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Architecture as a tool to rebrand Gown and Town socioeconomics through Public–Private Partnerships (PPPs): Advancing Sustainable Plastic Waste Management using the Afe Babalola University Model

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Abstract: ***The intersection of architecture and public–private partnerships (PPPs) presents a powerful approach to address pressing environmental and socioeconomic issues. At Afe Babalola University (ABUAD), plastic waste management has evolved and is still evolving into a model that not only advances sustainability, job creation and community resilience but also supports town and gown relations. This research explores how architecture can rebrand town and gown socioeconomics using the Afe Babalola University model through Public–Private Partnerships (PPPs), with emphasis on skill development and sustainable plastic waste management. The research adopts a mixed-methods approach, combining literature review, interviews with university and community stakeholders and field observations. It further investigates how PPPs and architectural intervention initiatives can reinforce collaborations, support circular economy practices and promote green skill development. The results show that architecture, when integrated into PPP frameworks, serves as both a physical and figurative bridge, enabling the creation of waste-to-resource hubs that encourage recycling, training and entrepreneurship. The paper posits that gown and town relations, which describe the interaction between the university and its host community, are pivotal for addressing common socio-environmental and socio-economic challenges such as plastic pollution and unemployment respectively. The study concludes that architecture can play a transformative role in repositioning ABUAD as a catalyst for sustainability, innovation and community empowerment in Nigeria.***

Key words: Architecture, circular economy, host community, PPPs, skill development.

1. Introduction

Plastic waste has emerged as one of the most pressing environmental and social challenges worldwide, particularly in urban regions of developing countries (Kortsen, Kilbride, Lowe, Peirce, & Shaver, 2023). In Nigeria, rapid urbanisation, weak regulatory enforcement and insufficient infrastructure often intensify the mismanagement of plastic materials, resulting in negative health outcomes, not to talk of the economical impact. Recognising these problems, scholars and practitioners have begun emphasising multi-stakeholder approaches such as public-private partnerships (PPPs) to mobilise resources and expertise to encourage community engagement in waste management (Adesuyi & Janet Solape, 2021; United Nations Environment Programme (UNEP), 2023).

Architecture, by virtue of shaping physical space, holds latent potential beyond aesthetic and shelter functions (Cheng. F, 2024). In view of this, the profession has the potentials to actively rebrand socio-economic relations between universities ("gown") and their host communities ("town") through thoughtful architecture that can influence participation behaviour thus signalling commitment. When combined with PPPs, these architectural interventions can become sustainable drivers of plastic waste reduction, economic development and improved environmental quality.

Afe Babalola University (ABUAD) in Ado-Ekiti, Ekiti State, offers a compelling case for exploring this synergy. The university has already embarked on multiple sustainability initiatives, including carbon management, renewable energy deployment, tree planting and collaborations with NGOs for climate adaptation. These efforts suggest both institutional will and community reach (ABUAD, 2023; ABUAD, 2022). Yet, the specific practice of integrating architectural design, plastic waste infrastructure and PPP models together, remain under-studied.

In view of the foregoing, this study becomes expedient as it examines how architecture can be

instrumental in rebranding gown and town socio-economics via PPPs, using ABUAD as a model. It draws on how architectural solutions supported by PPPs can advance sustainable plastic waste management and highlights a practical pathway for rebranding the gown-town relationship in ways that benefit the academia, society and environment.

2. Architecture, PPPs and Circular Economy

The growing need for sustainable development in higher institutions has brought architecture and environmental management into sharper focus. Architecture has provided the spatial and symbolic framework through which gown (the academic community) and town (the host society) can coexist productively. Integration of public-private partnerships (PPPs) and circular economy principles becomes a strategic instrument for advancing sustainable plastic waste management, particularly within university settings such as Afe Babalola University (ABUAD). High plastic consumption in Universities is not a new phenomenon as Universities are known to generate large volumes of plastic waste from cafeterias, laboratories, packaging, and student activities. Without structured and controlled management of wastes, this contributes to pollution and environmental degradation leading to poor living and learning environments.

