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RESEARCH

Integrating SDGs Principles into the Strategic Planning of Infrastructure Development in Post-War Sudan

Dr Hassan A. Abas
Civil Engineering Department, Prince Mugrin University
Medina, Saudia Arabia
Email: h.abbas@upm.edu.sa
ORCID: 0000-0002-7746-6496

Professor Allam Ahmed
World Association for Sustainable Development (WASD)
The QMB Innovation Centre, 5 Walden Street
London E1 2EF, United Kingdom
Email: allam@wasd.org.uk
ORCID: 0000-0002-1494-354X

ABSTRACT

PURPOSE: This study examines how Sustainable Development Goals (SDGs) can be systematically integrated into the strategic planning of infrastructure development in post-war Sudan. The objective is to develop a structured framework that supports sustainable, inclusive, and resilient reconstruction while addressing the country's complex post-conflict challenges.

DESIGN/METHODOLOGY/APPROACH: A mixed-methods approach was adopted, combining a systematic review of international best practices in post-conflict reconstruction with an analytical assessment of infrastructure performance in relation to SDG indicators. Key institutional, financial, technical, and governance challenges were examined to inform the development of an SDG-aligned strategic planning framework tailored to the Sudanese context.

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FINDINGS: The study proposes a comprehensive strategic planning framework that integrates SDG principles across all stages of infrastructure development. The framework emphasises clear vision and goal setting, inclusive stakeholder engagement, environmental and social impact assessments, adaptive risk management, and robust monitoring and evaluation mechanisms. The findings indicate that SDG-aligned planning can enhance infrastructure resilience, promote equitable resource allocation, and support long-term recovery in post-conflict environments.

ORIGINALITY: This research contributes a context-specific and holistic framework for embedding SDGs into post-conflict infrastructure planning, addressing a notable gap in existing literature by explicitly linking strategic planning processes with sustainability, resilience, and social equity objectives in fragile and conflict-affected settings.

IMPLICATIONS: The proposed framework offers practical guidance for policymakers, planners, and development agencies seeking to align reconstruction efforts with global sustainability agendas. Its application can support the restoration of essential services, strengthen institutional trust, and foster sustainable socio-economic development in post-war Sudan and comparable post-conflict contexts.

KEYWORDS: *Sustainable Development Goals; Environmental Social Governance; Strategic Planning; CSR Europe; Infrastructure Development; Sustainability; Post-War Sudan.*

INTRODUCTION

Sudan has greatly suffered from years of civil conflict and political instability that have caused significant damage to the nation's infrastructure. Economic activity, and basic services have been severely affected. The recent outbreak of armed conflict in 2023 further damaged critical infrastructure such as water supply systems, transportation networks, and electricity generation facilities, deepening poverty, displacement, and inequalities. This situation underscores the critical need for developing a strategic plan for Sudan post-conflict reconstruction.

Sudan's infrastructure has been seriously damaged by the long civil wars and political instability it has suffered since 1983. The conflict escalated in April 2023 and spread across central, western, and southern Sudan, including the capital city of Khartoum. Long-term violence and an atmosphere of lawlessness have destroyed major infrastructure such as roads, bridges, portal water supply, and power plants; this destruction stands in the way of economic operations and vital services. The decline has upset the lives of Sudanese people and held back the nation's prospects for development, thus worsening poverty and social discrimination. As a result, many urban and rural communities still lack basic services, including education, healthcare, and portal water supply, which are needed for social cohesiveness and economic development.

Restoration of post-war infrastructure is key to recovering public services, bringing displaced communities back home, and setting up economic activities

necessary for sustainable development. Vervisch (2011) reported that the development of infrastructure in post-conflict areas is the cornerstone for rebuilding trust in government institutions and supporting social cohesion among war-affected communities (Vervisch, 2011). In addition, well-planned infrastructure projects create jobs, stimulate economic growth locally, and sustainably improve the lives of affected populations. Through all these advantages working together, they make permanent peace achievable simply by improving quality of life for affected populations.

Global experiences in post-war infrastructure rebuilding show a complex of challenges and opportunities that influence recovery in conflict-affected regions. The cases of rebuilding infrastructure of Iraq, Afghanistan, and Bosnia and Herzegovina show the decisive role of strategic planning in helping redevelopment efforts. Proper strategic planning should address the immediate needs of populations and guarantee that reconstruction activities are aligned with national long-term development goals, thereby fostering economic stability and social cohesion (Cross, 2010). Pallas (2016) emphasises that effective planning should include resource allocation, building local capacities and stakeholder engagement. This will raise resilience and adaptability in response to future challenges (Pallas, 2016).

Fragmented governance structures and weak institutional frameworks represent major challenges to infrastructure development in post-conflict contexts (Fayazi *et al.*, 2017). Insufficient policy coherence and limited institutional capacity often constrain the effective planning, management, and operation of reconstruction projects. These challenges are further compounded by persistent security risks and political instability, which frequently cause project delays and escalate reconstruction costs. Financial constraints are intensified by the heavy reliance on external funding sources that typically characterises post-conflict recovery efforts. In addition, the imperative to ensure socially inclusive reconstruction that addresses the needs of vulnerable and marginalised groups adds further complexity to implementation. Infrastructure reconstruction both reflects and shapes the underlying socio-political dynamics of affected regions; if poorly designed, projects may reinforce existing divisions, whereas well-planned interventions can promote social cohesion. Consequently, careful consideration of socio-political factors is essential to ensure that reconstruction efforts contribute to inclusive development and long-term stability.

