EXPLORING CHALLENGES AND OPPORTUNITIES IN ALIGNING CONSTRUCTION PROJECT WITH SUSTAINABLE DEVELOPMENT GOALS (SDGs) IN BANGLADESH

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ABSTRACT

The objective of this research proposal is to delve into the challenges and opportunities associated with integrating construction projects with Sustainable Development Goals (SDGs) in the context of Bangladesh. This study seeks to deliver an in-depth perspective on how construction activities can catalyze the SDGs, thereby fostering sustainable growth within the nation. Employing a qualitative research approach focusing on case study analysis, this investigation will dissect the interface between construction endeavors and the SDGs. The research methodology encompasses the collection and examination of qualitative data through methods such as interviews, focus groups, document review, and direct observation, with the intent of uncovering the multifaceted aspects of SDG alignment in the construction domain.

Anticipated outcomes of this research include illuminating the particular obstacles construction stakeholders face when incorporating SDG-aligned opportunities into their operations, alongside actionable strategies to surmount these issues. Moreover, the research will pinpoint exemplary practices from successful construction projects in Bangladesh that resonate with distinct SDGs, to propagate these methods industry-wide.

The significance of this research is multifold; it is poised to influence policy-making processes, enable capacity development, inspire novel initiatives, bolster economic prosperity, reinforce community welfare, and facilitate the assimilation of international best practices. This study is distinctive in its examination of construction projects' alignment with the SDGs within Bangladesh, bridging the existing gap in comprehension of how such initiatives can effectively drive sustainable development.

Keywords: Sustainable Development Goals, construction sector, Bangladesh, qualitative research, case study approach, sectoral challenges, strategic opportunities, policy advocacy, capacity enhancement, innovation, community engagement.

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CHAPTER 01-INTRODUCTION OF THE RESEARCH

1. INTRODUCTION

Bangladesh finds itself at a crucial juncture, balancing its aspirations with the complexities of sustainable growth. The Sustainable Development Goals (SDGs) set by the United Nations provide a blueprint for prosperity, with the construction sector playing a key role in the country's progress. This study delves into the hurdles and prospects of integrating SDGs into construction endeavors in Bangladesh, a country navigating the dual challenges of rapid development and sustainability. The importance of this research lies in its capacity to transform the use of resources, bolster climate resilience, and spur innovation in the construction industry. Aiming to close the gap between SDGs and construction activities, this research seeks to guide policymakers, industry stakeholders, and practitioners in advancing sustainable, inclusive, and robust urban growth in Bangladesh. Embarking on this exploration, the study aims to align construction efforts with SDGs, contributing to a more sustainable and promising future for the nation.

1.1. Background

This study delves into the intricacies and prospects of integrating Sustainable Development Goals (SDGs) within construction initiatives in Bangladesh. The SDGs, comprising 17 objectives designed to eradicate poverty, safeguard the environment, and ensure prosperity for all by 2030, present a broad and interconnected framework that poses both challenges and opportunities for Bangladesh, a nation already progressing towards the Millennium Development Goals (MDGs) (Haque, 2022) [2]:). Given the construction sector's significant role in Bangladesh's economic growth and its impact on environmental and social dimensions, aligning its projects with SDGs offers a promising avenue for fostering sustainable development (Haque,2022) [1]. This study aims to assess the current alignment of construction projects with SDGs in Bangladesh, identifying barriers and opportunities to enhance this integration. The outcomes of this research could inform policymakers and industry stakeholders, enabling the formulation of strategies that drive sustainable practices within the nation's construction industry.

Link: [1]: & [2]:

1.1.1. Global SDG Background

The United Nations' Sustainable Development Goals (SDGs) represent a comprehensive framework of 17 interconnected goals aimed at addressing major global challenges and promoting sustainability across societal, economic, and environmental dimensions. Launched at the United Nations Conference on Sustainable Development in 2012, these goals build upon the foundation laid by the Millennium Development Goals (MDGs), signifying a unified commitment to tackle pressing global issues (United Nations, 2023). The SDGs encompass a wide range of areas, including efforts to eliminate poverty, reduce inequalities, address environmental degradation, and combat climate change, with each goal defined by specific targets and indicators to measure progress. Designed to foster collaboration among various goals, the SDGs aim to create a more sustainable future by linking achievements in different areas, thereby collectively addressing crucial concerns such as climate action, gender equality, peace, and well-being for future generations.

.Link: [3]: (United Nations, 2023).

1.1.2. GLOBAL PROJECT OF SDG

Established by the United Nations, the Global Sustainable Development Goals (SDGs) comprise a set of 17 interlinked objectives designed to tackle critical worldwide issues and enhance sustainability across social, economic, and ecological spectrums. Initiated at the 2012 United Nations Conference on Sustainable Development, the SDGs have taken over from the Millennium Development Goals (MDGs), representing a global pledge to confront essential international concerns (UNDP, 2023) .[4]: Covering a wide range of areas including poverty, inequality, environmental decay, and climate change, these goals are equipped with specific targets and benchmarks to facilitate the monitoring of advancements. The SDGs promote synergy among various objectives, thereby offering a pathway to a more sustainable planet where achievements in one goal can propel progress in others, effectively addressing key challenges such as gender equality, peace, climate change, and global prosperity for upcoming generations.

Link .[4]: (UNDP, 2023) .

1.1.3. SDG Project in Bangladesh

Bangladesh is actively advancing towards the achievement of the Sustainable Development Goals (SDGs), with the United Nations and its local allies aiding the government across a broad spectrum of initiatives aimed at fostering sustainable development, alleviating poverty, managing disasters, promoting peace and good governance, and enhancing various other sectors such as human rights, environmental conservation, climate action, healthcare, education, and social welfare, among others. Notable initiatives include the Sustainable Forests & Livelihoods Project (SUFAL) focused on the sustainable management of forests and enhancing the livelihoods of communities reliant on them, and the Bangladesh Sustainable Coastal and Marine Fisheries Project (SCMFP), dedicated to the welfare of coastal fishing communities and sustainable fishing practices. Another key project, the Sustainable Enterprises Project (SEP), seeks to encourage sustainable business models and assist small and medium enterprises (Creating a Green and Sustainable Growth Path for Bangladesh. 8 June 2022) .[6]. These endeavors collectively contribute to the robust progress in Bangladesh's sustainability objectives, offering valuable insights for policymakers and stakeholders to fortify strategies for sustainable development in the country.

Link:.[6] (Creating a Green and Sustainable Growth Path for Bangladesh. (2022, June 8

1.1.4. Challenges Based on SDG in Bangladesh in Construction Project

After making significant progress with the Millennium Development Goals (MDGs), Bangladesh is now engaging with the Sustainable Development Goals (SDGs), a complex array of interrelated objectives (ESCAP. Retrieved ,1 June, 2023) 7:. The construction sector in Bangladesh, vital for the country's economic advancement, significantly influences both societal welfare and environmental sustainability, underlining the critical need for integrating SDG principles into construction projects to achieve sustainable development (Fahmida, K., Syed, Y., & Saadat, 2021) 8: However, the journey toward SDG achievement faces several challenges, including a lack of awareness among stakeholders, inadequate coordination among different agencies, and the absence of an elaborate monitoring framework. The global dimensions of SDG targets further emphasize the importance of international collaboration. Within the realm of

construction, key challenges involve promoting environmental sustainability, upholding social responsibility and the rights of workers, and driving economic growth alongside poverty reduction. Addressing these issues requires a collaborative effort from government bodies, construction firms, community organizations, and all relevant stakeholders to advocate for sustainable construction methods, invest in green technologies, and safeguard the rights of workers throughout the construction process.

Link: [7]: ESCAP. Retrieved June 1, 2023, [8]: Fahmida, K., Syed, Y., & Saadat. (2021).

1.1.5. Opportunities Based on Sustainable Development Goals (SDGs) in Bangladesh in Construction Project

Bangladesh's economy benefits from the construction sector, but it also has a major negative influence on society and the environment *(SDGs and Construction Industries* 26, January 2020). .[9] Thus, one potential strategy for advancing sustainable development in Bangladesh is to match building projects with the Sustainable Development Goals (SDGs).

The building industry in Bangladesh has numerous potentials because of the SDGs' implementation. The SDGs, for instance, offer a framework for encouraging the development of sustainable infrastructure, which may aid in lowering the environmental effect of building projects 9. Furthermore, building projects that are in line with the SDGs may encourage human rights and social responsibility within the sector *(SDGs and Construction Industries 26 January*, 2017)..[9] Additionally, encouraging sustainable building methods might aid in generating fresh commercial prospects and stimulating Bangladesh's economy (The Daily Star,2017) [10]:

Policymakers and stakeholders must collaborate to create practical plans for coordinating building projects with the SDGs to seize these opportunities. This could entail creating standards for environmentally friendly building techniques, advancing green building technologies, and making sure that workers' rights are upheld during the building process. By doing this, Bangladesh can help accomplish the SDGs and encourage sustainable development in the building sector.

