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ISLAMIC VALUE-BASED COMMUNITY ENVIRONMENTAL LITERACY AND EDUCATION AS A FRAMEWORK FOR CIRCULAR ECONOMY AND SUSTAINABLE WASTE MANAGEMENT

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ABSTRACT:

Rural waste management presents multifaceted challenges, particularly where cultural and religious values strongly shape environmental practices. This study examines the integration of Islamic ethical principles within a community-driven waste management framework to strengthen environmental stewardship, foster sustained community engagement, and generate socio-economic benefits. Using a qualitative case study methodology, research was conducted at an Integrated Waste Management and Recycling Center (IWMRC) in a rural Indonesian village. Before the establishment of the IWMRC, local waste practices relied heavily on unregulated dumping and open burning, resulting in substantial environmental and public health risks. Since the center's operation in 2019–2024, the IWMRC has managed approximately 60 tons of waste annually, produced 20 tons of compost, and generated Rp 9,600,000 (USD 600) per year in revenue through waste bank activities, with active participation from about 280 local households and vendors (representing approximately 56% of the community). Thematic analysis reveals that Islamic values such as Khilafah (stewardship), Taharah (cleanliness), Amanah (trustworthiness), and Shura (consultative governance) are systematically embedded in technical operations and community education, guiding waste segregation, composting, and public learning. Circular economy principles, realized through waste bank programs, offer economic incentives that empower residents and improve livelihoods. Governance structures founded on justice (Adl), public welfare (Maslahah), and inclusive consultation support institutional resilience and sustainability. While early results are promising, this study acknowledges the limited follow-up period and recommends continued monitoring to assess long-term outcomes. These findings offer valuable insights for culturally attuned and sustainable waste management in Muslim-majority rural contexts.

KEYWORD: Rural Waste Management, Islamic Ethics, Environmental Stewardship, Community Participation, Circular Economy.

1. INTRODUCTION

The persistent crisis of environmental degradation and inadequate waste management remains a formidable challenge worldwide, particularly in rural regions characterized by under-resourced infrastructure, fragile institutional capacity, and limited ecological literacy. The escalating volume of waste—combined with fragmented, often inefficient disposal mechanisms—has intensified environmental contamination and public health threats while impeding progress toward achieving sustainable development targets (E. Nurhayati & Nurhayati, 2023; Shukla et al., 2024; Sunari & Nurhayati, 2023). In Indonesia, rural communities face compounded difficulties in waste collection, transport logistics, and processing, owing to infrastructural neglect and financial constraints (Senekane et al., 2021; Susantrin et al., 2025). Consequently, environmentally harmful practices such as

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indiscriminate dumping and the open burning of waste have become commonplace, severely degrading ecosystems and increasing the burden of disease associated with environmental pollutants (Salim et al., 2023; Singh et al., 2020). In Desa Sukapura, for example, waste was previously managed predominantly through unregulated dumping in informal sites and frequent open burning, creating substantial environmental and health hazards for local residents.

These operational deficiencies are further aggravated by endemic environmental illiteracy. A confluence of deep-rooted socio-cultural norms, minimal access to structured environmental education, and prevailing misconceptions regarding sustainable practices—such as composting and waste segregation—hinders the adoption of ecologically responsible behaviors (Han et al., 2018; Jevrić & Ćipranić, 2023). This underscores the pressing need for contextually grounded educational initiatives that integrate environmental knowledge with the cultural and ethical values that shape rural life, thereby enabling transformative behavioral change (E. Nurhayati & Nurhayati, 2023; Shukla et al., 2024)et al., 2024).

While technological innovations—including anaerobic digestion and aerobic composting—offer promising solutions for organic waste reduction and resource recovery (Chethan et al., 2024), their impact remains limited in the absence of meaningful community engagement. The circular economy framework, which prioritizes recycling, reuse, and efficient resource utilization, offers an integrated approach to rural waste challenges (Lima et al., 2021; Mihai et al., 2022; Wijayanti, 2023). However, its success depends on the socio-cultural adaptability of interventions and the mobilization of local knowledge and participation.

Sustainable rural waste management must therefore be reconceptualized as a multidimensional endeavor—one that unifies ecological stewardship, economic empowerment, and social solidarity. Sound waste practices contribute to environmental protection through pollution mitigation and biodiversity conservation (Salim et al., 2023); simultaneously, they generate livelihoods, enhance material efficiency, and reduce reliance on primary resource extraction (Viljoen et al., 2021). Socially, these systems can engender collective responsibility, foster trust, and fortify public health (Jevrić & Ćipranić, 2023). Despite this integrative potential, implementation remains fragmented due to regulatory disjunctures and cultural misalignment.

Empirical studies from Indonesia highlight a range of institutional and systemic gaps. Rural areas are frequently constrained by substandard infrastructure (Humaira & Putri, 2023; Tatsuno et al., 2021), inconsistent enforcement of environmental regulations (Fatimah et al., 2024; Tatsuno et al., 2021), and insufficient public environmental literacy (Ismiraj et al., 2023). These deficiencies perpetuate unsustainable disposal practices and heighten ecological and health vulnerabilities. Furthermore, limitations in technical capacity and the underdevelopment of market mechanisms for recyclable materials—compounded by the limited implementation of Extended Producer Responsibility (Pramiati et al., 2021)—undermine more progressive waste valorization efforts.

