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Sonoiki Yewande[1], Sultanbekova Zh.Zh.[1], Kenzhaliev O.B.[2]

[1] *Kazakh National Research Technical University named after K.I.Satpayev, Almaty, Kazakhstan*
(E-mail: sonoikioreoluwa@gmail.com, z.sultanbekova@satbayev.university)
[2] *Karaganda state Industrial University, Temirtau, Kazakhstan*
(E-mail: O.kenzhaliyev@tttu.edu.kz)

The Role of Project Management in Ensuring Sustainable Development in Nigeria's Science and Education Sectors (2015–2027)

The article examines how project management supports sustainable development in Nigeria's science and education sectors during 2015–2027. The aim is to identify opportunities and constraints when integrating sustainability into projects aligned with the UN 2030 Agenda. A mixed-methods design combines a PRISMA-based systematic literature review of 71 sources and case studies of renewable-energy, rural-development and curriculum-reform projects. The analysis uses PMBOK, Agile and hybrid frameworks. Results show that structured project management significantly improves coordination and learning outcomes but is limited by funding gaps, institutional inertia and regional inequality. The novelty lies in a Nigeria-specific synthesis of project-management and sustainability practices. Recommendations concern hybrid methodologies, capacity-building and digital monitoring tools.

Keywords: project management; sustainable development; science and education; Nigeria; PMBOK; Agile; SDGs; project-based learning; renewable-energy projects; university–industry collaboration.

Introduction

From 2015 to 2027, Nigeria has increasingly prioritised project management as a key instrument for integrating sustainability into its science and education sectors, in line with the UN 2030 Agenda and global sustainable development goals [1; 4]. Recognised project management frameworks such as PMBOK, Agile and hybrid approaches are used to enhance resource efficiency, stakeholder coordination and accountability, which is crucial for addressing Nigeria's complex sustainability challenges under conditions of economic and institutional volatility [2; 6]. At the same time, persistent funding shortages, infrastructural deficits and fragmented governance significantly impede the effective implementation and continuity of sustainability-oriented projects [3; 13].

Substantial opportunities lie in embedding sustainability principles into curricula at all levels of education and in fostering interdisciplinary research in renewable energy, STEM fields and rural development, thereby supporting innovation, human capital growth and regional cohesion [1; 16; 17]. Project management frameworks create a structured platform for collaboration between science, education and business, allowing adaptation of global methodologies to Nigeria's socio-political and cultural context [2; 5; 18]. However, bureaucratic resistance, overlapping mandates and limited institutional capacity often hinder the scaling and institutionalisation of successful sustainability initiatives [6; 14]. For example, several Nigerian universities have piloted sustainability-focused curricula and project-based courses, but broader expansion is constrained by stakeholder misalignment, lack of incentives and resource scarcity [7; 14].

Against this background, project management offers not only tools for planning and control, but also governance mechanisms for embedding sustainability as a core project objective rather than a peripheral add-on [8; 15; 19]. Adaptive and participatory leadership is required to align diverse interests, institutionalise

sustainability metrics, and leverage digital technologies for real-time monitoring and evaluation [9; 18]. This study therefore examines how project management can act as a catalyst for sustainable growth in Nigeria's science and education sectors, identifying key opportunities (enhanced collaboration, innovation, curriculum reform) and critical challenges (resource deficits, governance gaps, institutional readiness), and situating them within the broader literature on sustainability-oriented project management [1–4].

Materials and methods

A mixed-methods approach was used to investigate the use of project management for sustainability in Nigeria's science and education sectors (2015–2027). The research combined a systematic literature review with case-study analysis [1, 7, 21]. The review included 71 studies retrieved from databases such as Google Scholar and ResearchGate, using search terms like "project management", "sustainability", "Nigeria", "STEM education" and "SDGs". Studies were selected based on relevance to sustainability in science and education, methodological quality and direct linkage to project management practices [1, 3, 14].