.Link: [9]: *(SDGs and construction industries*.2020, January 26). And The Daily Star(2017) [10]:

1.1.6. Failure Reason Based on SDG In Bangladesh in Construction Project

Bangladesh's construction failures are frequently caused by a complex web of interrelated issues that are related to the nation's progress towards attaining the Sustainable Development Goals (SDGs). The haphazard building is facilitated by rapid urbanization, poor planning, lax laws, and climate change; insufficiently disaster-resilient designs result in structural breakdowns during extreme weather occurrences (Hasan, M., & Macdonald, G. 13 September 2021) 11. Budgetary constraints lead to poor resource management, which exacerbates poverty and inequality problems and restricts access to secure and decent housing. It also results in inadequate infrastructure. Construction quality and safety are compromised by corruption and a lack of trained labor, which influences communities and workers alike. Construction failures are further compounded by issues related to health and safety, energy efficiency, sanitation, and inadequate community involvement. In addition to improving construction quality, addressing these problems also advances Bangladesh's larger objectives of environmental resilience, equitable growth, and sustainable development.

11: (Hasan, M., & Macdonald, G. 13 September 2021)

1.1.7. Novelty Gap In Urban Areas Based On Sustainable Development Goals (SDGs) In Bangladesh in Construction Project

In Bangladesh's urban landscape, there is a notable disconnect between current construction practices and the objectives outlined in the Sustainable Development Goals (SDGs). Issues such as achieving gender equality within the construction sector, providing access to affordable and eco-friendly housing, building climate-adaptable infrastructure, enhancing the efficiency of resource use, fostering community participation in urban development, enforcing rigorous health and safety standards, and integrating advanced green technologies present significant challenges (The Daily Star, 26, January 2020) 9: To bridge these gaps, a concerted effort is required from government entities, construction companies, local communities, and development agencies.

This collaborative approach should focus on promoting innovation, building capacity, reforming policies, and raising awareness. Such endeavors will be crucial in aligning urban construction activities with the SDGs, ultimately contributing to the development of more resilient and sustainable urban environments in Bangladesh.

Link [9]: (The Daily Star, 26, January 2020)

1.2. RESEARCH PURPOSE

This qualitative research study aims to investigate how construction projects in Bangladesh relate to the Sustainable Development Goals (SDGs). The goal is to comprehend how construction projects help or hinder the accomplishment of the SDGs through a case study approach. The primary phenomenon of construction methods and SDG-related projects will be the subject of this study. Participants in this study include government agencies, non-governmental organizations, construction businesses, and local populations that are either involved in or impacted by construction projects. Bangladesh is the research location; it is a nation that is rapidly urbanizing and dealing with difficult sustainability issues. The central focus of this research is to assess the extent to which construction practices and projects in Bangladesh align with the Sustainable Development Goals (SDGs). It aims to explore the breadth of opportunities and challenges encountered in achieving such alignment.

1.3. RESEARCH OBJECTIVES

The objectives of the research are-

To identify the key Sustainable Development Goals relevant to the construction sector in Bangladesh.

2. To explore the various opportunities within construction projects that align with specific SDGs.

3. To assess the potential economic, social, and environmental impacts of integrating SDG-aligned opportunities in construction projects.

4. To provide recommendations for stakeholders on how to maximize these opportunities and address challenges.

1.4. PROBLEM STATEMENT

Bangladesh's building industry has a great deal of potential to promote sustainable development and support the Sustainable Development Goals (SDGs) of the UN. Still, there is a significant knowledge vacuum about the precise avenues through which construction projects might effectively advance the SDGs. Bangladesh's rapid infrastructural development and urbanization are in line with the SDGs, which seek to address climate vulnerability, promote industry and innovation, and build sustainable cities. However, the building sector faces considerable obstacles in successfully incorporating these objectives. The intricate environment, which is marked by population expansion, insufficient infrastructure, and vulnerability to climate change, makes it difficult for building initiatives to be in line with the SDGs.

Through a thorough investigation of the difficulties faced by building projects in Bangladesh in aligning with the SDGs, this research proposal aims to close this knowledge gap. It is extremely important since it clarifies several issues related to sustainable development, such as innovation, capacity building, resource efficiency, climate resilience, and policy development (International-Partnerships.ec.europa.eu.). 12. The goal of the research is to identify these obstacles and offer insightful information that will be useful to academics, business professionals, legislators, and development agencies. The ultimate purpose of this research is to help build projects that incorporate sustainable development principles more successfully, which will help Bangladesh achieve the SDGs in general.

12. (International-Partnerships.ec.europa.eu.)

1.5. GAP OF THIS RESEARCH

Even while the significance of sustainable development and the SDGs is becoming more widely acknowledged, little is known about the real-world difficulties Bangladeshi building projects face in trying to meet these objectives. Although scholarly works offer valuable perspectives on certain facets of sustainable construction and SDG implementation, there is a dearth of all-encompassing research delving into the complex obstacles encountered by construction projects striving to incorporate SDGs in the distinct context of Bangladesh.

1.6. QUALITATIVE RESEARCH QUESTIONS AND HYPOTHESES

R1: How can the construction sector in Bangladesh effectively align with specific Sustainable Development Goals (SDGs) to contribute to the country's sustainable development agenda?

H1: Integrating sustainable materials, energy-efficient designs, and community-inclusive planning into construction projects in Bangladesh contributes significantly to achieving relevant Sustainable Development Goals (SDGs), accelerating the country's sustainable development agenda.

R2: What are the challenges faced by construction stakeholders in integrating SDG-aligned opportunities into their projects, and how can these challenges be addressed?

H2: Lack of awareness, financial constraints, and inadequate regulatory frameworks significantly hinder the integration of SDG-aligned opportunities in construction projects in Bangladesh. Addressing these challenges will enhance the integration of sustainable practices.

R3: What are the best practices adopted by successful construction projects in Bangladesh that effectively align with specific SDGs, and how can these practices be replicated across the industry?

H3: Adopting waste minimization, use of renewable energy, and enhancement of green spaces in construction projects aligns with specific SDGs and demonstrates increased long-term cost savings and community well-being in Bangladesh. These practices can be replicated industry-wide through collaborative platforms, certifications, and public-private partnerships.

1.7. CONCEPTUAL FRAMEWORK

A conceptual framework offers a lucid depiction of the variables, the interconnections between them, and the foundational suppositions that constitute the basis of a research investigation. (Hassan, M. 27 August 2022) 31. The following framework integrates the Efficiency of SDG Alignment, Challenges with Opportunities, and Best Practices into a cohesive structure, illustrating the interplay between these elements in promoting SDG alignment within the construction sector in Bangladesh.

Conceptual Framework for SDG Alignment in the Construction Sector

Figure 1. CONCEPTUAL FRAMEWORK

1. Foundations of SDG Alignment

Relevance to Construction: Recognizes the essential connection between construction activities and SDGs, especially SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities).

Practices and Initiatives: Encompasses sustainable practices like green building certifications and the use of sustainable materials that contribute to achieving SDGs.

Measurement Tools: Involves the adoption of specific indicators and metrics, such as green building certifications and carbon footprint assessments, to gauge the impact of construction projects on SDGs.

2. Enabling Factors

Stakeholder Collaboration: Emphasizes the need for effective cooperation among all stakeholders, including construction companies, government agencies, NGOs, and communities, to facilitate SDG alignment.

Policy and Regulatory Framework: Advocates for adaptable and regularly reviewed policies and regulations that effectively promote SDG-aligned construction practices.

3. Challenges and Solutions

Financial and Awareness Barriers: Identifies financial constraints and a lack of awareness as significant obstacles to SDG alignment, suggesting the need for targeted financial mechanisms and awareness campaigns.

Technological and Capacity Barriers: Highlights the challenges related to limited technological adoption and capacity gaps, recommending investment in technology transfer and skill development programs.

4**. Best Practices and Success Factors**

Successful Projects: Draws on examples of successful construction projects that have effectively aligned with SDGs, highlighting key success factors such as government leadership, community engagement, and innovative designs.

Ethical Considerations: Stresses the importance of ethical research and project implementation practices, including informed consent and community engagement, to ensure responsible SDG alignment.

5. **Outcomes and Impact**

Sustainable Development Advancement: The goal of integrating the above elements is to advance sustainable development within the construction sector, contributing to the broader national and global sustainability agenda.

Interconnections:

The framework suggests that the Foundations of SDG Alignment serve as the basis for understanding and initiating SDG-aligned construction practices.

Enabling Factors Challenges and Solutions are dynamically interrelated, where addressing challenges through innovative solutions and collaborative efforts enhances the enabling environment for SDG alignment.