Nonetheless, community-led innovations have demonstrated the viability of participatory models. Waste banks, for instance, exemplify hybrid interventions that combine financial incentives with civic education to encourage sorting and recycling behavior (Sekito et al., 2013; Ulum et al., 2024). Similar programs in Himachal Pradesh and Belize have leveraged local engagement, educational programming, and technological integration (e.g., waste-to-energy conversion) to achieve sustainability objectives (Hobbs et al., 2017). These exemplars affirm the efficacy of participatory, context-sensitive governance in fostering sustainable waste ecosystems.

A notable limitation of many such programs, however, lies in their secular orientation, which often fails to resonate fully within religiously devout communities. In Muslim-majority societies, including rural Indonesia, Islamic ethical doctrines—such as *khalifah* (stewardship), *taharah* (ritual cleanliness), and *amanah* (trust and accountability)—serve as foundational moral compasses (Purnomo et al., 2024). When these values are embedded within environmental education, they offer a compelling motivational framework for encouraging sustainable behaviors (Lutfauziah et al., 2024; Zabidi et al., 2021). Yet, their systematic inclusion in environmental governance and infrastructure planning remains underexplored.

Programs like Adiwiyata and Green Pesantren have pioneered efforts to bridge this gap by harmonizing Islamic teachings with environmental pedagogy (Fua et al., 2018). These models combine moral development with ecological awareness, cultivating a holistic environmental ethos. However, the literature remains limited with respect to scaling such models beyond formal educational institutions and into broader community-based infrastructure such as waste management systems.

This study seeks to address that empirical and conceptual gap by exploring the operationalization of Islamic environmental ethics within the framework of an Integrated Waste Management and Recycling Center (IWMRC) situated in a rural Indonesian village. Although previous research has acknowledged the pedagogical potential of Islamic values in fostering ecological consciousness (Begum et al., 2021; Rekan et al., 2024), little attention has been paid to their integration into the technical, economic, and institutional dimensions of circular waste governance.

Focusing on the IWMRC in Desa Sukapura, West Java, this research investigates how Islamic moral principles are embedded into technical waste management procedures and community-driven educational programming. The study's contribution lies in its

interdisciplinary synthesis of environmental science, Islamic ethics, and rural education to formulate a replicable and culturally congruent model of sustainable waste governance. Since the IWMRC began operating in 2019–2024, it has managed approximately 60 tons of waste annually, produced 20 tons of compost, and engaged about 280 households and vendors (56% of the target community), generating Rp 9,600,000 (USD 600) per year in new revenue streams for local participants

Accordingly, the following research questions guide the study:

1. How are Islamic ethical principles such as *khalifah*, *taharah*, and *amanah* operationalized in the technical processes of rural waste management at the IWMRC?
2. In what ways does Islamic value-based environmental education enhance community environmental literacy and participation in waste management activities?
3. How does the integration of Islamic ethics within a circular economy framework promote socio-economic benefits in rural communities?
4. What institutional governance mechanisms, guided by Islamic values such as *adl*, *shura*, and *maslahah*, support the sustainability and scalability of the IWMRC program?

This research engages with local stakeholders to document the pedagogical approaches, technical systems, and governance structures that underpin the IWMRC's operations. In doing so, the study contributes to an emerging body of scholarship at the nexus of faith-based environmentalism, participatory governance, and rural sustainable development. The findings are intended to inform future policy design and programmatic interventions across Muslim-majority rural contexts, offering a culturally embedded and ethically grounded model for circular waste management. While the present findings are promising, the study acknowledges the relatively short follow-up period and recommends ongoing monitoring and evaluation to assess long-term sustainability and impact.

2. METHOD

This chapter provides a detailed account of the research methodology, emphasizing the rationale and systematic procedures employed to investigate the integration of Islamic ethics within rural waste management practices. Central to this study is a robust qualitative research design that facilitates an in-depth exploration of complex, context-specific phenomena. To complement the qualitative approach and enhance transferability, selected quantitative indicators of program output (such as annual waste collected, compost produced, and participation rates) were also compiled from program records for the most recent operational period (2023–2024).

The study employed a qualitative case study design, specifically chosen for its ability to provide a holistic and nuanced understanding of the intersection between Islamic ethical values and practical waste management in the Integrated Waste Management and Recycling Center (IWMRC) of Desa Sukapura, West Java. Case study methodology is particularly appropriate here because it allows for the comprehensive investigation of real-life processes and behaviors within their natural setting, which is essential when examining how culturally embedded values influence community environmental literacy and operational waste management. This design supports the exploration of multiple dimensions—technical, social, educational, and institutional—enabling a detailed contextualization of how faith-based ethics inform sustainable development practices. Additionally, baseline information on waste management practices prior to the establishment of the IWMRC was documented through stakeholder interviews and community recollection, with particular attention to former reliance on open dumping and burning.

The decision to use qualitative methods was driven by the research questions, which seek to understand not only what practices occur but also how and why these practices are influenced by Islamic teachings. Qualitative inquiry allows for rich, descriptive data that capture the perspectives, experiences, and motivations of diverse stakeholders. Such depth is indispensable for unpacking the layered dynamics between religious values, community engagement, and technological implementation that characterize the IWMRC.

