems, the program not only improved service delivery but also strengthened social capital and collective responsibility for environmental management. Successful implementation of community-based programs requires attentiveness to the social and cultural contexts of target populations. For example, smart city projects in the Global South revealed significant challenges due to social inequalities and implementation gaps. Inclusive governance, meaningful engagement, and tailored area-based development are essential to bridging these gaps and advancing social sustainability in community services. Such insights stress the importance of grounding activities in the lived realities and expectations of local communities for greater impact (Sugandha *et al*., 2025).

Applying established implementation research frameworks aids in designing, executing, and evaluating community-based programs systematically. For instance, the DECIPHeR initiative highlighted incorporating validated theoretical models and focusing on implementation outcomes (e.g., process measures and sustainability indicators) rather than solely intervention outcomes, thereby supporting effective delivery of community-based interventions and addressing health disparities. Meticulous attention to study design elements, such as cluster randomization and accounting for multi-level influences, fortifies program rigor and impact (Murray *et al*., 2023). Implementation of community service activities is a multifaceted process, demanding well-structured volunteer engagement, collaborative governance, thorough project initiation, adaptation to operational contexts, evidence-based frameworks, community involvement, strong execution infrastructure, and social-cultural sensitivity. Combining these elements enhances the prospects of sustainable and impactful community service programs that effectively address local needs and leverage community assets for long-term benefit.

3.2.4 Contribution to Theory and Practice

This study contributes to the management sciences literature by proposing an integrative model that links construction asset management with socio-economic outcomes. The model demonstrates that infrastructure performance cannot be fully optimized without considering governance quality and community engagement. This integrated perspective addresses a gap in existing studies, which often treat technical, managerial, and social dimensions separately. From a practical standpoint, the model offers a scalable and adaptable framework for decentralized infrastructure systems, particularly in developing countries. The combination of asset lifecycle management, digital governance systems, and community-based approaches provides a comprehensive strategy for improving efficiency, transparency, and sustainability. However, the study also acknowledges limitations, including the relatively small sample size and short intervention duration, which may affect the generalizability of the findings. Future studies are recommended to apply longitudinal approaches and larger samples to further validate the model.

Community-based programs in diverse settings encounter operational barriers such as resource constraints, regulatory navigation, and community partnership engagement. Studies on mobile produce market operations revealed that challenges mapped to organizational infrastructure, external policy environments, and engagement processes require mitigation strategies such as formalized community agreements, innovative volunteer staffing, and diversification of ancillary services. Tailored approaches to address these internal and external factors are necessary to optimize implementation success and sustainability (Kasprzak *et al*., 2022).

4 | CONCLUSION AND RECOMMENDATIONS

The integration of construction asset management with social infrastructure revitalization can significantly enhance the performance, governance, and sustainability of community-based infrastructure systems. The implementation of lifecycle-based asset management improved asset reliability and reduced operational disruptions, while the introduction of digital financial and asset systems strengthened transparency, accountability, and decision-making processes. The revitalization of infrastructure as a social platform successfully increased community participation and transformed the TPST facility into a multifunctional hub for education and empowerment. These findings confirm that a socio-technical approach, combining technical efficiency with social value creation, is essential for achieving sustainable infrastructure management. The study provides empirical evidence that integrated asset management and social infrastructure strategies generate synergistic impacts across technical, institutional, and community dimensions. The proposed model offers a practical and scalable solution for improving decentralized infrastructure systems in emerging economies.

Based on these findings, several recommendations are proposed for future program development. Future programs should extend the duration of mentoring and training to ensure deeper institutionalization of asset management practices and governance systems, as sustained capacity-building efforts are essential for embedding new practices within institutional routines. In parallel, further development of integrated digital platforms—such as asset management systems linked with financial dashboards—is recommended to improve real-time monitoring and decision-making, while continuous refinement of KPI-based governance systems remains necessary to support performance evaluation and adaptive management strategies. Beyond the technical and governance dimensions, increasing the scale and diversity of community engagement programs can further strengthen the social function of infrastructure and enhance long-term sustainability outcomes. The proposed model should also be tested and replicated in other TPST facilities or similar decentralized infrastructure systems to validate its scalability and adaptability across different institutional and socio-economic contexts. Finally, future research should adopt longitudinal designs and larger sample sizes to examine the long-term impacts of this integrated approach, particularly with respect to behavioral change, economic outcomes, and environmental performance.

ACKNOWLEDGEMENTS

The authors would like to express their gratitude to the Institute of Research and Community Service (LPPM) of the University of Islam Malang for the financial support provided through the UNISMA Institutional Grant (Hi-Ma), based on Grant Implementation Agreement Number 173/G164/U.LPPM/K/B.07/III/2025, dated March 3, 2025, which enabled the successful implementation of this community service activity.