Best Practices and Success Factors provide practical insights and models that can be replicated and adapted across the industry to overcome challenges and leverage enabling factors effectively.

The culmination of these efforts in the Outcomes and Impact segment reflects the achievement of sustainable development through construction practices aligned with SDGs

1.8. SIGNIFICANCE OF THE STUDY

The proposed research exploring the relationship between construction projects and the Sustainable Development Goals (SDGs) is poised to play a pivotal role in the trajectory of Bangladesh's development. The aim is multifaceted: to bolster economic expansion, cultivate strategic partnerships, enhance community welfare, optimize resource use, reinforce resilience against climate change, guide policymaking, build professional capabilities, spur innovation, and stimulate further economic prosperity as outlined by the United Nations Development Program (12, June 2022) 13. The potential of this study lies in its capacity to catalyze a transformative shift toward sustainable and resilient urban environments within Bangladesh, ultimately contributing to the nation's progress and the general well-being of its populace.

Link: 13. *United Nations Development Program*. (12, June 2022)

1.9. SCOPEOF RESEARCH:

This study primarily investigates how construction projects in Bangladesh conform to the Sustainable Development Goals (SDGs). It explores the building industry, focusing on SDGs 9, 11, and 13, and seeks to determine the potential and problems therein (United Nations Development Programme,12, June 2022) 13. The study evaluates the effects of SDG-aligned behaviors, includes a range of stakeholders, and uses a variety of data collection techniques. Stakeholders will receive actionable recommendations, and the study may draw upon cross-cultural learning from global models. Although the research's main beneficiaries are the building industry in Bangladesh, its conclusions might apply to other comparable situations globally.

13. *United Nations Development Program*. (12, June 2022)

1.10. LIMITATIONS

Although the goal of this research proposal is to thoroughly examine how construction projects in Bangladesh correlate with the SDGs, there are a few important caveats to be aware of. The focus of the study is Bangladesh, which restricts the findings' direct applicability to other areas. It may be challenging to obtain data from a variety of stakeholders, which could lead to logistical issues and response bias. Cautious consideration should be given to generalizability outside of the Bangladeshi context, as the recommendations' applicability may change over time due to the dynamic character of the building industry. The comprehensiveness of the study may be impacted by resource limitations and biases in data collecting and analysis. Additional constraints include ethical issues and cross-cultural transferability. The study also grapples with complex challenges in assessing long-term outcomes and considering external factors like political volatility within its scope.

14. Fei, W., Opoku, A., Agyekum, K., Oppong, J. A., Ahmed, V., Chen, C., & Lok, K. L. (2021).

1.11. DEFINITION OF TERMS

For clear and consistent comprehension of essential terms within this research proposal, the definitions provided below will serve as a reference:

1. **Sustainable Development Goals (SDGs)**: The Sustainable Development Goals (SDGs) are 17 global goals developed by the UN to address economic, social, and environmental concerns. The SDGs include goals including poverty reduction, gender equality, climate action, and sustainable urban development.
2. **Construction Industry**: The sector that plans, designs, builds, and manages infrastructure projects. It includes a variety of players, including construction companies, architects, engineers, contractors, and suppliers.
3. **Alignment**: This research focuses on how construction projects and practices link with the SDGs to help achieve global goals.

4. **Resource Efficiency**: In building projects, responsible and effective use of materials, energy, and resources reduces waste, costs, and environmental implications.
5. **Climate Resilience**: Construction projects can adapt to the effects of climate change, such as extreme weather events, increasing sea levels, and shifting weather patterns.
6. **Policy Formulation**: Policy formation refers to the crafting and execution of governmental regulations, incentives, and guidelines that influence the conduct and methodologies of the construction industry about the SDGs.
7. **Capacity Building**: Policy formation entails the development and application of government directives, benefits, and advisories aimed at shaping the practices and operations of the construction sector in alignment with the SDGs.
8. **Innovation**: Innovation within construction projects encompasses the adoption of novel technologies, materials, and processes that emphasize sustainability, efficiency, and the principles embodied by the SDGs.
9. **Community Engagement**: Engaging local communities in the planning and decision-making processes of construction projects fosters social inclusion and considers the needs and preferences of the residents.
10. **Cross-Cultural Learning**: Adapting successful methods from foreign SDG-aligned construction projects to the Bangladeshi environment.
11. **Stakeholders**: Stakeholders include construction practitioners, policymakers, government agencies, non-governmental organizations (NGOs), and local people.

CHAPTER 2- REVIEW OF LITERATURE

2. INTRODUCTION

The literature review conducted for this study underscores the increasing recognition of the construction industry's potential to advance the Sustainable Development Goals (SDGs) (The Daily Star, 26,January 2020).[9]:

Specific areas, such as resource efficiency and environmental performance, have been identified as key domains where building projects can align with the SDGs. However, debates persist regarding the economic viability of sustainable practices and the delicate balance between development and environmental conservation. The review also highlights unresolved issues, including the need for comprehensive sustainability metrics and the empowerment of women in the sector. Emerging themes such as construction information modeling (BIM), circular economy concepts, and green construction standards have garnered attention(The Daily Star, 26,January 2020).[9]:.Moreover, recent studies have begun to explore the social dimensions and cross-cultural applicability of novel technologies, laying the groundwork for further investigation into the construction industry's contribution to the SDGs.

(The Daily Star, 26,January 2020).[9]:

2.1. ESTABLISHMENT

Numerous studies have focused on how construction projects conform to the Sustainable Development Goals (SDGs). All these studies have demonstrated how crucial the building sector is to the advancement of sustainable development. It is acknowledged that using sustainable building techniques can have a good effect on the social, economic, and environmental spheres, in line with the SDGs. A study conducted by Autodesk found that using sustainable building methods benefits businesses as well as the environment (M.,20, September 2021). The SDGs can be directly impacted by construction projects in several key areas, including resource efficiency, community well-being, climate resilience, and environmental performance. It has been

acknowledged that using innovative technology, energy-efficient designs, and sustainable building materials is crucial to reaching the SDG targets.

15. for, M. (20, September 2021). *Sustainable Construction: Why Building for a Better World Is Better for Business*. Autodesk.com.

2.2. CONTENTIOUS NOTIONS*:*

While there's a broad consensus on the potential of the construction industry to advance the SDGs, the feasibility of certain sustainability measures remains debated. Key areas of contention include the economic sustainability of green building practices, the balance between environmental conservation and economic development, and the challenge of achieving social equity in construction endeavors. Construction projects hold significant potential to positively influence critical aspects such as resource efficiency, community welfare, climate adaptability, and environmental quality (BigRentz, 4, February 2020). *16* These debates underscore the complexity of harmonizing social, environmental, and economic considerations in the construction field, underscoring the absence of a universal solution.

16. Berentz. (4, February 2020). *Sustainable Construction: Methods and Benefits | Berentz*. Www.bigrentz.com.

2.3. ACCEPTED DISAGREEMENTS

The conflict between immediate financial benefit and long-term sustainability is one acknowledged topic of debate in the area (World Economic Forum, 27, June 2023,). Construction projects frequently put short-term profits ahead of long-term sustainability and social justice. This tension draws attention to the necessity of more precise industry standards and regulatory guidelines to balance these competing objectives. Furthermore, it has been recognized that rigorous decision-making is necessary in areas where trade-offs between various SDGs, such as those about economic growth and climate action, must be made to maximize overall impact.

17. (World Economic Forum, 27, June 2023).

2.4. UNSOLVED PROBLEMS AND ISSUES

There are still several unresolved problems with construction projects' compatibility with the SDGs. These include integrating sustainable practices into informal urban settlements, empowering women in the construction industry, and creating comprehensive, globally applicable sustainability indicators for construction projects. Determining the best laws and incentives to support sustainability in the building industry is still a challenging task. Research and innovation are also needed to address how resilient construction projects are to the growing effects of climate change.

2.5. EMERGING TRENDS AND NEW APPROACHES

The rising use of building information modeling (BIM) for sustainable design and construction, the acceptance of green building standards, and the application of circular economy principles to construction processes are examples of emerging trends. There has also been an increase in the investigation of natural remedies and the application of renewable energy sources in building projects. To establish comprehensive methods for SDG alignment, innovative approaches entail the development of multidisciplinary research that brings together environmental science, policy studies, social sciences, and building engineering.

2.6. RESEARCH EXTENSIONS AND DEPARTURES

By examining the social dimensions of construction projects—such as community participation and gender inclusion—that were previously understudied, a recent study builds on earlier findings. The examination of the cross-cultural transferability of sustainable construction methods from global examples to the setting of Bangladesh is another area where studies have deviated from earlier research. This study differs from previous ones in that it applies novel technologies and materials and evaluates their economic viability, rather than concentrating on general sustainability principles. Furthermore, this field's research is progressively integrating newer international organization goals and aims as well as evolving SDGs.