Participant selection was guided by purposive sampling to ensure the inclusion of individuals with significant involvement and expertise related to the IWMRC's multifaceted operations. Fifteen participants were strategically chosen to represent a cross-section of key actors, including waste management personnel, religious leaders who contribute to ethical framing, community members directly participating in waste processing, and local officials overseeing governance. This targeted approach was justified to access the most informative cases relevant to the study's objectives, emphasizing depth over breadth.

Data collection combined multiple qualitative techniques to enable triangulation and enhance data richness. Semi-structured interviews were the primary tool, offering guided yet flexible dialogues that uncovered participants' insights on the operationalization of Islamic ethics, community education efforts, and governance challenges. Interviews were audio-recorded, transcribed verbatim, and translated as necessary, ensuring data integrity and accessibility. Complementing interviews, participant observation allowed the researcher to directly witness community behaviors, educational sessions, and waste processing activities, providing empirical grounding to the self-reported data. Document analysis of operational manuals, educational materials, and policy documents supplemented these methods, enriching the

contextual understanding and verifying procedural consistency.

Data were analyzed using thematic content analysis, which began with open coding to identify emergent concepts directly from the data. Subsequent axial coding refined these into coherent categories and themes aligned with the study's conceptual framework. Qualitative data analysis software facilitated systematic management and retrieval of codes, supporting a rigorous and transparent analytic process. The iterative analytic approach enabled continual refinement and deep interpretation, capturing the complex interplay of ethics, practice, and governance within the IWMRC.

To ensure validity and reliability, methodological rigor was prioritized through data triangulation across sources and methods, enhancing the credibility of findings. Member checking was employed to validate interpretations with participants, mitigating the risk of researcher bias or misinterpretation. An audit trail documented all research decisions and analytical procedures, providing transparency and enabling replication. Reflexive practices were integral, as the researcher critically engaged with potential biases and maintained awareness of their influence throughout the research. Finally, the relatively short operational period of the IWMRC at the time of data collection (2023–2024) is acknowledged as a limitation, and recommendations for ongoing monitoring are noted to support future transferability.

Ethical considerations were rigorously observed. Ethical approval was secured from an institutional review board before commencement. Participants provided informed consent after receiving comprehensive information about the study's aims, processes, and their rights. Confidentiality was maintained by anonymizing data and ensuring secure data storage. Respect for local cultural and religious norms was emphasized through ongoing consultation with community leaders and sensitivity to local practices, fostering ethical and respectful engagement.

3 RESULTS AND DISCUSSIONS

3.1 Islamic-Inspired Technical Stewardship in Waste Processing

The foundation of the **Integrated Waste Management and Recycling Center** (IWMC) approach to waste management is deeply rooted in the Islamic concept of *Khilafah*, which emphasizes humanity's role as stewards of the earth. This ethical framework shapes the IWMC's approach to waste management, where ethical principles of responsibility and trustworthiness are operationalized through meticulous waste segregation and processing. Before the intervention, waste in Desa Sukapura was largely unmanaged, with most materials disposed of by open dumping or burning. Since the center's establishment, waste segregation at source has become standard practice, ensuring materials are properly sorted before reaching the processing facility. Central to this approach is the practice of waste segregation at its source, ensuring that materials are sorted properly before reaching the processing facility. As one informant described, "Waste is collected from the source in a segregated way, enabling it to be used as raw material in IWMC's treatment processes." This practice not only ensures the technical feasibility of recycling but also aligns with the Islamic value of avoiding wastefulness (*Israf*) and promoting the optimal use of resources.

The program's success is also due to its regular and systematic collection schedule. As one participant stated, "The waste collection is regularly scheduled, and materials are pre-sorted according to type." This routine ensures that waste is sorted efficiently and processed without delay, contributing to the smooth operation of the system and preventing contamination. The vast majority of the waste handled by IWMC is organic, including vegetable scraps, fruit peels, and leftover food from markets. This is consistent with the types of waste most commonly generated in local market settings. An informant noted, "The majority of processed waste is organic—vegetables, fruits, and other culinary leftovers." During 2019–2024, the IWMC managed approximately 60 tons of waste annually, with over 70% of it classified as organic.

IWMC processes this organic waste through composting, using traditional methods such as windrow composting, alongside mechanized processing techniques. The use of shredders, sieves, and melters enhances the efficiency of the operation. As one participant explained, "We use composting systems including windrow methods, supported by equipment like shredders, sieves, and melting machines." Quality control of the compost is another crucial aspect of the program. To ensure that the compost meets high standards, it is supplemented with NPK fertilizers, as described by an informant: "Composting is conducted properly, with NPK added to ensure good fertilizer quality." In 2019–2024, the center produced approximately 20 tons of compost, which was distributed locally to support agriculture. This attention to detail in both the technical aspects of waste processing and the ethical principles of stewardship reflects the integration of Islamic environmental values into sustainable waste management practices.