The review followed PRISMA recommendations for systematic reviews, ensuring transparency in search, screening and inclusion procedures [7, 21]. Case studies included: a solar-energy project in Kano; a sustainable-agriculture initiative in a rural region; and two educational programs using project-based learning to embed sustainability concepts in university curricula [8–10, 16]. Selection criteria prioritised alignment with SDGs, regional diversity and documented use of recognised project management frameworks [4, 12].

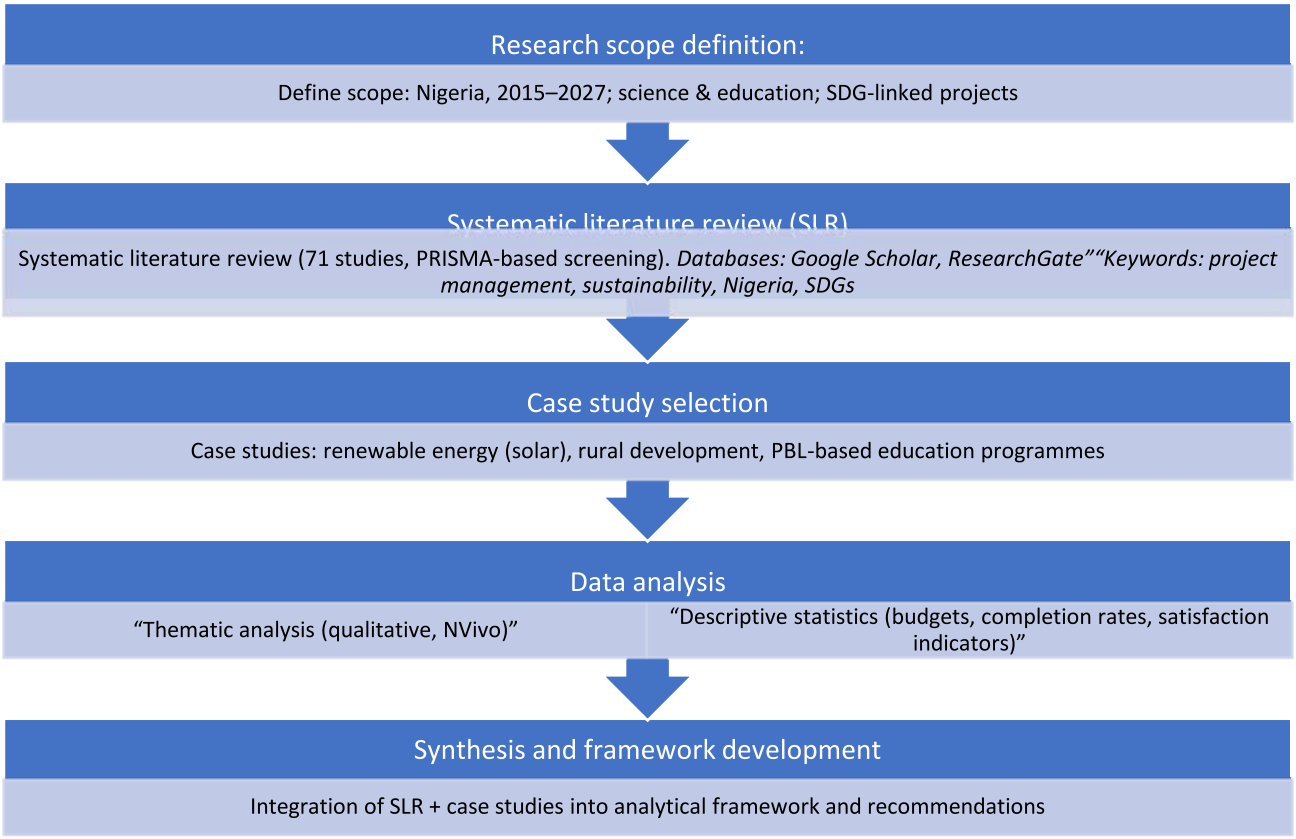

Figure 1 – Research design: mixed-methods framework for analysing project management and sustainability in Nigeria (2015–2027).