There needs to be an holistic approach to the reconstruction of post-war infrastructure, incorporating economic viability, social equity, and environmental sustainability. This can be achieved by making the reconstruction approach compatible and aligning with the United Nations Sustainable Development Goals (SDGs). The

SDGs provide an integrated model for addressing challenges facing nations, such as poverty, inequality, climate change, and environmental degradation. Kopiika *et al.* (2025) noted that the effective infrastructure planning in post-conflict contexts requires strategic, adaptive, and forward-looking measures that address urgent reconstruction needs and support sustainable development (Kopiika *et al.*, 2025). The principles of sustainability, inclusiveness, and resilience in SDGs should be at the core of this strategy. Sustainability involves reducing environmental impacts, improving resource use, and ensuring long-term economic sustainability. On other hand, inclusion focuses on meeting the needs of all segments of the population, especially marginalised groups, to promote social justice. Resilience focuses on supporting the continuity of services by ensuring that infrastructure can endure and recover from disasters, such as natural disasters and economic disruptions. Strategic planning supports the setting of long-term goals, prioritisation, and resource allocation, ensuring that infrastructure projects are technically and financially workable and contribute effectively to sustainable and equitable development.

Several frameworks have been established to help integrate SDGs principles into strategic infrastructure planning. One of these frameworks is the SDGs Compass. The SDGs Compass is a step-by-step guide to mapping strategies to the SDGs, with tools to measure and manage contributions to the global goals (Elalfy *et al.*, 2021). The Integrated National Financing Framework (INFF) is another essential framework, helping countries in financing their national development plans, such as infrastructure projects, while ensuring alignment with the SDGs. The INFF aims to recognise financing requirements, manage risks and sources and combine them into a coherent plan supporting sustainable development goals (Gjaci, 2023). In addition, the Strategic Environmental Assessment (SEA) has been identified as a useful method for integrating environmental sustainability goals into strategic planning. SEA assesses the environmental impacts of proposed infrastructure development, to ensure that sustainability concerns are integrated from the beginning (Semeraro *et al.*, 2020; Nwanekezie *et al.*, 2021; Zhovnirchyk *et al.*, 2023). Collectively, these frameworks offer practical guidance to ensure that infrastructure planning and development contribute effectively to achieving the SDGs.

This study investigates the opportunities and challenges of the integration of SDG principles into the strategic planning of reconstruction projects in post-conflict Sudan. The objectives include developing methodologies for systematically embedding SDG principles into reconstruction efforts. The research is organised around three key questions. First, it investigates how global SDGs can effectively guide Sudan's

infrastructure development by finding relevant SDG elements. Second, it explores the obstacles and opportunities associated with aligning infrastructure projects with SDGs. Finally, it develops a comprehensive framework to guide SDG-aligned infrastructure planning. This framework integrates lessons from the identified challenges and opportunities and outlines practical steps for embedding SDG principles into all stages of post-conflict Sudan infrastructure initiating, planning, execution, and monitoring.

METHODOLOGY

This study adopts a mixed-methods approach to mainstream the SDGs into infrastructural planning in post-conflict Sudan. This starts with a systematic review of the best international practices and peer-reviewed literature to work out both opportunities and challenges for SDG alignment. A strategic framework unique for the post-conflict context is then constructed to incorporate key elements of reconstruction effort; these include goal setting, stakeholder engagement, risk management, and monitoring. Aligned with the SDGs, this framework can be adapted to Sudan's unique post-conflict context.

SDGS IN THE CONTEXT OF POST-WAR SUDAN

Post-war Sudan is faced with the special challenge of reconstructing its infrastructure to restore basic services, resume economic life, and help social stability. Short-term requirements are to bring clean water, electricity and restore basic health services to the population while at the same time setting up systems that will facilitate long-term growth. Connecting this effort to the SDGs offers a firm framework to achieve both short-term reconstruction and sustainable development goals. Several of the SDGs can prove to be of special significance to Sudan's post-war infrastructure reconstruction. Figure 1 shows key SDGs relevant to post-war infrastructure development in Sudan, including SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 11 (Sustainable Cities and Communities). Considering these SDGs will ensure that the reconstruction effort will lead to resilience, sustainability, and economic growth.