The findings of this study reveal that the Integrated Waste Management and Recycling Center (IWMRC) in Desa Sukapura operationalizes the Islamic concept of Khilafah as a foundational ethical framework that profoundly shapes its waste management practices. This stewardship principle emphasizes humanity's role as caretakers of the earth, requiring responsible, trustworthy management of natural resources to maintain ecological balance for present and future generations (Bhat, 2024; Hussein et al., 2024; Omercic, 2024). Within the IWMRC, this manifests through rigorous waste segregation at the source, ensuring that materials are sorted carefully before processing, thus enabling

efficient recycling and resource recovery. The practice aligns with the Islamic value of avoiding wastefulness (Israf) and optimizes resource utilization, confirming the integration of ethical and technical dimensions as envisioned in Maqasid al-Shari'ah frameworks (Azmin Shompa et al., 2025; Mohd Zain et al., 2024).

The systematic scheduling of waste collection further reinforces operational efficiency and environmental protection by preventing contamination and ensuring the uninterrupted processing of segregated waste streams. The predominance of organic waste—vegetable scraps, fruit peels, and market leftovers—reflects the typical waste profile of rural market communities and offers a tangible opportunity for sustainable composting practices. Employing traditional windrow composting augmented by mechanized equipment such as shredders, sieves, and melters illustrates a pragmatic blending of indigenous knowledge with modern technology. Quality control measures, including the supplementation of compost with NPK fertilizers, highlight the program's commitment to producing high-grade soil amendments that support agricultural sustainability.

These technical practices embody the Islamic principles of cleanliness (Taharah) and waste avoidance (Israf), which not only inform the physical segregation and processing of waste but also underscore an ethical obligation to maintain purity and minimize unnecessary consumption (Japar et al., 2023; Omar et al., 2016). The rigorous separation of biodegradable and non-biodegradable waste preserves material integrity for recycling, thus operationalizing Taharah within the waste management lifecycle and contributing to the broader goal of environmental stewardship. The incorporation of emerging technologies, such as automated identification and segregation systems, further enhances adherence to these values by reducing human exposure to hazardous waste and maintaining hygiene standards (Rafeeq et al., 2016; Sahu & Reddy, 2024).

The study's results corroborate the notion that Islamic stewardship offers a comprehensive ethical framework that transcends mere technical compliance to foster holistic sustainability. This framework integrates moderation (wasatiyyah), justice (Adl), and care for vulnerable populations, guiding waste management beyond efficiency towards equity and ecological preservation (Bhat, 2024; Hussein et al., 2024). The alignment with Maqasid al-Shari'ah emphasizes not only resource conservation but also the protection of community welfare and social justice, ensuring that environmental policies do not exacerbate inequalities.

This study's implications are multifold. First, it highlights the critical importance of integrating indigenous ethical systems—particularly Islamic environmental ethics—into rural waste management to enhance efficacy and community ownership. Second, it suggests that technical interventions, no matter how advanced, require ethical grounding and culturally relevant education to achieve lasting behavioral transformation. Third, it emphasizes the value of combining traditional and modern composting techniques within an ethical framework to optimize environmental and economic outcomes.

The ethical principles embedded in Islamic stewardship provide a holistic and culturally resonant foundation for sustainable rural waste management. The successful application of these principles within the IWMRC demonstrates the viability of faith-informed environmental governance that promotes responsible resource use, community participation, and socio-economic empowerment. This integrated approach offers a replicable model for similar contexts seeking to harmonize religious values with sustainable development goals, ultimately fostering a more just and environmentally conscious society.

3.2 Community Environmental Literacy Education and Participation

The success of IWMC cannot be separated from its commitment to community education and engagement, which aligns closely with Islamic values of *Ta'awun* (mutual cooperation) and *Tazkiyah* (self-purification through knowledge). The program actively fosters environmental literacy through comprehensive educational initiatives. One informant highlighted, "We conduct socialization activities and distribute pamphlets to raise community awareness." These efforts are designed to increase knowledge about the importance of waste segregation and the broader environmental implications of waste management. Prior to the program, community environmental literacy was low, and participation in structured waste management was minimal. This proactive approach is essential for ensuring that the community understands their role in the waste management process and the ethical and environmental significance of their actions.

IWMC does not function solely as a technical operator but also as an active educator and field executor. By playing these dual roles, the program ensures that community members are continuously engaged, both through learning and practical involvement. One informant elaborated: "IWMC acts as both an educator and a field executor," underscoring the program's hands-on approach to capacity-building within the community. This involvement extends to multiple levels, with residents directly participating in waste collection, sorting, delivery, and the payment of retribution fees. The program's requirement that waste be sorted at the household level and delivered directly to the processing facility is enforced strictly to prevent improper disposal practices. As one informant clarified, "Waste must be sorted properly and delivered directly; leaving it on the roadside is prohibited."

Participation in IWMC is measured not just by the act of waste sorting but by a holistic commitment to maintaining a clean environment. As one participant shared, "Residents compete in sorting and collecting waste, resulting in a cleaner environment and greater communal comfort." This competitive spirit enhances social

cohesion and fosters a sense of collective responsibility, which is central to the program's success. Participation levels are also quantified through metrics such as the volume of waste collected and the accuracy of sorting, with one informant noting, "We measure participation by the volume of waste and accuracy of sorting." During 2019–2024, approximately 280 households and vendors—around 56% of the target community—actively participated in regular sorting and waste bank activities. This structured approach ensures that community members are actively involved, and it reinforces the notion that environmental literacy is not just theoretical but an actionable practice.