REFERENCES

Bowen, D. J., Nguyen, A. M., Lerouge, C., Lepoire, E., & Sheng Kwan-Gett, T. (2021). Factors affecting the initiation of a shared decision making program in obstetric practices. Healthcare, 9(9), Article 1217. https://doi.org/10.3390/healthcare9091217

Cosio Borda, R., Quispe, L., Rodríguez, J., Ober, J., & Khan, N. (2024). The role of internet and social interactions in advancing waste sorting behaviors in rural communities. Resources, 13(4), Article 57. https://doi.org/10.3390/resources13040057

Eckardt, C., Kimbu, A. N., & Font, X. (2021). Operationalising sustainability in volunteer tourism by power-sharing with the receiving organisation. Tourism Recreation Research, 259–269. Advance online publication. https://doi.org/10.1080/02508281.2021.2002097

Galpin, T. J. (2023). The strategist's view needs to extend beyond planning to execution. Strategy & Leadership, 51(4), 3–11. https://doi.org/10.1108/sl-04-2023-0038

Garoghan, S., Adewumi, A. S., Ofetotse, E. L., Onyango, V., & Dawodu, A. (2025). Enhancing sustainable waste management strategies for small and medium-sized enterprises: A focus on commercial refurbishment projects in the United Kingdom. Frontiers in Built Environment, 11, Article 1469398. https://doi.org/10.3389/fbuil.2025.1469398

Kasprzak, C. M., Lally, A. E., Schoonover, J. J., Gallicchio, D., Haynes-Maslow, L., Vermont, L. N., Ammerman, A. S., Raja, S., Tumiel-Berhalter, L., Tirabassi, J. N., & Leone, L. A. (2022). Operational challenges that may affect implementation of evidence-based mobile market interventions. BMC Public Health, 22, Article 776. https://doi.org/10.1186/s12889-022-13207-8

Levinger, P., Dreher, B., Fearn, M., & Hill, K. D. (2025). Successful implementation and sustainability of a physical activity health promotion approach utilising community peer-led training: Case studies of two local governments in Victoria. Health Promotion Journal of Australia, 36(2), Article e70005. https://doi.org/10.1002/hpja.70005

Mathieson, A., Brunton, L., & Wilson, P. M. (2025). The use of patient and public involvement and engagement in the design and conduct of implementation research: A scoping review. Implementation Science Communications, 6, Article 42. https://doi.org/10.1186/s43058-025-00725-w

Min, J. C. S., Thing, H. W., Jing, C. Y., Mahmud, A. T., & Mohd Fateh, M. A. (2024). Development of procedural framework for 6R implementation in construction waste management. Planning Malaysia, 22(32). https://doi.org/10.21837/pm.v22i32.1520

Murray, D. M., Heagerty, P., Troendle, J., Lin, F.-C., Moyer, J., Stevens, J., Lytle, L., Zhang, X., Ilias, M., Masterson, M. Y., Redmond, N., Tonwe, V., Clark, D., & Mensah, G. A. (2023). Implementation research at NHLBI: Methodological and design challenges and lessons learned from the DECIPHeR Initiative. Ethnicity & Disease, 33(Spec Issue), 12–17. https://doi.org/10.18865/ed.decipher.12

Pambudi, N. F., Samarakoon, S. M. S. M. K., Simatupang, T. M., Ratnayake, R. M. C., & Mulyono, N. B. (2025). Risk management for the circular economy business model sustainability of reduce, reuse, and recycling in plastic waste management. Discover Sustainability, 6. https://doi.org/10.1007/s43621-025-02134-4

Puluhulawa, F. U., Puluhulawa, J., Puluhulawa, M. R. U., & Harun, A. A. (2024). Handling plastic waste based on sustainable tourism in the legal framework of telematics. WSEAS Transactions on Environment and Development, 20, 16–25. https://doi.org/10.37394/232015.2024.20.3

Saillaja, V., Priyadharshini, B. I., Tiwari, P. A., Natarajan, S., Vanithamani, M. R., & Mishra, B. R. (2024). Sustainable management strategies for enhancing commercial growth in the public health sector. South Eastern European Journal of Public Health, 128–136. https://doi.org/10.70135/seejph.vi.1653

Sri Kristinayanti, W., Zaika, Y., Padma Devia, Y., Solimun, S., & Agung Wibowo, M. (2024). Green construction and local wisdom integration for sustainability: A systematic literature review. Civil Engineering Journal, 10(11), 3779–3802. https://doi.org/10.28991/cej-2024-010-11-020

Sugandha, S., Freestone, R., & Favaro, P. (2025). Social sustainability, smart cities and the Global South: Learning from the Indian experience. Cities, 165, Article 106149. https://doi.org/10.1016/j.cities.2025.106149

Tumpa, R. J., & Naeni, L. (2025). Improving decision-making and stakeholder engagement at project governance using digital technology for sustainable infrastructure projects. Smart and Sustainable Built Environment, 14(4), 1292–1329. https://doi.org/10.1108/sasbe-10-2024-0451

Xu, X., Chen, T., & Yu, X. (2025). From risk perception to sustainable governance: A stakeholder-centric approach in urban infrastructure development. Sustainability, 17(8), Article 3483. https://doi.org/10.3390/su17083483

Yusria, M., Kholik, K., Hajar, S., & Warjio, W. (2025). Healthy and waste-free area: Integrated waste management, regional resilience through sustainable development in Deli Serdang Regency, Indonesia. Journal of Posthumanism, 5(3). https://doi.org/10.63332/joph.v5i3.832.

How to cite this article: Putra, I. L., Fatimah, A., Khamim, M., Nugrahani, N., Ismawa, N. R., Indrawan, A. K., & Wijayanto, N. (2026). Strengthening Construction, Asset Management, and Revitalization of Social Infrastructure at TPST 3R Gadingkulon. *AJAD : Jurnal Pengabdian Kepada Masyarakat*, *6*(2), 319–330. https://doi.org/10.59431/ajad.v6i2.866.