2.1 Architecture and the Gown-Town Relationship

Architecture plays a crucial role in mediating the gown-town relationship by shaping environments to foster collaboration. Universities act as solid ground for urban and rural development, influencing surrounding communities through physical planning knowledge dissemination and economic activity (Jackson & Holmes, 2020). Built spaces such as research centres, innovation hubs and public amenities can strengthen mutual interaction between academia and local communities, fostering shared responsibility for environmental and economic sustainability (McShane & Coffey, 2022). At ABUAD, architecture extends beyond educational infrastructure to community-oriented facilities, including health, agricultural and environmental initiatives (ABUAD, 2023) Such spaces not only provide social value but also act as platforms for public engagement in sustainable development.

ABUAD serves as a living laboratory for sustainability; and by extension all universities should too. The implementation of PPP and circular economy–based solutions demonstrates environmental leadership and educates students in practical sustainability approaches. Reasons for this are not farfetched and are in alignment with Global and National Agendas which are geared to integrate these approaches as they support the UN Sustainable Development Goals (SDGs); particularly SDG 11 (Sustainable Cities and Communities), SDG 12 (Responsible Consumption and Production), and SDG 17 (Partnerships for the Goals).

In furtherance of this and to buttress her alignment with improving gown and town relationships, ABUAD is in partnership with organisations like Netlink Environmental Conservation Organisation (NECOR) through which the World Environmental Conservation Conference (WECC) has held twice in ABUAD. Discussions included but were not limited to circular economy, waste management, environmental degradation, carbon sequestering among others.

2.2 The Afe Babalola University (ABUAD)

Afe Babalola University (ABUAD) provides a practical example of how architecture, integrated with public–private partnerships (PPPs), can rebrand gown–town socioeconomics through sustainable plastic waste management. The university demonstrates that architecture is more than a framework for learning but rather it functions as a spatial tool for environmental education, circular innovation and community engagement (ABUAD, 2024).

Sustainability at ABUAD is embedded in both policy and practice. The university's Impacting the Global Goals by DEGREEs report highlights initiatives such as the Clean and Green Campus and the Plastic Recycling Committee, which coordinate waste segregation, collection and recycling across the institution (ABUAD, 2024). Similarly, the Climate Change Plan details achievements in green landscaping, renewable energy adoption and student participation in recycling programmes (ABUAD, 2023). Through these interventions, architectural design becomes a behavioural driver by turning sustainability into an everyday practice among students, staff and visitors.

Architecturally, ABUAD extends beyond its campus boundaries to build collaboration with industry and local communities. Its proximity to the ABUAD Industrial Research Park has fostered PPPs focused on recycling, renewable materials and green construction (ABUAD, 2021). Purpose-built collection pavilions, processing sheds and demonstration lab's function both as infrastructure and learning spaces. In this system, private partners contribute technology and logistics, the university provides research and spatial planning, while the surrounding community gains employment and entrepreneurship opportunities. Such cooperation

illustrates how architecture-driven PPPs can support both circular economy goals and social inclusion (UNECE, 2021).

The ABUM's strength lies in its integration of architecture and governance. Transparent SDG reporting and adherence to national policies have built partner confidence, while visible green infrastructure reinforces environmental education. This form of "architectural pedagogy," where people learn sustainability through spatial experience, effectively translates policy into daily action (ABUAD, 2024). Within Nigeria's wider policy context, the government's plan to phase out single-use plastics underscores the relevance of ABUAD's initiatives (Reuters, 2024). The university's model aligns with these national objectives by demonstrating how institutional architecture can support local circular economy practices through PPP engagement. To sustain progress, ongoing monitoring, inclusive community participation and adaptable design remain crucial for long-term effectiveness (ABUAD, 2023).

2.3 Public-Private Partnerships (PPPs) in Sustainable Architecture

According to UNECE (2021), PPPs are essential for achieving the Sustainable Development Goals (SDGs) by combining public oversight with private sector efficiency and investment. Public-private partnerships have therefore emerged as an effective framework for leveraging resources, technology and innovation in sustainable infrastructure delivery. Within architectural practice, PPPs enhance project practicality by aligning environmental objectives with financial sustainability, particularly in waste management and green design (Shen, Tam, Gan, Ye, & Zhao, 2016).