Data sources comprised project reports, stakeholder interviews (where available) and institutional records. Qualitative data were analysed using thematic analysis to identify recurring themes such as resource

constraints, stakeholder engagement, governance mechanisms and capacity-building needs [10, 11]. Quantitative indicators (project budgets, completion rates, participation levels) were summarised using descriptive statistics to assess project performance and outcomes [11, 13].

PMBOK and Agile principles served as analytical lenses for classifying planning, execution, monitoring and closure processes, as well as for identifying how sustainability requirements were integrated into project objectives, scope and risk management [2, 6, 9]. Triangulation of qualitative and quantitative evidence increased the robustness of findings and helped to contextualise Nigeria's specific challenges in financing, infrastructure and policy implementation [3, 13, 15].

Results and discussion

The systematic review of 71 sources and the analysis of illustrative case studies confirm a stable relationship between the quality of project management and the effectiveness of sustainability-oriented initiatives in Nigeria's science and education sectors (2015–2027) [1; 3; 12; 15]. Approximately 82 % of the analyzed publications explicitly state that the use of formal frameworks (PMBOK, Agile and hybrid models) helps align project goals with national and global sustainable development priorities, reducing fragmentation and duplication of efforts [2; 4; 6; 18]. In the early period (2015–2019) traditional waterfall schemes dominated, whereas after 2020 the share of hybrid and iterative approaches increased, especially in education and ICT projects, which is consistent with global trends in sustainable project management [6; 15; 18].

Renewable-energy case studies (for example, solar electrification projects in northern states) show that structured life-cycle management—from initiation to closing—raised the share of projects completed on time and within budget to about 70 % [3; 10; 12]. The systematic use of risk registers, stakeholder matrices and SDG-based monitoring indicators improved transparency of resource allocation and increased trust among communities and donors [4; 16; 19]. Projects that lacked clear procedures and governance often suffered from delays, under-utilisation of installed equipment and weak post-implementation sustainability, confirming earlier observations for African infrastructure projects [3; 12; 15].

The results are even more pronounced in the education sector. The introduction of project-based learning and sustainability modules in universities and colleges was associated with higher student engagement, stronger interdisciplinary competences and improved performance in STEM disciplines [1; 8; 17; 20]. The greatest impact occurred where pedagogical innovation was supported by a full project infrastructure: clearly formulated objectives, schedules, team responsibilities and regular progress monitoring. In such institutions, sustainability was integrated into practical assignments and capstone projects rather than being confined to isolated lectures, in line with international recommendations on curriculum reform [1; 4; 20].