2.7. DEPENDED ON VARIABLES

In the domain of research investigating the alignment of building projects with the Sustainable Development Goals (SDGs), the choice of the dependent variable depends on the specific

objectives and constraints of the investigation (Sustainable Buildings and Construction: Responding to the SDGs, 17,February 2022)32 Previous research studies have shown that the dependent variable, or the outcome under investigation, can take many different forms. These comprise social inclusion and equality metrics, economic impact metrics, resource efficiency metrics, climate resilience, innovation adoption rates, community well-being evaluations, gender inclusion metrics, and cross-cultural learning impacts. To enable researchers to evaluate the contributions of building projects to the SDGs with knowledge, the dependent variable chosen in these studies depends upon the specific study aims and areas of SDG alignment under consideration.

32. *Sustainable Buildings and Construction: Responding to the SDGs*. (17,February 2022). One Planet Network. https://www.oneplanetnetwork.org/knowledge-centre/resources/sustainable-buildings-and-construction-responding-sdgs

2.8. INDEPENDENT VARIABLES

The independent variable in earlier research examining how building projects correspond with the Sustainable Development Goals (SDGs) is context-dependent and varied. It changes according to the study goals and SDG alignment components being studied. These independent variables include cross-cultural considerations, organizational culture and leadership commitment, sustainable construction methods, project financing mechanisms, stakeholder engagement levels, project size and type, government policies and regulations, adoption of technological innovation, collaboration and partnerships, and educational initiatives (Graphing Tutorial, 2019).48 These independent variables are chosen by researchers to better understand their impact on how closely building projects adhere to the Sustainable Development Goals (SDGs) and to reveal the complex dynamics at work in sustainable construction practices.

2.9. THEORY AND THEORETICAL GROUNDING

Theory: The primary theory that serves as the foundational framework for this research is the **Triple Bottom Line (TBL)** theory.

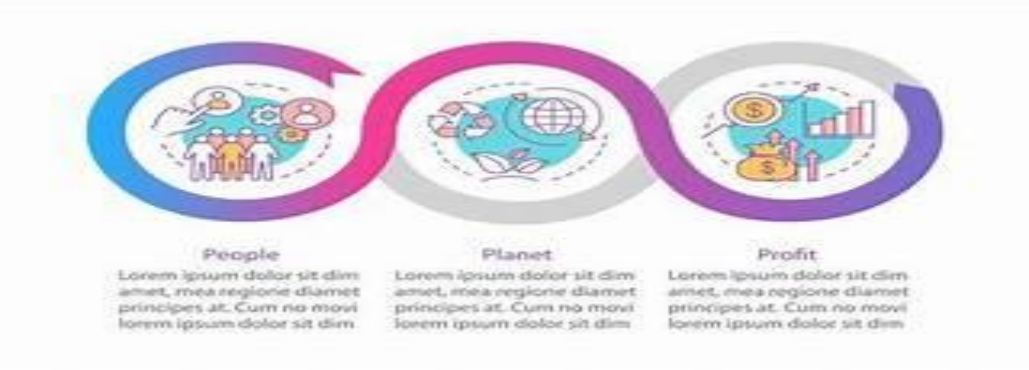

Figure 2Triple Bottom Line (TBL) theory.

Theoretical Grounding*:* According to John Elkington's TBL theory, businesses and industries should be assessed and held responsible for their effects on society and the environment as well as their financial performance (profit) (Nogueira, E., Gomes, S., & Lopes, J. M. 2023). The theory offers a strong and thorough basis for comprehending how building initiatives might support the Sustainable Development Goals (SDGs).

Because the TBL theory recognizes the interdependence of the economic, social, and environmental components, it is a good fit for this research. In the context of the building sector, it highlights the need for projects to be both financially feasible and positively impact social justice and environmental sustainability, in line with the SDGs.

A precise framework for evaluating how construction projects affect sustainable development is offered by the TBL theory. It is consistent with the goal of the research to investigate how the building industry might support social progress, economic development, and environmental conservation to fulfill the SDGs. The notion emphasizes how crucial it is for building projects to employ ecologically friendly materials, promote social inclusion, and manage resources responsibly.

The TBL hypothesis looks at how construction projects can concurrently benefit people, the environment, and profit. Within this TBL framework, it will examine the obstacles, chances, and creative strategies that construction industry stakeholders may use to improve their alignment with the SDGs. The goal of the research is to offer empirical support to the body of knowledge

by demonstrating how building projects may successfully use the TBL strategy to address the SDGs and achieve sustainable development.

[18]: Nogueira, E., Gomes, S., & Lopes, J. M. (2023). Triple Bottom Line, Sustainability, and Economic Development: What Binds Them Together? A Bibliometric Approach. *Sustainability*, *15*(8), 6706. MDPI

2.10. SUMMARY

This research delves into the construction sector's role in enhancing economic, social, and environmental dimensions by exploring the alignment of construction projects with the Sustainable Development Goals (SDGs). While the value of sustainable construction is broadly recognized, debates persist over issues such as achieving social justice in construction efforts, navigating the balance between growth and environmental conservation, and the economic viability of sustainable practices. Key emerging trends include Building Information Modeling (BIM), principles of the circular economy, and green building standards. This study sets itself apart by focusing on the social aspects of construction projects, examining the cross-cultural applicability of sustainable practices, and assessing the financial viability of innovative technologies. Grounded in the Triple Bottom Line (TBL) framework, this research underscores the interconnectedness of economic, social, and environmental factors in the construction industry. The aim is to provide concrete evidence on how construction projects can effectively implement the TBL concept to achieve sustainable development and meet the SDGs.

CHAPTER 3: METHODOLOGY

3. INTRODUCTION

This Research adopts a dynamic approach, emphasizing stakeholder involvement, a deep understanding of context, and adaptability within the fast-paced urban development of Bangladesh's construction sector. It seeks to support sustainable development by coordinating building projects with the Sustainable Development Goals (SDGs). To investigate this complex subject, the study combines case studies and interview with an inductive methodology and qualitative methodologies. Research ethics are crucial because they protect participant rights and promote openness. To promote sustainable growth in Bangladesh's construction industry, this research aims to close the knowledge gap between theory and practice by involving stakeholders and encouraging knowledge co-creation.

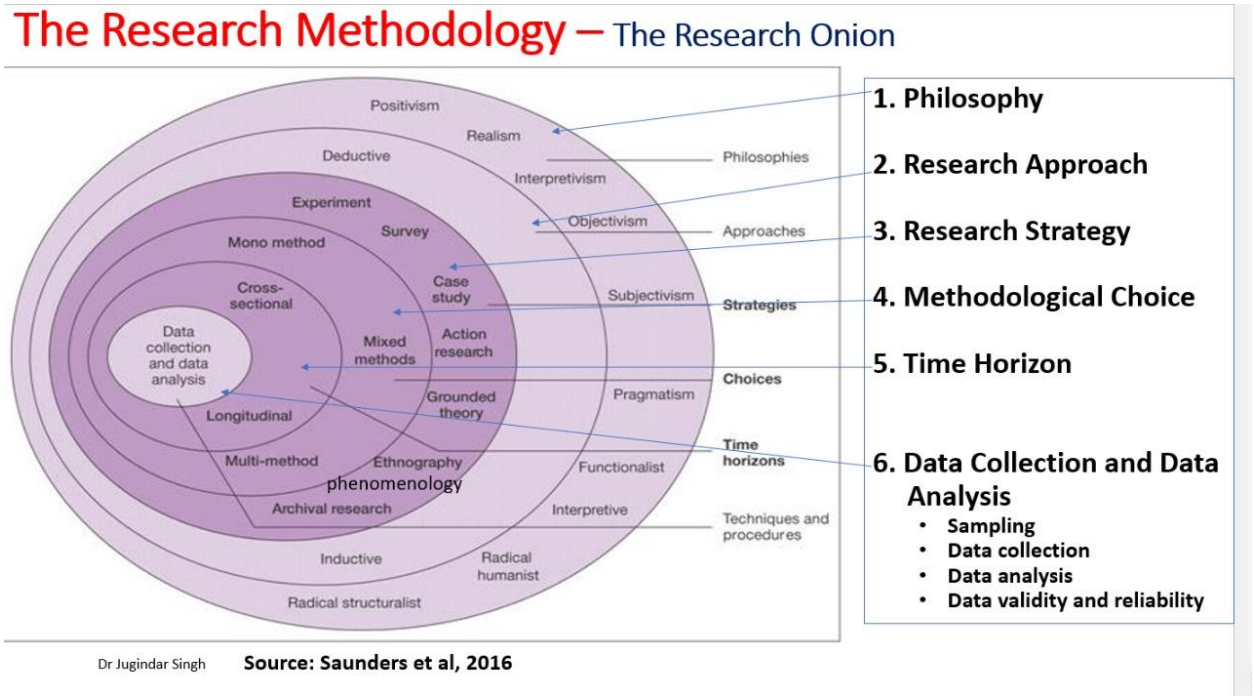

Figure 3 Research Onion

3.1. RESEARCH PHILOSOPHY

This study's research philosophy is based on an interactive strategy that emphasizes active participation and collaboration with a variety of stakeholders in Bangladesh's building industry. Stakeholder participation, knowledge co-creation, participatory action, contextual understanding, and flexibility are all highly valued components of interactive research (Bangladesh Construction Market | 2020–2027). [19]

This research underscores the vital role of stakeholder collaboration in pinpointing challenges, crafting solutions, and applying sustainable practices within construction projects. Recognizing the intricate nature of sustainable development, this study emphasizes the necessity of considering local nuances, adopting an inclusive strategy, and fostering positive transformations in the construction sector through joint efforts in solution development and sustainable practice implementation. The research philosophy centers on engaging stakeholders in a participatory process to jointly generate knowledge and work collaboratively toward sustainable development within Bangladesh's construction industry. Ultimately, the study aims to contribute to Bangladesh's broader sustainable development goals by providing an in-depth analysis of the opportunities and challenges in aligning construction projects with the Sustainable Development Goals (SDGs).