In Nigeria, PPPs have become increasingly relevant in university-led projects that address urban sustainability and resource recovery. However, institutional challenges such as weak regulatory frameworks and financial constraints continue to hinder it large-scale implementation (Mhatre, Gedam, & Unnikrishnan, 2023). Despite these challenges, ABUAD provides an emerging model of PPP-driven campus development where architectural planning, academic leadership and private collaboration converge to address sustainability issues, particularly in plastic waste management.

2.4 Circular Economy and Plastic Waste Management in Architectural Context

The circular economy (CE) framework shifts focus from the linear "take-make-dispose" model toward regenerative cycles of reuse and recycling (UNECE, 2018). In architecture, CE principles manifest through material efficiency, adaptive reuse, and design for disassembly (Kortsen et al., 2023). Applying these principles to plastic waste management within university campuses not only reduces environmental impacts but also reinforces educational and community engagement goals.

ABUAD's existing recycling initiative exemplifies CE in practice: plastics collected across the campus are sorted and transported to external recycling centres through structured partnerships. This system demonstrates how proper design, policy and PPP frameworks can collectively address plastic waste challenges. Talamo et al. (2025) affirm that integrating waste reuse into architectural design supports both environmental and economic outcomes, especially in developing regions. In a related study on Health Care Waste Management, Raji and Adeogun, (2024) posit that proper documentation, sufficient budget, adequate supply of HCWM materials, frequent training of healthcare workers, and development of local manuals and guides are essential if a country is determined to achieve an efficient and sustainable HCWM system. Thus, embedding waste recovery systems such as designated collection pavilions and eco-friendly landscape features into the built environment, gives room for architecture to be an operational tool for sustainable resource management.

2.5 Architecture-Based PPPs for Sustainable Socioeconomic Rebranding

Rebranding gown-town socioeconomics through architecture-based PPPs involves transforming the university's role from an isolated academic entity to an active participant in community development. Owojori and Okoro (2022) argue that PPPs foster innovation and inclusive growth when they bridge institutional expertise with private-sector investment. At ABUAD, this collaboration has the potential to create circular value chains where architectural design supports environmental education, job creation and entrepreneurship through recycling initiatives.

Furthermore, architecture-based PPPs promote visible, functional spaces that exemplify sustainability by turning waste management into an educational and economic asset. Through integrating design thinking with community participation, ABUAD's plastic management model demonstrates how sustainable architecture can reposition gown-town relations toward a symbiotic and circular economy-based partnership.

3. Methods

This study employed a mixed approach using structured questionnaires to examine how architecture-based Public–Private Partnerships (PPPs) advance circular-economy practices at Afe Babalola University (ABUAD) while the case study and observation was done to marry the responses with the existing situation. The questionnaire, composed of Likert-scale questions, was distributed digitally to ensure accessibility and environmental responsibility. Over 200 valid responses were obtained, comprising 100 students from various colleges, 50 staff and lecturers 30 community Members and 20 visitors selected randomly to ensure honest and unbiased data.

Quantitative responses were analysed using descriptive statistics such as frequencies, percentages and bar charts, while qualitative comments were examined through thematic analysis to interpret contextual perceptions. This combination provided a holistic understanding of how architectural design and PPP frameworks can jointly enhance sustainability and strengthen ABUAD's gown-town collaboration.

4. Findings and Analysis

4.1 Overview of Respondents and ABUAD Context

The study captured approximately 200 valid responses from students, staff and members of the host community surrounding Afe Babalola University (ABUAD), Ado-Ekiti. This diverse mix reflects the university's integrated gown–town structure, where academic administrative and community participants interact daily through academic programs and shared infrastructure. ABUAD's established sustainability philosophy visible in its landscaped environment, waste segregation culture and green architectural developments provided a relevant context for examining how architecture-based Public–Private Partnerships (PPPs) could strengthen circular-economy practices within and around the university.

4.2 Role of Architecture-Based PPPs in Advancing Circular Economy at ABUAD

Survey results (Figure 1) show that 98 % of participants were aware of plastic-waste problems within ABUAD's environment, while 76 % understood the concept of PPPs. An overwhelming 94 % supported collaboration between the university, private sector and the community to address these challenges and 91 % believed PPPs could stimulate the micro-economy around Ado-Ekiti.