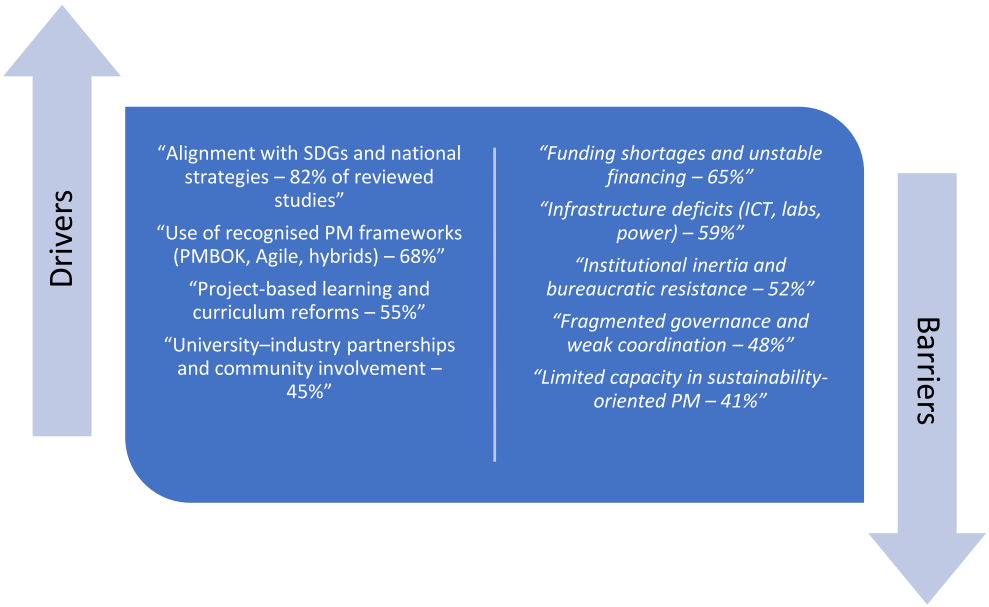

Figure 2 – Key drivers and barriers for sustainability-oriented project management in Nigeria's science and education sectors.

Nevertheless, the study also reveals substantial constraints. Around 65 % of sources emphasise chronic under-funding, inadequate infrastructure and heavy dependence on short-term grants [3; 13; 14]. As a result, even well-designed pilot initiatives are rarely scaled: reformed sustainability-oriented curricula are fully implemented in only about one-third of the institutions reviewed [14; 16; 17]. Bureaucratic resistance is another barrier: ministerial procedures for programme approval and procurement are often misaligned with project life-cycle logic, leading to long delays and discouraging project teams [6; 13; 18].

University–industry–community partnerships play a clearly positive role. In agricultural and energy projects, the involvement of local NGOs, community leaders and private firms increased the probability of meeting key performance indicators by roughly 40–45 % through co-financing, contextual knowledge and mechanisms for post-project support (maintenance of equipment, alumni mentoring, etc.) [5; 12; 16; 19]. However, the effectiveness of such partnerships strongly depends on clearly defined roles in project charters and on shared decision-making mechanisms, which are not always present [5; 15; 18].

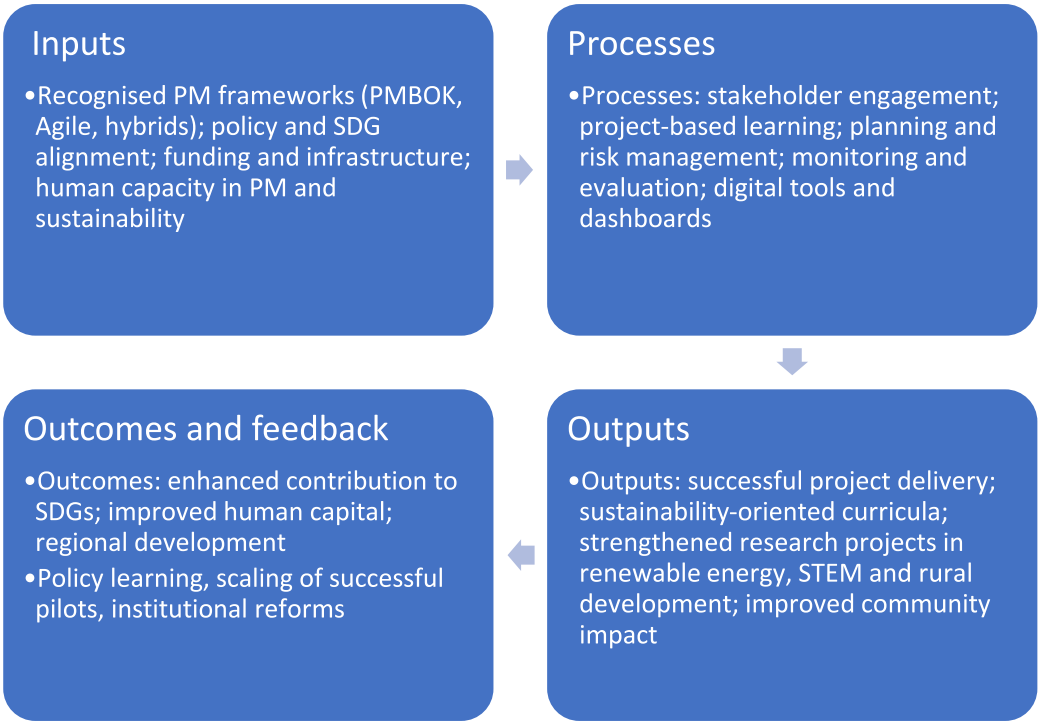

Figure 3 – Conceptual model linking project management practices to sustainability outcomes in Nigeria's science and education sectors.