The success of the Integrated Waste Management and Recycling Center (IWMC) in Desa Sukapura is fundamentally intertwined with its robust commitment to fostering community environmental literacy, deeply rooted in Islamic values such as *Ta'awun* (mutual cooperation) and *Tazkiyah* (self-purification through knowledge). The program's comprehensive educational initiatives have markedly enhanced community awareness of the critical importance of waste segregation and the wider environmental ramifications of improper waste management. Informants underscored the pivotal role of socialization efforts and the distribution of educational materials, which cultivate a sense of ethical responsibility among community members. These initiatives ensure that environmental stewardship is internalized not only as a regulatory obligation but as a moral imperative.

Crucially, the IWMC transcends the conventional role of waste management as a purely technical service provider by embracing a dual function as both an educator and an operational executor. This duality fosters continuous community engagement, integrating knowledge dissemination with practical involvement. Residents participate actively in waste collection, sorting, delivery, and the payment of associated fees, all underpinned by strict enforcement of household-level waste segregation to prevent improper disposal. Such rigor aligns with global best practices in waste management and supports the technical efficiency and environmental integrity of the system (Alao et al., 2025; Azita et al., 2020).

Community participation extends beyond individual compliance, manifesting as a collective social practice imbued with a spirit of cooperation and friendly competition. Residents' reported competition to excel in waste sorting and collection contributes not only to improved environmental cleanliness but also to heightened communal solidarity and comfort. This dynamic reflects broader theoretical and empirical evidence underscoring the transformative potential of social learning and collective responsibility in enhancing waste management outcomes (Fajri et al., 2025; Sunarti et al., 2023). The IWMC's systematic use of participation metrics—tracking both waste volume and sorting accuracy—demonstrates a structured and sustained engagement with environmental literacy that moves beyond abstract knowledge to embodied, actionable practice.

The educational components of the IWMC are firmly grounded in adult learning principles, which further elucidates their effectiveness. Recognizing adults as self-directed learners motivated by practical and culturally relevant knowledge, the program designs learning experiences that directly connect environmental education to the community's lived realities and immediate concerns (S. Nurhayati, Tersta, et al., 2024; Ratnawulan et al., 2025). This approach resonates with Knowles' theory of andragogy, emphasizing learner autonomy, experiential learning, and the applicability of knowledge to real-world problems (Cacam et al., 2023; S. Nurhayati, 2015; S. Nurhayati & Millenia, 2024). By eschewing didactic instruction in favor of participatory and hands-on learning, the IWMC empowers adults to assume active stewardship roles, thereby fostering sustained behavioral change.

Such alignment with adult education theory is corroborated by studies demonstrating that culturally sensitive, learner-centered educational interventions significantly improve sustainable behaviors in rural contexts (Nakashidze et al., 2024; S. Nurhayati, Dina, et al., 2024; Rosita et al., 2020; Tini et al., 2025). The integration of Islamic ethical teachings within these educational efforts enhances motivation by providing a moral framework that links ecological responsibility with spiritual values. This synergy between cognitive understanding and ethical conviction amplifies the depth and durability of community engagement.

These findings are consistent with established models of environmental literacy, which posit that knowledge, attitudes, and practices form a triadic foundation critical for effective environmental action (Alao et al., 2025). The IWMC exemplifies how combining value-based education with participatory governance and technical rigor can effectively bridge the commonly observed gap between pro-environmental intention and sustained behavior (Shyamal et al., 2023).

Moreover, the embedding of Islamic values significantly strengthens the program's social and motivational foundations. By framing environmental stewardship within a religious-ethical paradigm, the IWMC mobilizes intrinsic motivators that resonate deeply with community identity and belief systems. This alignment fosters not only individual commitment but also social cohesion, creating a community-wide normative environment supportive of sustainable waste practices. This observation aligns with empirical evidence from Muslim-majority contexts where faith-based education has proven instrumental in advancing environmental responsibility (Mohamad et al., 2012; Purnomo et al., 2024).

While alternative factors such as financial incentives or infrastructural improvements may contribute to program outcomes, the qualitative data emphasize that the integrative educational approach—anchored in Islamic ethics—and participatory governance are the primary

drivers of sustained engagement. The normalization of environmental stewardship as a communal norm, reinforced by monitoring mechanisms and shared accountability, emerges as the critical mechanism facilitating behavioral transformation.

These insights have substantial implications for policy and program design in rural waste management. They underscore the imperative of integrating adult learning principles with culturally and religiously relevant ethical frameworks to foster genuine community ownership and long-term sustainability. Programs that neglect these dimensions risk perpetuating the disjunction between knowledge and practice, undermining effectiveness. The IWMC model demonstrates that success is predicated on the confluence of technical proficiency, value-laden education, and active community participation.

This study confirms that community environmental literacy, informed by adult education theories and deeply embedded within Islamic ethical values, constitutes a vital catalyst for effective and sustainable rural waste management. This integrated approach not only facilitates knowledge acquisition but also nurtures the motivation and social structures essential for enduring environmental stewardship. As such, it provides a scalable and culturally attuned framework applicable to similar rural Muslim-majority contexts striving to reconcile sustainable development with local cultural imperatives.