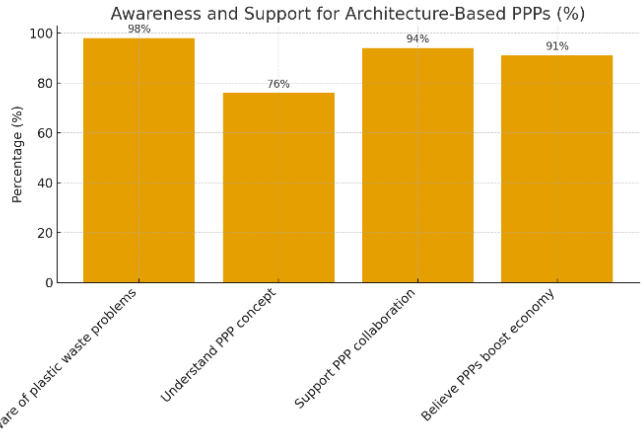

Figure 1: Awareness and support for Architecture-Based PPPs
Source: Field Survey, 2025

These figures demonstrate ABUAD's strong institutional and social readiness for PPP-driven sustainability. The university's structured governance model, which combines academic management with entrepreneurial leadership, makes it a natural anchor institution for piloting architecture-based PPPs. Such partnerships could leverage ABUAD's research expertise and land resources alongside private investment to create sustainable existing infrastructure such as eco-material laboratories, and innovation hubs that can add more to the impact of the recycling centre that serve both the campus and the surrounding community.

4.3 Sustainable Architectural Innovations

As illustrated in Figure 2, respondents identified several architectural innovations that align with ABUAD's design philosophy and sustainability aims. Recycling hubs and centres (84 %), plastic collection points (76 %) and fabricated plastic building materials (68 %) were the most preferred, while eco-friendly building designs (62 %) and modular units (54 %) followed closely. These solutions directly correspond to ABUAD's existing emphasis on structured campus planning and its drive for self-sufficiency.

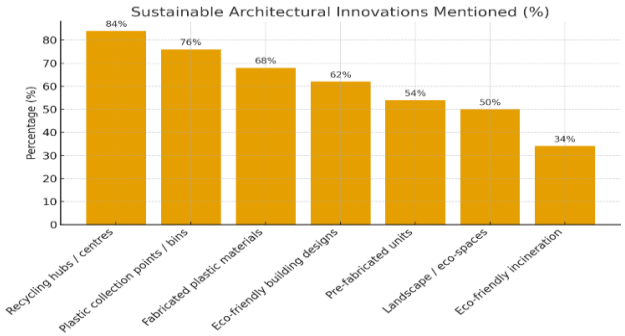

Figure 2: Sustainable Architectural Innovations.
Source: Field Survey, 2025

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At Afe Babalola University (ABUAD), a well-established recycling initiative is already in operation, with plastic waste collected as seen in Fig. 3; across the campus and transported to an external ABUAD recycling centre for processing. This system demonstrates ABUAD's commitment to environmental responsibility and provides a strong platform for expanding circular-economy practices.

Figure 3: Plastic Collection Area within ABUAD Campus
Source: Field Survey, 2025

Figure 4: Waste Collection Initiative within ABUAD Campus (showing designated bins)
Source: Field Survey, 2025

The existing waste collection areas, as illustrated in the Fig. 4, showcases organised points where plastics and other wastes are gathered before transfer. Building on this foundation, ABUAD's landscaped spaces and residential zones can be further enhanced through the integration of architecturally designed sorting and collection hubs that complement the ongoing system through the processes at the ABUAD Industrial park (Fig. 5 and Fig. 6).

Figure 5: ABUAD Industrial Park
Source: Field Survey, 2025

Figure 6: ABUAD's Existing Waste Recycling Plant
Source: Field Survey, 2025

It is thus a work in progress that using recycled plastic materials such as paving blocks and façade panels which can enrich ABUAD's infrastructure expansion while reducing dependence on virgin materials. Similarly, adopting modular and prefabricated units aligns with the university's rapid and adaptable construction model, enabling efficient maintenance and reduced material waste.