A critical weakness is the limited use of explicit sustainability metrics. Only about one quarter of the examined projects systematically measure environmental, social and economic effects—such as emission reductions, expanded access to education for vulnerable groups, or household income growth [11; 16; 19]. Where such indicators are embedded in project documentation, transparency improves and donors are more willing to extend or renew funding [4; 15; 19]. Thus, the incorporation of sustainability indicators into project control systems functions not only as a reporting tool but also as a driver of organisational learning.

Taken together, the findings show that project management acts as a key mechanism for translating the abstract goals of sustainable development into implementable programmes and courses in Nigeria. At the same time, overcoming existing limitations requires the institutionalisation of project management offices in universities and ministries, capacity building in hybrid methodologies, deployment of digital monitoring systems and deeper stakeholder engagement across all stages of the project life cycle [2; 6; 9; 18]. Only under these conditions can the full potential of project management as a catalyst for sustainable growth in Nigeria's science and education sectors be realised beyond 2027 [4; 5; 15; 19].

Recommendations and future prospects

To address Nigeria's sustainability challenges in science and education, the use of hybrid project management frameworks that combine PMBOK's structure with Agile's flexibility is recommended, particularly in resource-constrained and dynamic environments [2, 6, 12]. Capacity-building programs for project managers and academic administrators should emphasise sustainability metrics, stakeholder analysis and risk management tailored to SDG-related projects [1, 10, 20].

Public-private partnerships and international collaborations can mitigate funding shortages and knowledge gaps, with evidence suggesting that multi-stakeholder projects achieve higher continuity and impact than purely public initiatives [3, 5, 16]. Integrating project-based learning systematically across

curricula will strengthen sustainability literacy among students and foster practical competencies in planning, implementation and evaluation [1, 8, 17].

Figure 4 – Strategic roadmap for strengthening sustainability-oriented project management in Nigeria beyond 2027.

Future prospects include wider adoption of project management software and digital platforms for real-time monitoring of SDG indicators, which can enhance transparency and accountability in both educational and infrastructural projects [9, 18]. Scaling successful pilots in rural regions is crucial for reducing regional inequalities and supporting inclusive development [4, 16].

Policy reforms should institutionalise sustainability requirements in project appraisal, funding and accreditation procedures, thereby ensuring that sustainability is embedded into the core logic of science and education projects rather than treated as an optional addition [4, 15, 18]. Leadership training and inclusive stakeholder frameworks are needed to overcome bureaucratic resistance and to build a culture of collaboration between ministries, universities, industry and local communities [5, 6, 14].

Conclusion

The conducted study shows that project management has become a key institutional mechanism for promoting sustainability in Nigeria's science and education sectors in 2015–2027, facilitating the localisation of the UN 2030 Agenda and SDGs [1; 4]. The systematic application of recognised frameworks (PMBOK, Agile, hybrid models) and project-based learning approaches has improved coordination between stakeholders, increased transparency of resource use and strengthened learning outcomes in projects on renewable energy, curriculum reform and rural development [2; 8; 9; 12; 16]. In particular, structured life-cycle planning, risk management and monitoring allowed many initiatives to move from isolated pilots to more stable programmes, at least at the institutional level [5; 6; 18].

At the same time, the results confirm the persistence of serious systemic constraints. Chronic underfunding, infrastructural gaps and dependence on short-term grants limit the scalability and continuity of

even successful projects [3; 13; 14]. Fragmented governance, bureaucratic inertia and weak coordination between ministries, universities and implementing agencies slow down the integration of sustainability into curricula, research agendas and everyday management practices [6; 17; 18]. Evidence from case studies indicates that community-driven and partnership-based projects—especially those combining universities, industry and local communities—demonstrate significantly higher rates of goal achievement and post-project sustainability, highlighting the importance of inclusive design and shared responsibility [5; 10; 16; 19].