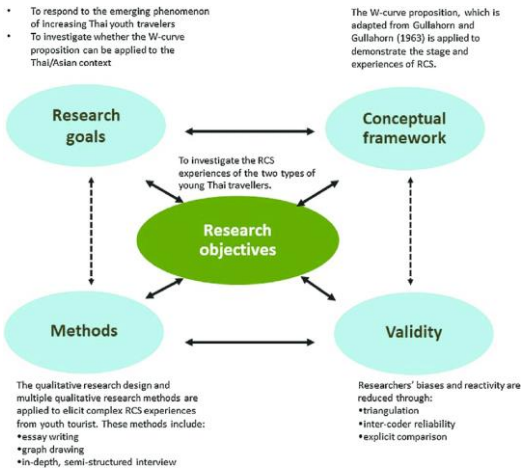

Figure 4 Interactive Research

[19]: Bangladesh Construction Market | 2020-2027

3.2. RESEARCH APPROACH

This study adopts an inductive research methodology, driven by the objective of exploring the intricate process of integrating construction projects with Sustainable Development Goals (SDGs) in the context of Bangladesh. This data-centric approach requires gathering and scrutinizing data and insights from participants within the construction sector of Bangladesh. Starting from specific observations and identifying patterns and recurring themes, the study seeks to build broader understandings and generate novel insights that are tailored to the unique challenges and opportunities of the construction industry. This method is particularly suited to the complexity and local nuances of the topic of SDG alignment, enabling the research to reveal fresh viewpoints and theoretical frameworks grounded in the specificities of Bangladesh.

The inductive approach's inherent flexibility and adaptability are ideally suited for a research paradigm where stakeholders are deeply involved in collaboratively generating knowledge and sustainable solutions (Dudovskiy, 2021)49. This methodology facilitates the organic development of insights and concepts, evolving in real time with input and feedback from stakeholders. Such a participatory and context-aware research approach is designed to foster sustainable development within Bangladesh's construction sector, aiming to synchronize with the overarching objectives of the SDGs while addressing the distinct challenges and prospects unique to the local setting.

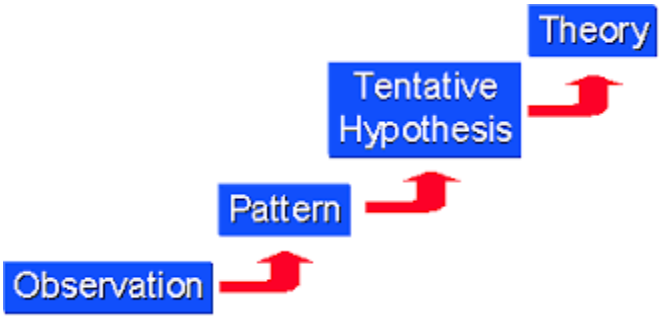

Figure 5 Inductive Approach

[20]: Investigating the causes of construction delay

3.3. METHODOLOGICAL CHOICE FOR RESEARCH

To deeply investigate how construction projects in Bangladesh align with the Sustainable Development Goals (SDGs), this study employed a qualitative research methodology exclusively. Opting for a qualitative monomethod underscores the value of exploring the complex, contextual, and nuanced aspects of the research theme. This approach involves gathering and examining qualitative data through various means, including interviews, focus group discussions, document reviews, and observational studies. These techniques are instrumental in achieving a detailed and layered comprehension of the challenges and opportunities inherent in integrating SDGs within the construction industry.

The qualitative methodology aligns perfectly with the intricate nature of the research topic, acknowledging the significant variation in challenges and opportunities that arise from differing local contexts. It facilitates the gathering of diverse viewpoints and experiences from various stakeholders in Bangladesh's construction sector, such as construction firms, governmental bodies, and community members (Chen, C., & Lok, K. L. 2021) [20]. Employing an inductive approach within this qualitative framework facilitates the organic emergence of patterns and themes from the gathered data. This method enables a thorough and contextually sensitive investigation into how construction projects can effectively advance the SDGs. The flexibility and adaptability inherent in this approach make it particularly well-suited for navigating the dynamic landscape of sustainable development within the construction sector, especially when confronting the unique challenges posed by the Bangladeshi context.

[20]: Fei, W., Opoku, A., Agyekum, K., Oppong, J. A., Ahmed, V., Chen, C., & Lok, K. L. (2021).

3.4. RESEARCH STRATEGY

Interview: Sekaran and Bougie (2016) highlight that qualitative research inherently involves interpretation, forming the cornerstone of basic qualitative research. The primary aim of conducting foundational research is to deepen understanding of specific phenomena and the

challenges encountered across various organizations and sectors, with the ultimate goal of devising solutions. Insights derived from such research often play a crucial role in addressing organizational challenges subsequently. In executing fundamental qualitative research, researchers gain an understanding of how participants perceive their experiences and construct their realities. This process of information gathering lays the groundwork for theory development, particularly in the field of management. Basic qualitative research typically involves collecting data through methods such as interviews, observations, and document reviews (Sekaran & Bougie, 2016).

Figure 6 Qualitative research strategy.

3.5. TIME HORIZON

This study employs a cross-sectional methodology, fitting seamlessly with its objective to explore the integration of construction projects with the Sustainable Development Goals (SDGs) in Bangladesh. By adopting a cross-sectional framework, this research is able to provide a contemporaneous snapshot of the alignment between construction projects and the SDGs (Stainton, H. 19, January 2019). This perspective sheds light on the current challenges and opportunities in the construction industry, offering timely insights for policy formulation and practical implementation. Given that the research encompasses various case studies and interviews, the cross-sectional approach to data collection and analysis is particularly

advantageous. This method ensures that the outcomes are relevant and actionable for those involved in construction management and policy development.

It is crucial to recognize the inherent temporal constraints of a cross-sectional approach, which provides a single-point-in-time view and may not capture the longitudinal dynamics of SDG alignment. Future research may require a longitudinal approach to delve into the evolving patterns and trends (Chat, L. 2 June 2016). Nevertheless, the cross-sectional design is apt for the current study's goals, which focus on delivering a detailed examination of SDG integration in Bangladesh's construction industry and supporting prompt policy and procedural changes.

Link:**21.** Chat, L. (2 June 2016).

26Stainton, H. (19, January 2019).

3.6. DATA

To collect data, comprehensive details from each case study will be compiled, encompassing project documents, discussions with stakeholders, and visits to project sites. This compilation will cover the objectives of the project, methodologies in design and construction, sustainability initiatives, faced challenges, and results related to the SDGs. Nevertheless, it is noted that interviews stand as the predominant technique for gathering insights on a subject of interest (Sekaran & Bougie, 2016).