4.4 Challenges Limiting PPP and Circular-Economy Integration at ABUAD

According to Figure 7, the most recurrent barriers to successful PPP circular-economy integration include lack of awareness (88 %), poor communication between university and community (72 %) and limited funding/resources (68 %). Secondary concerns such as lack of trust (42 %) and unclear terms of engagement (34 %) also featured prominently.

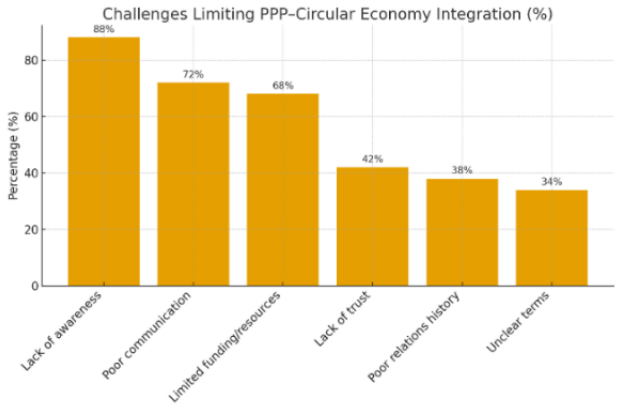

Figure 7: Challenges Limiting PPP-Circular Economy Integration.
Source: Field Survey, 2025

Within ABUAD's context, these results point to gaps between the university's sustainability vision and the community's participation capacity. While ABUAD's management has instituted several sustainability policies, awareness at the grassroots level remains limited, especially among residents who are less connected to academic programs. Additionally, funding constraints and communication barriers between university departments, local entrepreneurs and environmental agencies limit full PPP integration. Building mutual trust through transparent benefit-sharing mechanisms will therefore be essential.

4.5 Behavioural Readiness for Circular-Economy Practices among ABUAD Stakeholders

Figure 6 shows that 92 % of respondents were willing to separate plastic waste if adequate collection points were provided, 90 % agreed that recycling could improve community finances, and 60 % already practiced recycling frequently. These statistics highlight the potential for ABUAD to scale up waste management innovations by reinforcing architectural and behavioural systems simultaneously.

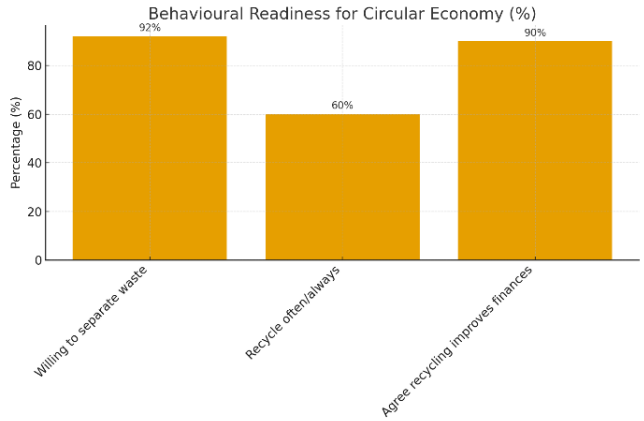

Figure 8: *Behavioural Readiness for Circular Economy.*

Architecturally, this readiness can be harnessed through the design of eco-hubs and green learning spaces within the university functional areas where students, staff and residents can participate in recycling, learn about sustainable construction and observe the transformation of waste into usable building materials. Behaviourally, it reflects the willingness of ABUAD's academic community and host residents to embrace circular-economy lifestyles if infrastructure and incentives are accessible.

5. Discussions

5.1 Key Findings

The study has revealed that Afe Babalola University (ABUAD) has achieved a significant level of environmental awareness and institutional readiness for circular-economy transition through architecture-based Public-Private Partnerships (PPPs). An outstanding 98 % of respondents acknowledged the severity of plastic-waste issues within the university, while 94 % supported PPP collaboration between the university, the private sector and the surrounding community. This strong consensus underscores ABUAD's potential as a model environment for implementing sustainable PPP frameworks.

Architectural innovation emerged as a central enabler of circularity. Respondents prioritized recycling hubs (84 %), plastic collection points (76 %) and the development of fabricated plastic building materials (68 %) as the most impactful design strategies. The existence of a functional recycling system within ABUAD including designated collection areas and a plastic-processing centre located in the industrial park demonstrates the university's applied commitment to sustainable waste management and provides a foundation for scaling circular practices.