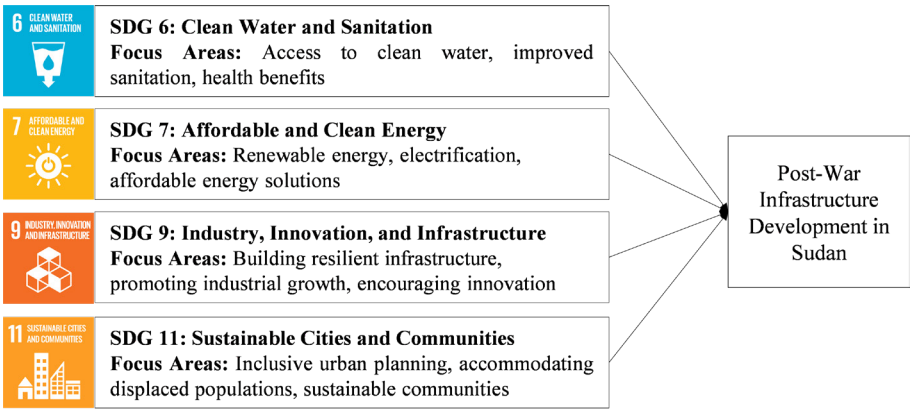

Figure 1 SDGs Alignment with Sudan's Post-War Infrastructure Development

Source: Constructed by authors

SDG 6 (Clean Water and Sanitation) is aimed at enhancing access to safe drinking water and sanitation facilities, both critical to the population's health. Mohmmed *et al.* (2018) stated that the drought and water shortages have been significant factors driving human displacement in Sudan over the past decades (Mohmmed *et al.*, 2018). Therefore, restoration of these facilities will enhance community resilience and help in resettlement. Equally so, SDG 7 (Affordable and Clean Energy) emphasises the importance of increasing access to renewable and reliable sources of energy. Fostering the use of alternatives such as solar and wind power will mitigate the effects on the environment, lowering the cost of energy and achieving the goal of sustainable energy. Before the war, household electricity coverage was only 40%. However, the conflict severely affected the electricity sector, needing extensive recovery efforts. A stable electricity supply is a crucial factor for activating economic growth and encourage community stability.

SDG 9 (Industry, Innovation, and Infrastructure) emphasises the development of a resilient infrastructure to foster sustainable and inclusive industrialisation. Enhancing transportation systems, energy grids, and digital connectivity will not only stimulate economic growth but also help bridge the gap between urban and rural areas in Sudan. Lastly, SDG 11 (Sustainable Cities and Communities) targets the reconstruction of cities with an eye on sustainability and equity. Housing, transportation, and investment in public spaces should incorporate resilience measures to cope with challenges such as climate change, thereby encouraging equitable development in all communities.

FRAMEWORK FOR SDG-ALIGNED STRATEGIC PLANNING

Reconstruction of war-affected Sudan requires a sustainable, inclusive, and resilient framework that is grounded on iterative improvement and ongoing feedback from different stakeholders. Such an integrated framework should address both current needs and long-term developmental goals. Aligning the proposed framework with the SDG principle will provide all these advantages. Figure 2 illustrates a systematic five-step process for SDG integration into framework strategic for reconstruction post-conflict in Sudan.

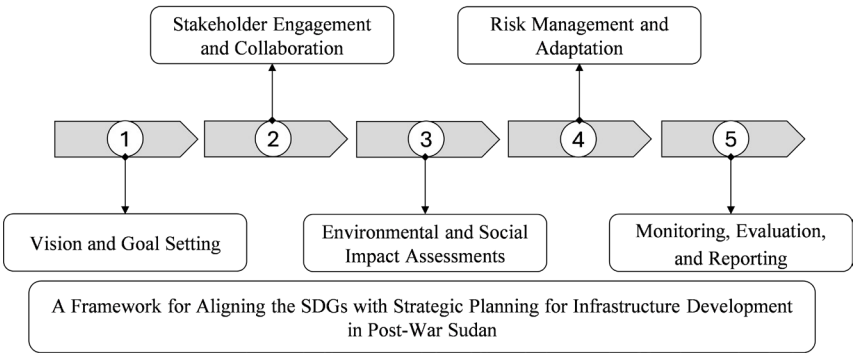

Figure 2 The Framework for Integrating SDGs Principles into Sudan's Infrastructure Planning

Source: Illustrated and edited by authors

The framework is supported by five key building blocks. Vision and Goal Setting connects project goals to the SDGs, addressing both immediate reconstruction needs and long-term development goals. Stakeholder Engagement promotes accountability and inclusiveness by involving local communities, governments, the private sector and international organisations in the decision-making process. Environmental and Social Impact Assessments (ESIAs) help to show potential impacts of the proposed projects, ensuring social fairness in project implementation and sustainability. Risk Management and Adaptation (RMA) addresses challenges such as political instability and funding limitations by applying adaptive strategies that build resilience. Lastly, Monitoring, Evaluation, and Reporting (MER) sets up strong systems to track progress, support transparency, and ensure alignment with SDG targets.

Vision and Goal Setting

Alignment of infrastructure projects with the SDGs demands a strategic process that begins with setting up a clear vision and defined goals that are explicitly based on the relevant SDGs. This ensures that overall sustainable development goals are integrated in planning stages of infrastructure projects to make them address immediate needs while supporting long-term national goals. In post-conflict Sudan, with urgent recovery of infrastructure needs, development vision needs to target enhanced resilience, inclusive and sustainable systems that support economic recovery, and social cohesion. This vision needs to reflect the core principles of SDG 6 (Clean Water and Sanitation), SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 11 (Sustainable Cities and Communities), all of which are directly relevant in Sudan's post-conflict recovery.