3.7. INTERVIEWS

In qualitative research, interviews tend to be open-ended and less rigid, reflecting the understanding that individuals perceive their worlds distinctively. This study utilized semi-structured online interviews with key stakeholders to gather data. Positioned between the poles of structured and unstructured interviews (Merriam, Qualitative Research, 2009), semi-structured interviews allow for predetermined themes and questions to guide the conversation, albeit with the flexibility to adapt as per each participant's responses. This flexibility enables the omission or modification of certain questions about the SDGs pertinent to the study's focus. Furthermore, the

sequencing of questions was adjusted to maintain a natural dialogue flow. Given the dynamic nature of business contexts, supplementary inquiries were introduced during the interviews to delve deeper into the study's subject matter and aims (Saunders, Lewis, and Thornhill, 2009)

3.8. DATA COLLECTION

In this qualitative study, semi-structured interviews were conducted, supplemented by additional questions to delve deeper into the issue being studied. The interviews commenced with a broad introductory question, leading into more specific sub-questions. Probing techniques were employed to encourage participants to elaborate on their initial responses or provide more detailed explanations of their views. The semi-structured nature of the interviews allowed for questions centered around experiences and behaviors, such as "Can you share your level of familiarity with the Sustainable Development Goals (SDGs) and their significance for Bangladesh's construction sector?", as well as interpretive queries like "What do you perceive as the major obstacles for the construction industry in meeting specific SDGs?" (Merriam & Tisdell, Qualitative research a guide to design and implementation, 2016). To gain further insights, follow-up prompts like "Could you expand on that?" were used (Merriam, Qualitative Research, 2009). Additionally, all interviews were recorded online to ensure comprehensive data capture for analysis, with note-taking serving as a backup measure (Creswell, 2014). Audio-recording the interviews also enabled researchers to concentrate more intently on the discussion, capturing not just the verbal responses but also the nuances of the participants' expressions (Saunders, Lewis, and Thornhill, 2019).

28. *The Best 10 Qualitative Data Analysis Software in 2019*. Hubspot.com.

3.9. DATA PROCESSING

The collection of qualitative data results in a significant volume of information. The researcher utilized coding and categorization techniques to structure this data efficiently. Through coding, the researcher was able to detect patterns, discern connections, and organize the data into meaningful categories, which facilitated the derivation of insightful conclusions. Categorization involves the systematic arrangement and classification of coded units, aiding in identifying patterns and relationships within the data (Sekaran & Bougie, 2016).

In this qualitative research, the gathered data were promptly transcribed to reduce the transcription backlog. Following this, the data were organized to succinctly capture the findings of the research. This organization was achieved through manual coding, supplemented by using Microsoft Word (Cresswell, 2014; Saunders, Lewis, & Thornhill, 2009). To enhance the credibility of the research findings, it was essential to conduct checks for validity and reliability. Ensuring qualitative validity entails confirming the correctness of the research outcomes by applying certain techniques, whereas qualitative reliability is about maintaining the uniformity of the researcher's approach in various studies. A suggested method for enhancing reliability is to meticulously review the transcripts to identify and correct any inaccuracies that might have occurred during transcription (Creswell & Creswell, 2018).

3.10. DATA ANALYSIS

Probing questions such as "Could you elaborate on that?" were employed to deepen the understanding (Merriam, Qualitative Research, 2009). All interviews were conducted online and recorded to ensure comprehensive data capture for subsequent analysis, with note-taking as an additional measure of accuracy (Cresswell, 2014). Audio recording of the interviews also allowed researchers to remain attentive and capture both the verbal responses and the nuances of the participants' expressions (Saunders, Lewis, and Thornhill, 2009).

The third stage of the process involved the coding of the collected data. Coding entails segmenting the data into text or image fragments and labeling these segments with a category name in the margin before initiating the information gathering. The fourth stage utilized the coding framework to construct a detailed analysis of the setting. The fifth step refined the presentation of the description and themes within the qualitative study, typically conveyed through narrative passages. The sixth and final step in the data analysis involved scrutinizing the qualitative research findings or data to draw meaningful conclusions (Cresswell, 2014).

3.11. ETHICAL CONSIDERATION

This study is guided by important ethical considerations. All participants will be required to give informed consent, ensuring they are fully aware of the research objectives and their involvement (Hassan, M. 11,April, 2023). Measures will be taken to strictly protect the anonymity, privacy, and confidentiality of participant data. The aim is to balance the potential benefits of the research

to stakeholders with any possible adverse effects, maintaining transparency and neutrality throughout the process. Compliance with ethical permissions and established ethical guidelines is mandatory, along with continuous oversight to uphold ethical standards. By adhering to these principles, the research seeks to safeguard participants' rights and contribute valuable insights into sustainable development within Bangladesh's construction industry.

27. Hassan, M. (11,April, 2023). *Ethical Considerations - Types, Examples and Writing Guide*. Research Method.

3.12. CONCLUSION

This research evaluates how construction projects in Bangladesh align with the Sustainable Development Goals (SDGs) by adopting an interactive framework that prioritizes stakeholder engagement, collaborative knowledge generation, and sensitivity to the local context. Utilizing an inductive approach and qualitative methods, the study aims for a comprehensive and nuanced understanding of this complex issue. Through case studies and surveys, the research will explore the challenges and prospects for integrating SDGs within Bangladesh's construction sector. Ethical considerations are fundamental to this study, with a commitment to uphold participants' rights, ensure transparency, and maintain fairness throughout the research process. By adhering to these ethical guidelines and employing these research methodologies, the study aspires to advance sustainable development within Bangladesh's construction industry by fostering active participation and shared knowledge creation.

CHAPTER 4: DATA COLLECTION METHOD

4. INTRODUCTION

This chapter delves into an in-depth analysis of how construction projects in Bangladesh align with the Sustainable Development Goals (SDGs). Drawing upon the insights gathered from participants, this section aims to thoroughly explore the current understanding and attitudes towards the SDGs within the Bangladeshi construction sector. Authored by Zainab Alridha et al., in 2023, the study leans on firsthand experiences shared by industry participants during interviews. These participants were encouraged to reflect on their experiences and insights regarding the SDGs in their professional capacity.

Semi-structured interviews, designed with open-ended questions, facilitated a guided yet flexible discussion around three core research inquiries. This approach allowed for a comprehensive exploration of the precursors and obstacles influencing SDG-aligned construction practices, as well as the industry's expectations regarding the achievement of these goals. The analytical framework of the study was built on the thematic analysis of transcribed interviews, where themes were identified and categorized based on the participants' direct responses.

Hence, this chapter unveils the synthesized findings from the meticulously coded interview data. It highlights the key themes and categorizes them according to the participants' verbatim responses, providing a nuanced understanding of the intersection between construction practices and SDG alignment in Bangladesh.

4.1. PRESENTATION OF FINDINGS

This study engaged nine professionals who are actively involved in construction projects within Bangladesh. Creswell and Clark (2018) emphasize that transcripts from interviews and comprehensive observational notes can span hundreds of pages, all of which demand thorough examination, detailed interpretation, and intricate synthesis. Qualitative analysis aims to uncover patterns, recurring themes, significant categories, and emerging concepts, thereby offering a deep understanding of the studied phenomena or processes. (Hassan, M. 3, July 2022)[36] Through the meticulous study of detailed descriptions, fresh perspectives often emerge, and the analysis of intertwined themes can provide valuable insights.

The age range of the participants spanned from 30 to 60 years, each with a minimum of five years of professional experience and at least forty hours of work per week. This demographic information was gathered for purposive sampling, aiming to facilitate a smoother initiation into the semi-structured interview sessions. To offer a clearer view of the sample demographics under consideration, Table 6 presents the detailed demographic information of the participants.

Link : (Hassan, M. 3, July 2022)36

Name	Role	Email Address	Years of working experience	Job Sector	Average working hours per week
Ashik Mahmud	Owner of Mohammad and Noman Supply Agency,Gazipur,Dhaka,Bangladesh.	ashikmahmud@gmail.com	7	private	60
ATM Nowsher Ali	Executive CRM T K Bhaban (12th Floor) 13 Karwan Bazar,Dhaka 1215,Bagladesh.	nowsherali@gmail.com	11	private	50
Farid Uddin	Assistant Director, Bangladesh Scouts, Dhaka,Bangladesh.	faridbdscouts@gamil.com	10	Govt.	48
Md. Atikur Rahman	Sub-Assistant Engineer (Civil) Loal Government Engineering Department (L.GED)	ataur6018@gamil.com	6	Govt.	40
Md.Tusher Ahmed	Sub assistant engineer (civil) Roads and highways,Natore.	rakibulrhd@gamil.com	8	Govt.	40
Sha Nawz Chawdhury	Supervisor, Urban Foundation,Dhaka, Bangladesh.	s.nawaz@gamil.com	5	private	50
Md. Dabirul Islam	Sub-Assistant Engineer (Civil) DPHE,Mnikganj	dabirulce@gmail.com	7	Govt.	40
Md.Kawser Ali	Site Engineer,Bhagmara Upazila Model Mosjid Rajshahi,Mim development engineering limited	kingkawsero903@gmail.com	8	private	50

Figure 7.Data of the participants.