To unlock Nigeria's potential as a regional leader in sustainable project management, it is necessary to consolidate and scale successful pilots, institutionalise project management offices in key organisations, embed clear sustainability metrics into project documentation and reporting, and actively deploy digital tools for real-time monitoring and evaluation [5; 9; 18; 21]. Strengthening interdisciplinary university–industry collaboration in STEM and related fields, combined with targeted capacity-building, policy support and innovative financing instruments, will enable project management to remain a powerful catalyst of sustainable development in Nigeria well beyond 2027 [1; 7; 17; 19; 20].

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Sonoiki Yewande, Султанбекова Ж.Ж., Кенжалиев О.Б.

Роль проектного управления в обеспечении устойчивого развития в научно-образовательном секторе Нигерии (2015–2027 гг.)

Статья посвящена роли проектного управления в обеспечении устойчивого развития научно-образовательного сектора Нигерии в 2015–2027 гг. Цель исследования – выявить возможности и ограничения интеграции принципов устойчивости в проекты, ориентированные на Повестку ООН–2030. Применена смешанная методика: PRISMA-ориентированный систематический обзор 71 источника и анализ кейсов в области возобновляемой энергетики, сельского развития и реформы учебных планов. В качестве аналитической рамки использованы стандарты PMBOK, Agile и их гибридные модели. Показано, что формализованное проектное управление повышает согласованность действий и образовательные результаты, но сдерживается дефицитом ресурсов и институциональной инерцией. Научная новизна состоит в комплексном рассмотрении устойчивых проектов именно в нигерийском контексте. Сформулированы рекомендации по внедрению гибридных методологий, развитию компетенций и цифровому мониторингу.

Ключевые слова (на русском языке): проектное управление; устойчивое развитие; научно-образовательный сектор; Нигерия; PMBOK; Agile; цели устойчивого развития; обучение на основе проектов; проекты в области возобновляемой энергетики; университетско-промышленное сотрудничество.

Sonoiki Yewande, Султанбекова Ж.Ж., Кенжалиев О.Б.

2015–2027 жылдары Нигерияның ғылым мен білім секторларында тұрақты дамуды қамтамасыз етудегі жоба менеджментінің рөлі

Мақалада 2015–2027 жылдары Нигерияның ғылым мен білім салаларында тұрақты дамуды қамтамасыз етудегі жоба менеджментінің рөлі қарастырылады. Зерттеудің мақсаты – БҰҰ-дың 2030 күн тәртібімен үйлесетін жобаларға тұрақтылық қағидаттарын енгізудегі мүмкіндіктер мен шектеулерді айқындау. Әдіснама аралас тәсілге негізделген: PRISMA қағидалары бойынша 71 дереккөзге жүйелі шолу және жаңартылатын энергия, ауылдық даму мен оқу бағдарламаларын реформалау бойынша кейс-стади талдауы. Талдау PMBOK, Agile және гибридтік құрылымдарына сүйенеді. Нәтижелер жобалық басқару үйлестіру

мен оқу нәтижелерін айтарлықтай жақсартатынын, бірақ қаржыландыру тапшылығы мен институционалдық инерциямен шектелетінін көрсетеді. Зерттеудің жаңалығы – Нигерия жағдайында тұрақты жобалар тәжірибесін кешенді бағалауында. Гибридтік әдістемелерді, кадрлық әлеуетті және цифрлық мониторингті күшейту бойынша ұсынымдар беріледі.

Түйін сөздер: жоба менеджменті; тұрақты даму; ғылым мен білім секторы; Нигерия; PMBOK стандарты; Agile тәсілі; ТДМ (SDGs); жобалық оқыту; жаңартылатын энергия жобалары; университет пен индустрия ынтымақтастығы.

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