SDGs and indicators must be linked to infrastructure project goals to make this connection operational. This process involves translating broad SDGs into specific, measurable, and defined Key Performance Indicators (KPIs) that support project initiation, execution, monitoring and evaluation. For instance, an urban water supply project in Sudan could align with SDG 6 by setting goals for increasing access to potable water and mitigating waterborne disease transmission. These goals should be supported by measurable KPIs, such as the percentage of the population with access to clean water and the mitigation of health risks associated with contaminated water, thus enabling systematic tracking of progress and assessment of outcomes. Figure 3 shows the strategic vision alignment framework for integrating SDG priorities into infrastructure project planning in post-conflict Sudan.

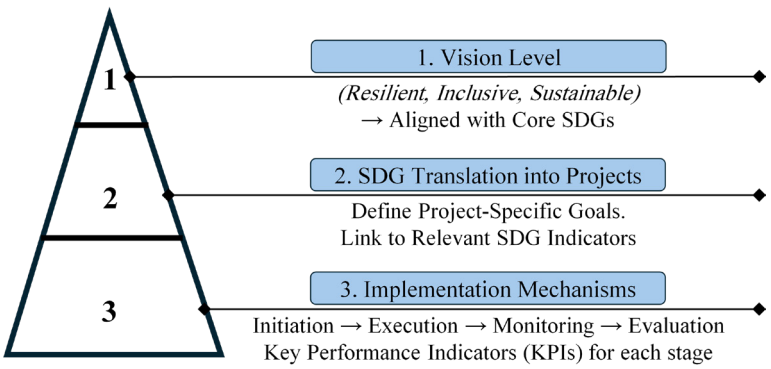

Figure 3 Strategic Vision Alignment Framework for Integrating SDG Priorities into Infrastructure Project Planning in Post-Conflict Sudan

Source: Illustrated and edited by authors

Moreover, matching project goals with SDG priorities demands an integrated plan that includes how SDGs relate to each other. For instance, a project focused on enhancing energy infrastructure (SDG 7), should also address its effects on economic growth (SDG 8), environmental sustainability (SDG 13), and social equity (SDG 10). Through incorporating SDGs into infrastructure plans, policy-makers can make sure these projects help achieve sustainability goals, supporting a more durable and inclusive future for Sudan.

Stakeholder Engagement and Collaboration

Effective stakeholder participation and inter-sectoral co-ordination are key to embedding SDG principles in strategic infrastructure planning. During Sudan's post-conflict reconstruction, it is important to involve a wide range of stakeholders from government and private-sector institutions to Civil Society Organizations (CSOs) and community organisations to ensure that infrastructure development is responsive to the diversity of the population. Figure 4 shows a schematic diagram to explain the Stakeholder Engagement Model for SDG-Based Infrastructure Planning in Post-Conflict Sudan. Stakeholder participation mechanisms should promote effective engagement at all stages of the planning process, from consultation to monitoring. This can be achieved through public forums, stakeholder workshops, and participatory planning sessions that empower different groups, including marginalised populations who are often excluded from decision-making.

Cross-sectoral co-operation is also necessary because SDG-compliant infrastructure projects require the convergence of several sectors' views such as urban planning, economic development, social services, and environmental management. Government agencies, non-governmental organisations (NGOs), and academic institutions must collaborate to address the complex, interconnected nature of post-conflict development. This approach ensures that the projects are not only technically sound but also socially and environmentally sustainable. Engaging diverse stakeholders enables planners to find potential trade-offs among different sustainable development targets. This engagement supports balancing economic growth with environmental protection and ensures that infrastructure investments help all social groups. Stakeholders are more likely to support initiatives reflecting their interests and values, thus enhancing overall project success (Adebayo *et al.*, 2024). Therefore, effective stakeholder involvement and cross-sectoral collaboration are crucial for integrating sustainable development goals into infrastructure planning.

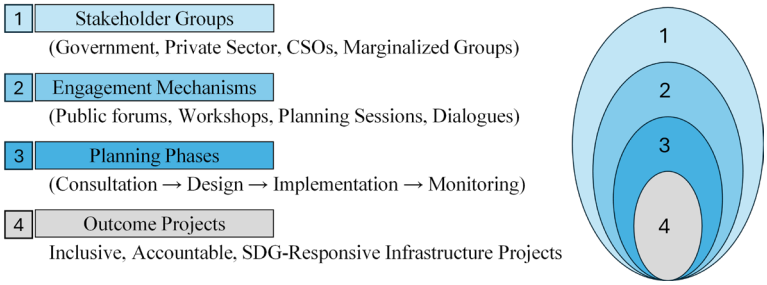

Figure 4 Stakeholder Engagement Model for SDG-Based Infrastructure Planning in Post-Conflict Sudan

Source: Illustrated and edited by authors

Environmental and Social Impact Assessments

Environmental and social impact assessments (ESIAs) serve as essential tools to assess the potential environmental and social effects of planned infrastructure before they are implemented, helping decision-makers minimise risks and maximise benefits (Hosny *et al.*, 2022; Adedoyin *et al.*, 2020; Ortiz *et al.*, 2018). In post-conflict Sudan, where ecological systems and social inequalities are significant, ESIAs need to be especially detailed and inclusive. They should address factors such as biodiversity, water resources, air quality, community relocation, and social cohesion. Applying SDG principles into these assessments allows infrastructure projects to expand economic opportunities, improving environmental sustainability and promoting social justice. This approach supports long-term benefits for communities and the environment.