Participants' Sector of Operation

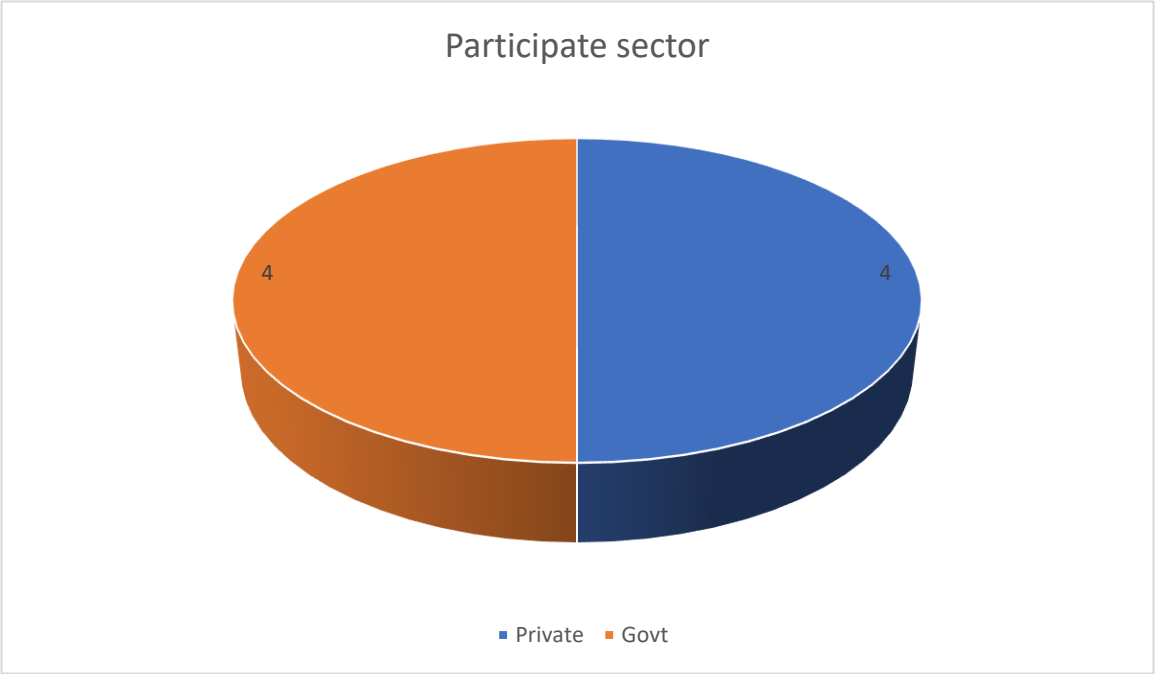

Figure 8. Participants' Sector of Operation

From Figure 8 above, it can be noted that the 50% came from Govt participants, 50% came from theprivate sector.

4.2. DATA COLLECTION FOR INTERVIEW

Data was collected between December 2023 and January 2024. Data were acquired using a variety of approaches. In-depth participant interviews were done via the Zoom platform. Each participant was asked semi-structured, open-ended questions, and the interviews were recorded with their permission. The interviewer collected clarifying observational field notes during the recorded interview, as well as extra notes for the non-recorded section before and after the recording. Accurate transcription ensures a clear understanding of participants' responses. (How to Conduct Qualitative Research Step by Step, n.d.) 35 The interviewer answered clarifying questions to gain a thorough grasp of the participants' responses.

The data was collected and analyzed qualitatively, which resulted in the themes that

emerged. The data collection process for the research project included the following:

• The study setting allowed for semi-structured and open-ended interview inquiries, as well as narrative inquiries.

• Participants were free to discuss their lived experiences without interruption. The usage of an audio recording device facilitated the transcription of the participants' sessions and helped to clarify the stated material.

The interview transcripts provided a thorough comprehension of the study questions' responses. Data from the interviews were analyzed using NVivo 14 software to identify emerging themes and patterns. The increased software coding of the research data included listing and grouping data, decreasing, and deleting data, and producing thematic groups, clusters, and secondary topics.

According to Creswell (2009), using manual analysis to sort, organize, and locate words in a qualitative study can be time-consuming and arduous. Creswell noted that data analysis utilizing a qualitative method may comprise six steps.

4.3. DATA TRANSCRIPTION

Following each interview, the audio files were checked, and transcription was completed quickly. After each transcription was completed, the audio file was played again and compared to the transcribed text. To ensure the correctness and authenticity of the transcripts, the audio recording was listened to a second time and compared to the transcribed text. Transcriptions were submitted to participants for approval to verify that their ideas and language were appropriately captured. While responding was not required, all participants agreed that the transcription accurately reflected their expressed opinions.

Each semi-structured interview transcript relevant to the research topic was then created based on the responses. The horizontalization process enhanced the reduction and deletion of redundant, interchangeable, and double-meaning statements. Expressions made during questioning and interviews were documented and evaluated. Statements with multiple meanings, as well as redundant or interchangeable points of view, were removed. Each expression was reviewed to ensure that it could be abstracted and labeled.

The interviews were transcribed in order of receipt. The transcripts and data collected related to the participants' contact information. Once the interview data was collected, it was analyzed for more understanding. The transcribed data were then analyzed jointly to ensure a comprehensive understanding of the material. Notes were taken and utilized to mark recurring themes and patterns, which served as the foundation for the coding system in the NVivo 14 program.

Data were acquired by analyzing and reviewing the transcription, both individually and collectively.

During the study, transcripts from eight interviews were examined. The study used the qualitative research software NVivo 14 to import the transcribed interviews and corroborate the data analysis that was previously established using the conceptual framework provided in Chapter 3. The qualitative technique using NVivo 14 software discovered themes related to educational level, job performance, political beliefs, salaries, and family values. Lumivero. (24 May,2023) 37 The major goal was to guarantee that the data gathered and recorded answered the original study questions. The data were classified using the NVivo 14 program and then divided into descriptive units. Data gathered during the interviews were analyzed, resulting in the collection of diverse perspectives from participants as they described their lived experiences, attitudes, beliefs, and opinions about the impact of a construction project. The subsequent step in the data analysis involved deciphering the information collected from the qualitative interviews to discern its significance. This step entailed the systematic organization and detailed description of the data, alongside a thorough examination of how the findings addressed the research questions posed by the study. In this second phase of analysis, the focus was on refining the interview transcripts and placing them within the context of the research. The data, derived from responses to open-ended questions, were aggregated to craft a collective portrayal of the participants' perspectives, beliefs, and attitudes. From the patterns that surfaced, an in-depth understanding of the impact of women's limited representation in leadership roles was developed.

Link: (Lumivero 24 May,2023) 37

4.4. ANALYSIS WITH RESEARCH QUESTIONS

In response to the Interview Question participants shared their experience according to their working experience.

Those interview questions covered the research question 1:

- How familiar are you with the Sustainable Development Goals (SDG 9: Industry, Innovation, and Infrastructure & SDG 11: Sustainable Cities and Communities) and their relevance to the construction industry in Bangladesh?
- What are the current sustainability practices and initiatives implemented in construction projects in Bangladesh? How do these practices contribute to SDG-11 alignment?
- How do you measure or assess the impact of construction projects on SDG alignment? Are there any specific indicators or metrics used?
- What are the potential benefits or advantages of aligning construction projects with SDGs in Bangladesh? How can SDG-9 alignment contribute to sustainable development in the country?
- How can the construction sector in Bangladesh effectively collaborate with other stakeholders, such as architects, engineers, labor unions, and local communities, to enhance SDG-9 alignment in construction projects?

Question 1: Research Question
Question 1: How can the construction sector in Bangladesh effectively align with specific Sustainable Development Goals (SDGs) to contribute to the country's sustainable development agenda?

The research question "How can the construction sector in Bangladesh effectively align with specific Sustainable Development Goals (SDGs) to contribute to the country's sustainable development agenda?" is critical for understanding the intersection between sustainable development and the construction industry in Bangladesh. Participant's insights provide valuable perspectives on this topic.

Alignment with SDG 9 and SDG 11:

Participant emphasizes the importance of SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities) for the construction sector in Bangladesh. They note, "achieving SDG 9 involves improving infrastructure, promoting technological innovation, and ensuring that industrialization is environmentally sustainable," highlighting the sector's role in economic development and the need for sustainable practices. Similarly, for SDG 11, Participant points out the relevance of making "cities and human settlements inclusive, safe, resilient, and sustainable," especially in the face of rapid urbanization.

Challenges in Alignment:

The participant identifies several challenges in aligning the construction sector with these SDGs. Key obstacles include "Limited Technological Adoption," "Resource Constraints," and the "Environmental Impact" of traditional construction methods. For SDG 11, challenges like "Unplanned Urbanization" and "Infrastructure Gaps" are significant. Participant suggests that addressing these challenges "requires a multi-stakeholder approach involving governments, the private sector, communities, and international organizations."

Barriers to Integration:

Further exploring the barriers, Participant points out a "Lack of awareness and understanding among stakeholders" and "Regulatory Constraints" as major hurdles. These barriers necessitate "a concerted effort from the government, private sector, and civil society to create an enabling environment."