3.3 Socio-Economic Impacts and Circular Economy Practices

IWMC exemplifies the principles of a circular economy, which reflects Islamic ethical principles of *Barakah* (blessing and prosperity) derived from the ethical use of resources. The program successfully integrates environmental stewardship with socio-economic benefits by transforming waste into valuable commodities. During 2019–2024, the waste bank generated approximately Rp 9,600,000 (USD 600) in additional income for participants. One stakeholder highlighted, “Waste sorted according to predetermined categories is purchased by the program.” This direct financial incentive encourages residents to engage in proper waste sorting, providing tangible rewards for their participation. This aligns with the Islamic concept of *Maqasid al-Shariah*, which seeks to preserve individual and community welfare, including economic security.

The establishment of a waste bank system further embeds the principles of circular economy into the community. As one informant explained, “Waste becomes a form of economic resilience as raw material for recycling, deposited through the waste bank program.” This innovative system allows community members to accumulate financial credit for the materials they contribute, enabling them to benefit directly from their environmental stewardship. Through this mechanism, IWMC creates new economic opportunities, thus promoting community-based empowerment and sustainable livelihood.

IWMC also fosters a sense of social cohesion by encouraging collaboration and competition in waste management. One participant noted, “Residents compete in sorting and collecting waste, leading to a more orderly environment and enhanced communal comfort.” The healthy competition that emerges from this system fosters a deeper sense of responsibility and pride within the community, further strengthening collective environmental action. The program has also successfully reduced harmful practices such as illegal dumping and the burning of waste, thereby improving local ecological conditions. As one informant stated, “The program has reduced illegal dumping and the burning of waste.”

The success of IWMC is assessed using a variety of economic, social, and environmental indicators. Economic success is measured by the volume of savings deposited in the waste bank: “The success is evident in the amount of savings deposited by the community.” Social success is tracked through participation rates: “Community involvement is measured by the number of active participants.” Environmental success is evident in the improved local conditions, with one participant commenting, “The environment has become more orderly and comfortable.” Quantitatively, over 280 households benefited from the program, with 20 tons of compost produced and over 60 tons of waste managed per year during the first full year of operation. These integrated measures demonstrate the program’s ability to deliver sustainable outcomes across multiple dimensions, reinforcing the interconnectedness of environmental, social, and economic well-being.

The Integrated Waste Management and Recycling Center (IWMC) in Desa Sukapura offers a paradigmatic illustration of circular economy principles operationalized within a rural waste management framework, deeply informed by Islamic ethical concepts, notably Barakah, which denotes blessing and prosperity derived from the prudent stewardship of resources. This initiative effectively synthesizes environmental conservation with socio-economic development by converting waste materials into economically valuable commodities, thereby incentivizing community participation through tangible financial returns. Such an approach embodies the ethical tenets of Maqasid al-Shari’ah, which prioritize the protection and enhancement of both individual and collective welfare, including economic security, thereby lending profound normative legitimacy to the program.

A salient outcome of the IWMC’s operation is the establishment of a waste bank system that concretely materializes circular economy principles by enabling residents to transform waste into a form of economic resilience. Through this mechanism, community members accumulate financial credit commensurate with the volume and quality of their contributions, thereby forging a direct link between environmental stewardship and economic empowerment. This symbiotic relationship echoes extant literature underscoring the pivotal role of

circular economy practices in catalyzing rural economic revitalization and job creation, particularly through the valorization of waste as secondary raw materials (Silva-González et al., 2021; Sreekumar et al., 2024). The IWMC's capacity to foster sustainable livelihoods while promoting environmental responsibility exemplifies the mutually reinforcing potential of integrated socio-economic and ecological frameworks.

Beyond economic dimensions, the IWMC actively cultivates social cohesion by engendering collaborative engagement and constructive competition in waste sorting and collection activities. This dynamic interplay has led to notable improvements in environmental quality and communal well-being, as residents derive pride and comfort from their collective achievements. The critical role of such participatory processes in sustaining pro-environmental behaviors and fostering social inclusion is well documented (Ishuga et al., 2024; Jongsuksomsakul, 2024; Mapani et al., 2023), underscoring the indispensability of social capital in the success of circular economy interventions within rural contexts.

Environmentally, the program has demonstrably curtailed deleterious practices such as illegal dumping and open burning, resulting in marked amelioration of local ecological conditions. These outcomes resonate with a robust body of evidence indicating that circular economy strategies—encompassing source separation, composting, and bioenergy conversion—significantly mitigate pollution and greenhouse gas emissions while enhancing climate resilience in rural settings (Ha, 2025; Islam et al., 2024; Lima et al., 2021; S. Nurhayati, Nurjaman, et al., 2024). The program's systematic evaluation through integrated economic, social, and environmental indicators further substantiates the holistic nature of its impact and aligns with sustainable development imperatives.

Nonetheless, despite these pronounced successes, the scalability and enduring sustainability of circular economy models such as IWMC face substantive challenges. Structural constraints—ranging from inadequate infrastructure and limited fiscal resources to fragmented institutional governance—persist as formidable impediments to widespread adoption and replication (Ishuga et al., 2024; Souza Piao et al., 2024). The insufficiency of pervasive public awareness and limited market incentives for certain waste categories also circumscribe progress. The IWMC's adoption of a multi-stakeholder governance framework—integrating governmental support, civil society engagement, and religious leadership—exemplifies a strategic response to these systemic barriers, reflecting scholarly recommendations for adaptive and inclusive institutional arrangements (Mihai & Grozavu, 2019).