It is necessary to incorporate SDG-related indicators and measurements into these impact studies to make this convergence operational. For instance, water resource projects are needed to converge with SDG 6 criteria. They are expected to offer clean and accessible potable water and ensure sustainable water management. Likewise, infrastructure development that affects local communities is subject to the SDG 11 metric. This ensures that it is inclusive, resilient and long-term sustainability. Converging with SDGs makes it easier for planners to meet the greater goals of SDGs. These include reducing inequalities (SDG 10), addressing climate change (SDG 13), and fostering innovation (SDG 9).

Furthermore, including SDG-targeted indicators in ESIAs enables monitoring of projects on a continuing basis. This enables adjustments to be made in case social or environmental challenges arise. Figure 5 shows a Simplified Flowchart of SDG-

Integrated Environmental and Social Impact Assessments (ESIAs). This adaptable strategy enhances long-term project sustainability. It enables projects to respond quickly to important considerations in a post-conflict setting like Sudan, whose circumstances can change quickly. Therefore, including detailed, SDG-targeted ESIAs in planning ensures infrastructure projects provide sustainable and equitable outcomes while enhancing long-term resilience and development of the nation.

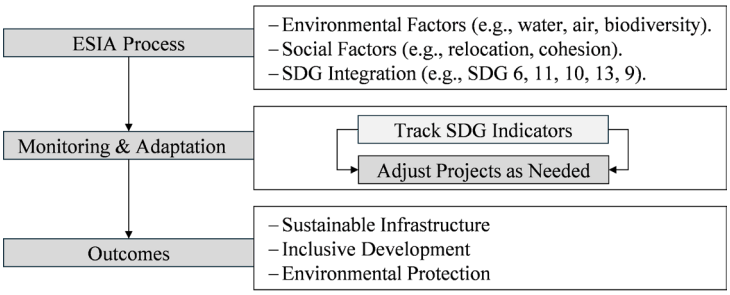

Figure 5 Simplified Flowchart of SDG-Integrated Environmental and Social Impact Assessments (ESIAs)

Source: Illustrated and edited by authors

Risk Management and Adaptation

There is a complex landscape of risks including political instability, funding constraints, and ability gaps in achieving SDG targets (Cernev and Fenner, 2020). Figure 6 shows the integrated risk management and adaptive planning framework for SDG-aligned infrastructure projects in post-conflict Sudan. Political instability, with its fluctuating governance structures and policy uncertainty, erodes the continuity and coherence of infrastructure projects and may result in project disruption, and diminished support for long-term projects (Jiang *et al.*, 2021; Khan *et al.*, 2019). To mitigate this, stakeholder engagement via formal arrangements constructs support bases is needed. As a result, the project becomes more resilient to political instability.

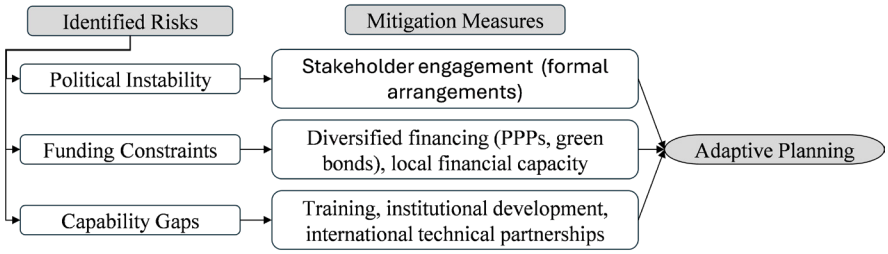

Figure 6 Integrated Risk Management and Adaptive Planning Framework for SDG-Aligned Infrastructure Projects in Post-Conflict Contexts

Source: Illustrated and edited by authors

Another major challenge is funding limitations, especially in a post-conflict environment where resources are generally limited and heavily dependent on external funding. Addressing this requires pursuing diversified sources of funding such as public-private partnerships (PPPs), blended finance, and innovative financial instruments such as green bonds. Local financial management capability is also important to ensure optimal utilisation of funds and minimising delays or project failures resulting from financial mismanagement.

Shortfalls in technical capability, project management, and institution building are part of the challenges of infrastructure projects to remain aligned with SDGs. Specialised capability development is important to enhance local professionals' competencies and institution building to ensure effective implementation and management of projects. Using the technical competencies of international organisation partnerships can also fill these gaps to make projects sustainable and resilient on a global level.

Adaptive planning is essential for managing altered conditions and unforeseen disruptions during SDG-targeted project implementation. Continuous monitoring and progress provide planners with the opportunity to notice changing conditions at an early point, and scenario planning allows for anticipation of disruptions. Adaptive planning provides agility for adjusting designs and deadlines because of unforeseen events, ensuring projects stay on track. Feedback loops enhance resilience through transfer of lessons from ongoing projects into future planning. Risk management and adaptation embedded within strategic frameworks provide Sudan with the capability to manage complexities of post-conflict reconstruction and ensuring infrastructure projects develop sustainably based on SDGs.