Nevertheless, challenges persist. The most pronounced barriers include limited awareness (88 %), poor gown–town communication (72 %) and funding shortages (68 %), followed by moderate issues of trust (42 %) and undefined partnership terms (34 %). These findings indicate that while ABUAD's institutional framework is progressive, gaps in stakeholder engagement and financing remain significant constraints to full PPP integration.

5.2 Implications of the Study

The findings suggest that architecture can serve as both a physical and behavioural medium for advancing sustainability in town-gown relations. By leveraging PPPs, ABUAD can extend its green infrastructure to include eco-innovation hubs,

modular laboratories and plastic-reuse fabrication units that combine education, production and environmental stewardship. Such interventions not only enhance spatial quality but also stimulate local micro-economies through Small and Meduim Enterprises (SMEs) development and materials innovation.

From a policy perspective, the ABUAD model exemplifies how universities can operationalize national sustainability goals such as Nigeria's proposed ban on single-use plastics, through institutional governance and architectural design. Establishing transparent PPP agreements, revenue-sharing models and awareness programmes will also be critical for scaling the model to other tertiary institutions. Moreover, integrating sustainability into the architectural curriculum can embed long-term behavioural change and professional competency among future architects.

5.3 Limitations and Areas for Further Research

While the study provides a rich contextual understanding of ABUAD's sustainability dynamics, several limitations should be acknowledged. The sample size of 200 respondents, though diverse, limits the generalizability of findings beyond the university and its immediate host community. Quantitative assessment of resource flow, waste volumes and life-cycle impacts was beyond the current scope and should be addressed in future research.

Further investigations could explore comparative analyses across other Nigerian universities implementing PPPs in sustainability, as well as longitudinal tracking of behavioural change following infrastructural interventions. Such studies would provide deeper insight into how architectural design and PPPs can synergize to accelerate the circular-economy transition in educational environments.

6. Conclusion and Recommendations

6.1 Conclusion

This study examined how architecture-based Public-Private Partnerships (PPPs) can advance circular-economy principles within Afe Babalola University (ABUAD), Ado-Ekiti. Findings revealed that environmental awareness among ABUAD stakeholders is remarkably high, with 98 % acknowledging the seriousness of plastic-waste problems and 94 % supporting collaborative interventions through PPPs. The survey also confirmed strong behavioural readiness, as 92 % of respondents expressed willingness to separate waste when adequate facilities are available.

Architectural innovations such as recycling hubs, collection points and the use of fabricated plastic materials were identified as the most viable strategies for improving waste management and resource efficiency. However, challenges including limited awareness, inadequate communication and funding constraints continue to limit the effective implementation of PPPs and the circular economy on campus.

Overall, ABUAD demonstrates exceptional institutional readiness to pioneer sustainable architecture-led PPP frameworks. The university's commitment to innovation and community engagement positions it as an exemplary instrument for testing and scaling architectural models that transform plastic waste into valuable resources therefore advancing both environmental quality and socio-economic development.

Recommendations

The following recommendations are proffered:

1. Afe Babalola University (ABUAD) should strengthen its existing recycling initiative by establishing a comprehensive Recycling and Design Innovation Hub through Public–Private Partnerships (PPPs). This hub would enhance the current plastic collection system by integrating design-based research, processing and fabrication of recycled materials into new architectural components. It would also serve as a practical learning and demonstration space where students, staff and industry partners collaborate on sustainable material development, promoting both academic innovation and environmental responsibility.
2. Future campus developments should embrace circular design principles that reduce material waste and promote reuse.
3. Architectural projects across ABUAD ranging from academic buildings to residential and landscape facilities should incorporate prefabricated and recycled components while ensuring each design includes waste-sorting and collection provisions.
4. To ensure effective implementation, ABUAD should expand partnerships with its host community, government agencies, and private investors through awareness programs, skill training, and incentive-based recycling schemes.
5. Strengthening communication and collaboration will improve trust and participation, while continuous monitoring

of recycling performance and material recovery rates will help measure impact.

All the above recommendations when combined are strategies which ABUAD can use to reinforce its leadership in sustainable architecture and serve as a replicable model for design-driven circular innovation across Nigerian universities.

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