Critically, the incorporation of Islamic environmental ethics provides an axiological foundation that substantially enhances the program's legitimacy, community acceptance, and efficacy. Core principles—*khalifah* (stewardship), *taharah* (purity and cleanliness), and *amanah* (trust and responsibility)—function not only as normative imperatives inspiring environmentally responsible conduct but also as cultural touchstones that anchor sustainability within the community's spiritual and moral worldview. This ethical embedding deepens motivation and ownership, thereby strengthening behavioral adherence and long-term commitment. Empirical literature corroborates the assertion that faith-based ethical frameworks can amplify pro-environmental behavior by fostering social cohesion, ethical accountability, and collective action (Bsoul et al., 2022; Purnomo et al., 2024).

The IWMC's model substantiates that the confluence of circular economy practices with Islamic ethical precepts generates multidimensional benefits that encompass environmental integrity, socio-economic upliftment, and social solidarity. This integrative and culturally resonant paradigm offers a replicable and scalable template for advancing sustainable rural waste management across Muslim-majority contexts. To consolidate and extend these gains, future endeavors must address infrastructural inadequacies, enhance market mechanisms, and intensify community-based educational efforts within supportive institutional frameworks. It is important to note, however, that the duration of follow-up in this study is limited, and future research should include longer-term monitoring to fully assess sustained impacts. Ultimately, this study affirms that the transformative potential of circular economy strategies is maximized when embedded within locally meaningful ethical and cultural narratives, thus fostering holistic, inclusive, and resilient rural development.

3.4 Institutional Governance and Collaborative Sustainability

IWMC's long-term success is supported by a robust institutional governance framework that aligns with Islamic principles of justice (*Adl*), public welfare (*Maslahah*), and consultative decision-making (*Shura*). Government involvement plays a pivotal role in supporting the program by enacting regulations and providing the necessary infrastructure for waste management. One informant stated, "The government issues regulations and provides waste management facilities," reflecting the essential role of public policy in enabling community-driven environmental initiatives.

In addition to government support, IWMC collaborates with various stakeholders, including non-governmental organizations (NGOs) and private-sector entities. These partnerships enhance the program's capacity by providing additional resources, expertise, and technical support. As a participant noted, "There is cooperation with NGOs and the private sector supporting the program." This multi-sectoral approach to governance exemplifies *Shura*, enabling inclusive consultation and shared responsibility across various stakeholders.

Looking forward, IWMC envisions expanding its operations by increasing recycling efforts and developing innovative business models, such as waste marts. A

stakeholder noted, "Plans include opening a waste bank mart and increasing recycling of residual waste." These future-oriented initiatives demonstrate the program's commitment to *Ijtihad*—reasoned innovation—by addressing emerging challenges and seizing new opportunities within the framework of a circular economy. Collaborative problem-solving is central to IWMC's adaptive governance model, with one informant stating, "Challenges are addressed through collaboration and partnership building."

While the program has achieved significant success, stakeholders also recognize the need for further investment in infrastructure and capacity building to ensure its continued sustainability. One informant remarked, "The community's strong interest demands better facilities to sustain the program," underscoring the ongoing balance between ambition and resource availability. This recognition of the dynamic interplay between aspiration and practical limitations is key to understanding the long-term viability of IWMC's model of sustainable waste management.

The enduring success of the Integrated Waste Management and Recycling Center (IWMRC) in Desa Sukapura is underpinned by a robust institutional governance framework that explicitly aligns with foundational Islamic ethical principles, namely justice (*Adl*), public welfare (*Maslahah*), and consultative decision-making (*Shura*). These principles collectively foster an inclusive, equitable, and participatory governance culture, which is crucial for mobilizing community stewardship and sustaining environmental initiatives. Government involvement remains indispensable, providing essential regulatory frameworks and infrastructural support that legitimize and enable local waste management efforts. Participants' accounts emphasize the government's pivotal role in issuing regulations and supplying waste management facilities, confirming the critical nexus between public policy and community-driven environmental programs. This finding coheres with established scholarship demonstrating that legal backing at both national and municipal levels is a prerequisite for effective and sustainable community-based waste management (Khoirul Anas et al., 2023; Kubota et al., 2020; Pamuji et al., 2023).

Complementing governmental support, the IWMRC's multi-stakeholder collaboration with non-governmental organizations (NGOs) and private sector partners exemplifies the Islamic principle of *Shura* through its promotion of shared responsibility and inclusive consultation. These partnerships enhance operational capacity by providing technical expertise, additional resources, and managerial support, which are vital in addressing complex waste management challenges that exceed the capacity of any single actor. The cooperative governance model observed reflects wider evidence advocating multi-sectoral approaches to foster institutional resilience, social innovation, and systemic change (Sunarti et al., 2023; Ulum et al., 2024). Moreover, this aligns with the efficacy of public-private partnerships (PPPs) documented in global waste management contexts, where private sector involvement significantly improves operational efficiency, financial sustainability, and environmental outcomes (Laohalidanond & Kerdsuwan, 2021).