Monitoring, Evaluation, and Reporting

Integrating SDG principles into Sudan's infrastructure development requires the implementation of robust Monitoring, Evaluation, and Reporting (MER) systems with the ability to monitor progress towards SDGs throughout a project's lifecycle. MER systems are crucial for ensuring that projects not only achieve short-term goals but also contribute towards greater goals, such as social equity, environmental sustainability, and economic resilience (Gunda *et al.*, 2023). MER systems must capture, analyse, and interpret data on key KPIs corresponding with specific SDGs, allowing project managers, sponsors and stakeholders to discover how well projects are performing towards global goals. Figure 7 depicts four integrated phases, Monitoring, Evaluation, Reporting, and Improvement, each improving SDG-aligned projects through monitoring performance measures, ensuring transparency and accountability, and feedback for reaching sustainability goals.

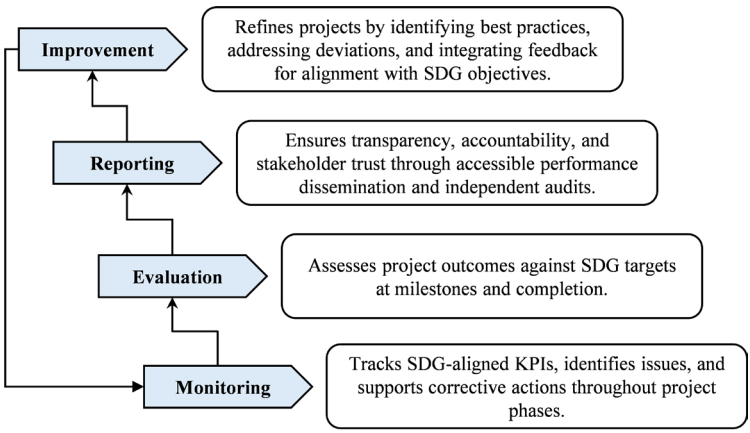

Figure 7 Four-Stage MERI (Monitoring, Evaluation, Reporting, Improvement) Framework for SDG-Aligned Project Management

Source: Illustrated and edited by authors

Application of SDG indicators into monitoring frameworks involves choosing relevant measures that reflect objectives of specific projects, for example, access to clean water (SDG 6), affordable energy (SDG 7), or resilient infrastructure (SDG 9). Such measures must be embedded into project design at the outset, with clear goals for each project phase. Regular monitoring against goals allows for detection of potential issues at an early stage, enabling corrective measures before serious deviations from project goals occur. Periodic reviews at major milestones and on project closure ensure that outcomes are critically reviewed for contribution towards SDGs.

Transparency and accountability in the reporting process are also crucial for stakeholder confidence and in garnering long-term support for SDG-aligned infrastructure projects. Effective, transparent reporting of project performance on progress, challenges, and lessons learned can be ensured through published reports, real-time sharing of data through digital portals, and independent audits for the verification of reported outcomes. Accountability processes, such as stakeholder oversight and feedback from affected local communities, also enhance the credibility of the reporting process, guaranteeing that infrastructure projects uphold high standards of integrity and performance.

DISCUSSION

Effectiveness of SDG Integration in Strategic Planning

Incorporating SDG principles into strategic infrastructure project development for post-war Sudan leads to a planning process that strikes a balance between short-term post-conflict reconstruction needs and long-term sustainability, inclusiveness, and resilience. Prioritisation of sustainable development targeted goals, such as clean water and sanitation (SDG 6), affordable and clean energy (SDG 7), industry, innovation, and infrastructure (SDG 9), sustainable cities and communities (SDG 11), and reducing carbon emissions (SDG 13) has helped these projects achieve significant achievements towards holistic development outcomes. Incorporating SDG indicators at the planning level provides a clear structure for setting quantifiable goals and monitoring system; this can lead to initiatives that have a real contribution towards international development agendas.

In comparison, traditional practices for planning, emphasising short-term economic benefits and rapid delivery of infrastructure, tend to short-change sustainability and social equity considerations. These practices can create infrastructure that is not resilient to stress from the environment and socio-economic factors, and can increase inequalities or disregard poor communities' interests. For instance, infrastructure projects with disregard for the environment can result in pollution, natural resource depletion, and long-term ecological damage, eventually undermining the development they seek to induce.

Implications for Policy and Practice

Effective integration of SDG principles into strategic infrastructure development highlights the obligation for a transition towards a new approach for conceptualisation, design, and implementation of infrastructure for post-conflict Sudan. Policy-makers

have a mandate to put increased focus on inclusivity, resilience, and sustainability into all stages of infrastructure development, from planning to execution and evaluation. Such a transition will require a multisector approach, one that integrates environmental, social, and economic considerations into decision-making for ensuring that infrastructure projects not only serve short-term recovery but also enhance long-term national development goals.

To upscale the integration of SDG principles into regional and national infrastructure planning, several crucial suggestions appear from this study. First, there is a need for SDG-aligned frameworks and tools at all levels of government and among planning agencies. This can be realised through mainstreaming SDG indicators and targets into sector-specific policy, and national development plans. Second, capacity-building initiatives also need priority for providing planners, engineers, and policy-makers with skills and knowledge, thereby empowering them with ability for successful implementation of SDG-aligned projects.

The study highlights the importance of ensuring greater co-operation among the private sector, international development agencies, and the public sector for raising finance and technical capacity for sustainable infrastructure development. These partnerships must be backed by sound governance frameworks that provide for transparency, accountability, and benefit sharing. Strong monitoring and evaluation frameworks are also essential for tracking SDG progress, as well as for ensuring that infrastructure projects are still adaptive to emerging opportunities and challenges.

CONCLUSIONS

This study provides a comprehensive analysis of how SDG principles are embedded into strategic infrastructure project planning for post-conflict Sudan, with a framework that will place infrastructure development on an equal footing with international standards for resilience, inclusive, and sustainability. The primary findings emphasise the fundamental importance of SDG principles being embedded into every aspect of infrastructure planning, from vision and goals setting through execution, monitoring, and evaluation. The proposed framework emphasises a multi-dimensional approach with a focus on environmental sustainability, social equity, and economic resilience, ensuring that infrastructure projects not only address short-term post-conflict reconstruction needs but also facilitate sustainable development over a long-time horizon.

A number of SDGs were identified as being highly pertinent for Sudan's infrastructure development, including SDG 6 (Clean Water and Sanitation), SDG 7

(Affordable and Clean Energy), SDG 9 (Industry, Innovation, and Infrastructure), and SDG 11 (Sustainable Cities and Communities). Aligning infrastructure projects with these goals, the framework ensures that projects are designed with a focus on addressing urgent societal needs as well as promoting overall development goals. The research also highlights the importance of stakeholder engagement and cross-sector co-ordination throughout the planning process, as effective integration of SDG principles needs active engagement from government, private sector, civil society organisations, and local communities.

Moreover, the study shows SDG alignment opportunities and challenges, including capacity building, innovative financing tools, and adaptive planning for navigating the dynamic and often volatile Sudanese post-conflict environment. The study suggests that with all the challenges, the implementation of the framework proposed can achieve more resilient, inclusive, and sustainable infrastructure outcomes. The framework not only offers a model for Sudan's reconstruction but also a template for replication and implementation for other post-conflict situations, enriching international debate on sustainable development and post-conflict reconstruction.

An important area for future research is to understand context-specific obstacles and the use of facilitators that affect successful SDG-aligned infrastructure project implementation. It includes studying socio-political dynamics, cultural factors, and governance frameworks that work out project outcomes across various post-conflict countries. Further, there is a necessity to explore financial instruments that help SDG-aligned infrastructure project scale-up, especially for low-resource contexts.

REFERENCES

Adedoyin, O.O., Raimi,.M.O., Olawale, S.H. and Emmanuel, O.O. (2020): A Review of Environmental, Social and Health Impact Assessment (Eshia) Practice in Nigeria: A Panacea for Sustainable Development and Decision Making. *MedCrave Online Journal of Public Health (MOJPH)*, Vol. 9, No. 3, pp.81-87. Available at: https://doi.org/10.15406/mojph.2020.09.00328

Cernev, T. and Fenner, R. (2020): The Importance of Achieving Foundational Sustainable Development Goals in Reducing Global Risk. *Futures*, Vol. 115, p.102492. Available at: https://doi.org/10.1016/j.futures.2019.102492

Cross, J.W. (2010): *Criteria for Post-War Infrastructure Reconstruction Efforts*. Defense Technical Information Center, U.S. Army War College, Carlisle Barracks, PA 17013-5050. Available at: https://doi.org/10.21236/ADA517910.

Elalfy, A., Weber, O. and Geobey, S. (2021): The Sustainable Development Goals (SDGs): A Rising Tide Lifts All Boats? Global Reporting Implications in a Post SDGs World. *Journal of Applied Accounting Research*, Vol. 22, No. 3, pp.557-575. Available at: https://doi.org/10.1108/JAAR-06-2020-0116

Fayazi, M., Arefian, F.F., Gharaati, M., Johnson, C., Lizarralde, G. and Davidson, C. (2017): Managing Institutional Fragmentation and Time Compression in Post-Disaster Reconstruction – the Case of Bam. *International Journal of Disaster Risk Reduction*, Vol. pp.340-349. Available at: https://doi.org/10.1016/J.IJDRR.2017.01.012

Gjaci, B. (2023): Public and Private Financing Instruments to Support SDGs: The Case of Albania. In Nedelko, Z. and Korez-Vide, R. (Eds): *7th FEB International Scientific Conference: Strengthening Resilience by Sustainable Economy and Business - towards the SDGs* (pp.277-287). University of Maribor, University Press. Available at: https://doi.org/10.18690/um.epf.3.2023.32

Gunda, T., Wachtel, A., Khadka Mishra, S. and Moog, E. (2023): Quantitative Approaches for Including Equity in Risk and Resilience Infrastructure Planning Analyses. *Risk Analysis*, September. Available at: https://doi.org/10.1111/risa.14230

Hosny, H. E., Ibrahim, A.H. and Eldars, E.A. (2022): Development of Infrastructure Projects Sustainability Assessment Model. *Environment, Development and Sustainability*, Vol. 24, No. 6, pp.7493-7531. Available at: https://doi.org/10.1007/s10668-021-01791-5

Jiang, W., Martek, I., Hosseini, M.R. and Chen, C. (2021): Political Risk Management of Foreign Direct Investment in Infrastructure Projects. *Engineering, Construction and Architectural Management*, Vol. 28, No. 1, pp.125-153. Available at: https://doi.org/10.1108/ECAM-05-2019-0270