Strategically, the IWMRC's vision to expand recycling efforts and innovate through initiatives such as waste bank marts demonstrates the application of *Ijtihad*, or reasoned innovation within an Islamic ethical framework. This reflects an adaptive governance orientation, essential for navigating the dynamic challenges of sustainable waste management and capitalizing on circular economy opportunities, such as resource recovery and waste valorization. Such future-oriented innovation aligns with the principles of the Sustainable Development Goals and circular economy frameworks, which advocate for continuous improvement and stakeholder engagement in environmental governance (Khoirul Anas et al., 2023; Taelman et al., 2018). Participant testimonies confirm that collaborative problem-solving remains central to overcoming obstacles, underscoring the governance model's flexibility and responsiveness (Linzalone et al., 2017).

Despite notable achievements, the IWMRC confronts persistent infrastructural and capacity constraints, with stakeholders recognizing the urgent need for enhanced facilities and technical support to sustain growing community participation. This tension between aspirational program goals and finite resource availability reflects a well-documented challenge in community-based environmental programs, where financial and technical limitations frequently hinder scalability and long-term impact (Munawir et al., 2024). Such recognition aligns with broader findings emphasizing that sustainable community-based waste management requires continuous investment in infrastructure, human capital, and institutional strengthening (Fajarwati et al., 2020; Kubota et al., 2020).

The evidence from this study reinforces the centrality of an ethically grounded, participatory, and multi-sectoral governance architecture in achieving sustainable rural waste management. By explicitly integrating Islamic values into governance structures, the IWMRC not only cultivates legitimacy and community trust but also fosters social cohesion and shared ownership, critical elements for program resilience and effectiveness. This finding resonates with broader governance literature advocating that culturally congruent and inclusive institutional frameworks are fundamental to sustaining environmental initiatives in rural and faith-based contexts (Latanna et al., 2023; Pamuji et al., 2023).

Additionally, the IWMRC's collaborative approach mirrors global best practices in PPPs, which have demonstrated significant benefits in improving operational efficiency, securing investments, and expanding environmental services. However, as the literature cautions, such partnerships must be carefully

designed to ensure equity, inclusivity, and responsiveness to local socio-economic conditions, thereby avoiding socio-spatial inequalities and fostering sustainable development (Makamté Kakeu–Tardy & Véron, 2019; Olukanni & Nwafor, 2019; Spoann et al., 2019). This study's findings contribute nuanced empirical support to these theoretical insights, highlighting the need for continual policy refinement and capacity enhancement tailored to rural realities.

This research elucidates how embedding Islamic ethical precepts within institutional governance enriches the sustainability and adaptability of community-based waste management. The IWMRC's governance model exemplifies the harmonization of religious values and contemporary environmental management, fostering justice, consultation, and public welfare in practice. It simultaneously illustrates the necessity of integrated stakeholder collaboration and resource mobilization to address the multifaceted socio-technical challenges inherent in rural waste governance. These insights provide valuable contributions to the academic discourse on faith-informed sustainability and offer practical implications for policy-makers and practitioners aiming to implement culturally resonant and effective environmental programs in Muslim-majority rural settings.

4. CONCLUSION

This study critically examined the integration of Islamic ethical principles within rural community-based waste management to advance sustainable environmental stewardship. Centered on the Integrated Waste Management and Recycling Center (IWMRC) in Desa Sukapura, the research demonstrated how core values such as *Khilafah* (stewardship), *Taharah* (cleanliness), *Amanah* (trustworthiness), and *Ijtihad* (reasoned innovation) fundamentally inform technical practices, educational efforts, socio-economic initiatives, and governance frameworks. Prior to the establishment of the IWMRC, waste management in Desa Sukapura was limited, with widespread open dumping and burning as the dominant practices. The intervention shifted community behavior to structured segregation at source and improved processing. The findings illustrate that embedding Islamic ethics alongside rigorous waste segregation and composting enhances both ecological outcomes and community engagement. Quantitative program records from 2019–2024 indicate that approximately 60 tons of waste were managed annually, with 20 tons converted to compost and over 280 households participating in waste bank activities, generating more than Rp 9,600,000 in economic benefits for participants. The operationalization of circular economy principles through waste bank mechanisms creates direct economic incentives, thereby empowering local residents while promoting resource conservation. Governance structures rooted in justice (*Adl*), public welfare (*Maslahah*), and consultative decision-making (*Shura*) facilitate inclusive collaboration and institutional adaptability, underpinning the program's sustained success. This research contributes significantly to the scholarly discourse by presenting a culturally nuanced, interdisciplinary model that harmonizes faith-based ethics, technological innovation, and participatory governance in rural waste management. It offers critical insights for policymakers and practitioners striving to implement contextually relevant and scalable sustainability initiatives within Muslim-majority rural settings. However, it is important to acknowledge that these findings are based on a relatively short follow-up period, and the full sustainability of impacts requires longer-term assessment. Future inquiries should expand comparative analyses across diverse socio-cultural environments, integrate robust quantitative assessments of environmental and economic impacts, and employ longitudinal methodologies to assess the durability of faith-informed governance models. Subsequent research should incorporate baseline, process, and impact indicators over extended periods to capture durability and transferability. In sum, the deliberate incorporation of Islamic environmental ethics into community-driven waste management represents a compelling and transformative avenue toward resilient, equitable, and culturally congruent rural sustainability.

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