Khan, A., Waris, M., Ismail, I., Sajid, M.R., Ullah, M. and Usman, F. (2019): Deficiencies in Project Governance: An Analysis of Infrastructure Development Program. *Administrative Sciences*, Vol. 9, No. 1, p.9. Available at: https://doi.org/10.3390/admsci9010009

Kopiika, N., Di Bari, R., Argyroudis, S., Ninic, J. and Mitoulis, S.A. (2025): Sustainability and Resilience-Driven Prioritisation for Restoring Critical Infrastructure after Major Disasters and Conflict. *Transportation Research Part D: Transport and Environment*, Vol. 139 p.104592. Available at: https://doi.org/10.1016/j.trd.2025.104592

Mohmmed, A., Zhang, K., Kabenge, M., Keesstra, S., Cerdà, A., Reuben, M., Elbashier, M.M., Dalson, T. and Ali, A.A. (2018): Analysis of Drought and Vulnerability in the North Darfur Region of Sudan. *Land Degradation & Development*, Vol. 29, No. 12, pp.4424-4438. Available at: https://doi.org/10.1002/ldr.3180

Nwanekezie, K., Noble, B. and Poelzer, G. (2021): Transitions-Based Strategic Environmental Assessment. *Environmental Impact Assessment Review*, Vol. 91, p.106643. Available at: https://doi.org/10.1016/j.eiar.2021.106643

Ortiz, G., Domínguez-Gómez, J.A., Aledo, A. and Urgeghe, A.M. (2018): Participatory Multi-Criteria Decision Analysis for Prioritizing Impacts in Environmental and Social Impact Assessments. *Sustainability: Science, Practice and Policy*, Vol. 14, No. 1, pp.6-21. Available at: https://doi.org/10.1080/15487733.2018.1510237

Pallas, C.L. (2016): Aid Reduction and Local Civil Society in Conflict- Affected States: New Research and Stakeholder Dialogue. *Journal of Peacebuilding and Development*, Vol. 11, No. 1, pp.105-109. Available at: https://doi.org/10.1080/15423166.2016.1146515

Semeraro, T., Radicchio, B., Medagli, P., Arzeni, S., Turco, A. and Geneletti, D. (2020): Integration of Ecosystem Services in Strategic Environmental Assessment of a Peri-Urban Development Plan. *Sustainability*, Vol. 13, No. 1, p.122. Available at: https://doi.org/10.3390/su13010122

Vervisch, T. (2011): The Solidarity Chain: Post-Conflict Reconstruction and Social Capital Building on Three Burundian Hillsides. *Journal of Eastern African Studies*, Vol. 5, No. 1, pp.24-41. Available at: https://doi.org/10.1080/17531055.2011.544541

Adebayo, Y.A., Ikevuje, A.H., Kwakye, J.M. and Esiri, A.E. (2024): Balancing Stakeholder Interests in Sustainable Project Management: A Circular Economy Approach. *GSC Advanced Research and Reviews*, Vol. 20, No. 3, pp.286-297. Available at: https://doi.org/10.30574/gscarr.2024.20.3.0354

Zhovnirchyk, Y., Chernov, S., Larina, N., Lukashuk, M. and Antonova, L. (2023): Strategic Planning for the Sustainable Development of Territorial Communities. *International Journal of Sustainable Development and Planning*, Vol. 18, No. 7, pp.2097-2105. Available at: https://doi.org/10.18280/ijsdp.180712

BIOGRAPHY

Dr. Hassan A. Abbas is an Assistant Professor of Civil Engineering at the University of Prince Mugrin, Saudi Arabia. He holds a PhD in Civil Engineering from King Fahd University of Petroleum and Minerals and brings more than two decades of combined academic and professional experience in academia and construction engineering. His research interests encompass soil improvement techniques, sabkha and expansive soils, sustainable infrastructure development, and topics related to the Sustainable Development Goals (SDGs), with a particular emphasis on the application of numerical modelling in civil engineering. Dr. Abbas is a registered Professional Engineer (PE) with the National Council of Examiners for Engineering and Surveying (NCEES). His research has been widely published in peer-reviewed journals and presented at international conferences.

Professor Allam Ahmed is a Professor of Knowledge Management and Sustainable Development; Founding President World Association for Sustainable Development; Founding Director SDGs Universities Initiatives and SDGs Tracker Initiative; and Honorary Professor Faculty of Medicine and Dentistry and Senior Policy Fellow Global Policy Institute, Queen Mary University of London. He is a Fellow (FCIM) and Chartered Marketer of the *Chartered Institute of Marketing (CIM),* UK; *Fellow (FFPH) Faculty of Public Health,* UK; PhD in Economics in two years at *Edinburgh Napier University,* UK; awarded the *Royal Agricultural University (RAU)* Scholarship and Prestigious Book Prize for Best MSc/MBA Dissertation; Listed in the *Who's Who in the World 2009-2021 and 2021* Who's Who in the World Lifetime Achievement Award, *Who's Who in Finance and Business 2009/2010* and *Who's Who in America 2012-2014* published by Marquis Who's Who, USA.