Sustainability Practices and Initiatives:

On a positive note, Participant highlights various sustainability practices being implemented in the construction sector, such as "Green Building Certification" and "Use of Sustainable Materials." These practices not only align with SDG 11 but also contribute to broader sustainability goals by addressing "key aspects of sustainable urban development."

Measuring and Assessing Impact:

To measure the impact of construction projects on SDG alignment, the Participant suggests using indicators like "Green Building Certifications" and "Carbon Footprint," among others. They emphasize the importance of establishing baseline data and regularly monitoring progress.

Policy and Regulation:

The effectiveness of policies and regulations promoting SDG alignment varies, with Participant noting the need for policies to be "adaptable and subject to periodic review."

Ethical Considerations:

In researching SDG alignment, ethical considerations such as "Informed Consent" and "Community Engagement" are crucial, according to Participants. These considerations ensure responsible and meaningful study of construction projects' alignment with SDGs.

Participants' insights shed light on the complexities of aligning the construction sector in Bangladesh with SDGs 9 and 11. Addressing the identified challenges and barriers, implementing sustainability practices, and adhering to ethical considerations are essential steps towards achieving this alignment. Collaboration among all stakeholders and continuous evaluation of policies and practices are key to advancing Bangladesh's sustainable development agenda through the construction sector.

Those interview questions covered the research question 2:

- In your opinion, what are the main challenges faced by the construction sector in aligning with SDG 9: Industry, Innovation, and Infrastructure & SDG 11: Sustainable Cities and Communities?
- What are the barriers or obstacles that hinder the integration of SDG9 & 11-aligned opportunities into construction projects in Bangladesh?
- Are there any specific policies or regulations in place to promote SDG alignment in the construction sector? How effective are these policies in practice?
- What are the challenges faced by construction stakeholders in integrating SDG-9-aligned opportunities into their projects, and how can these challenges be effectively addressed?

Question 2: Research Question
Question 2: What are the challenges faced by construction stakeholders in integrating SDG-aligned opportunities into their projects, and how can these challenges be addressed?

The research question "What are the challenges faced by construction stakeholders in integrating SDG-aligned opportunities into their projects, and how can these challenges be addressed?" is addressed comprehensively by Participant's insights.

Challenges in SDG Alignment:

Participant identifies several challenges that construction stakeholders face in integrating SDG-aligned opportunities into their projects. These challenges include:

Limited Technological Adoption: "The construction industry traditionally lags in adopting innovative technologies," highlighting resistance to change and a gap in leveraging modern solutions that align with SDGs.

Resource Constraints: Many projects, especially in developing regions like Bangladesh, "face resource limitations," which can hinder the implementation of sustainable and innovative solutions.

Skills and Education: There is a noted "need for skilled labor and education in modern construction techniques," including green building practices and the use of advanced technologies.

Environmental Impact: Traditional construction methods have "a significant environmental footprint," and "adapting to more sustainable materials and practices poses a challenge," indicating a need for a shift towards more eco-friendly approaches.

Infrastructure Gaps and Unplanned Urbanization: Issues like "many cities lack essential infrastructure" and the challenges of rapid urbanization exacerbate the difficulty in creating sustainable communities.

Affordability and Community Engagement: The participant points out that ensuring "affordability of housing" and "climate change resilience" requires significant investment, and

there are challenges when "communities are not adequately involved in decision-making processes."

Addressing the Challenges:

To overcome these challenges, Participant suggests a multi-faceted approach:

Multi-Stakeholder Collaboration: It is essential for "stakeholders, including the government, private sector, and civil society, to collaborate" in implementing strategies that align with SDGs, emphasizing the importance of collective action.

Raising Awareness and Capacity Building: Addressing the "lack of awareness and understanding among stakeholders" and investing in "capacity building" are critical steps towards creating an enabling environment for SDG-aligned practices.

Policy and Regulatory Support: The participant highlights the need for "adaptable" policies and regulations that are subject to periodic review to remain relevant and effective.

Ethical Considerations: Ensuring "informed consent," "community engagement," and "transparency" are vital in conducting research and implementing projects that align with SDGs.

Participant's insights shed light on the multifaceted challenges faced by construction stakeholders in integrating SDG-aligned opportunities into their projects. Addressing these challenges requires collaborative efforts, policy support, capacity building, and a commitment to ethical practices. By tackling these issues, the construction sector in Bangladesh can contribute significantly to the country's sustainable development agenda, aligning with the broader goals of the SDGs.

Those interview questions covered the research question 3:

- How do you perceive the role of stakeholders, such as construction companies, government agencies, NGOs, and local communities, in promoting SDG-11 alignment in the construction sector?
- What ethical considerations are important to address when conducting research on the alignment of construction projects with the SDG9 & 11 in Bangladesh?

Question 3: Research Question
Question 3: What are the best practices adopted by successful construction projects in Bangladesh that effectively align with specific SDGs, and how can these practices be replicated across the industry?

To analyze the insights provided by the participants in the context of the research question, "What are the best practices adopted by successful construction projects in Bangladesh that effectively align with specific SDGs, and how can these practices be replicated across the industry?" delve into the themes and strategies highlighted in their responses.

Ethical Considerations in Research and Implementation:

Respecting Local Communities and Cultures:

Participant 1 emphasizes, "Ethical considerations in researching SDG alignment in construction projects include respecting the rights of local communities, ensuring transparency, and avoiding any harm to the environment."

Building on this, Participant 3 mentions, "Informed Consent, Community Engagement, ... Cultural Sensitivity, and Open Communication."

These points underline the necessity for projects to prioritize community engagement and ensure that the local culture and values are respected, facilitating alignment with SDGs 9 and 11.

Ensuring Environmental Sustainability:

The focus on "avoiding any harm to the environment" (Participant 1) and ensuring projects adopt practices that "prioritize community well-being in research and project implementation" (Participant 2) points towards the essential ethical consideration of environmental protection.

Stakeholder Collaboration for SDG Alignment:

Multi-stakeholder Collaboration:

Participant 1 and Participant 2 both highlight the role of stakeholders in promoting SDG-11 alignment, noting the necessity of "Collaboration...to drive sustainable practices" and that "Stakeholders play a pivotal role."

This emphasizes the critical need for collaboration among construction companies, government agencies, NGOs, and local communities to ensure the success and sustainability of construction projects.

Engagement in the Decision-making Process:

The emphasis on collaboration and community engagement implies involving various stakeholders, including local communities, in the planning and execution phases, which is crucial for aligning projects with SDGs.

Practices for Sustainable Development:

Adopting Innovative and Sustainable Construction Techniques:

Although not directly quoted, the ethical considerations and emphasis on sustainability inferred from the participants' responses suggest the importance of adopting innovative construction methods that are environmentally friendly and sustainable.

Comprehensive Impact Assessments:

Participant 3's detailed list of ethical considerations, including "Long-Term Impact Assessment" and "Compliance with Regulations," points towards the necessity of understanding the broader impacts of construction projects, ensuring they contribute positively to sustainable development goals.

Implementing Regulations and Policies:

The call for "Collaboration" and engagement with "government agencies" (Participant 1 and 2) indicates the importance of a supportive regulatory framework that mandates or encourages sustainability in construction practices.

The synthesis of participants' responses highlights several key best practices for aligning construction projects with SDGs in Bangladesh: prioritizing ethical considerations like community respect and environmental sustainability, fostering stakeholder collaboration, and adopting sustainable construction techniques. These practices underscore the necessity of a collective effort among all industry stakeholders, supported by regulatory policies, to replicate success across the construction sector.

4.5. DATA ANALYSIS PROCEDURES

This study employed a qualitative research approach to delve into the attitudes, beliefs, and viewpoints of the participants. Semi-structured, individual interviews were utilized to explore the participants' experiences in depth. The qualitative interviews aimed to construct knowledge frameworks through reflective analysis and interpretation of the participants' insights. The data derived from these interviews were meticulously analyzed to gain a deeper understanding of the meanings behind the participants' experiences. The analysis of the qualitative data concentrated on identifying overarching themes emerging from the participants' attitudes, beliefs, and perspectives. The NVivo 14 software proved effective in managing the qualitative data analysis, facilitating the transcription, coding, analysis, and interpretation of the data collected from the semi-structured interviews. Participants were queried about their perceptions of the impacts, revealing their willingness to openly share their experiences, thoughts, and opinions.

The process of conducting reflexive thematic analysis involved the following steps:

Becoming thoroughly acquainted with the data.

Generating initial codes.

Developing themes.

Reviewing and refining themes.

Defining and labeling themes.

Compiling the final report.

In the initial phase of reflexive thematic analysis, the researchers immersed themselves in the data by transcribing the interviews. Following transcription, the researcher dedicated time to carefully read through the transcripts to acquire a holistic understanding of the content shared by the interviewees (Guzman, J., 4 December 2023). [38] Subsequently, the researcher moved on to generate initial codes, marking the beginning of the thematic analysis in NVivo 14.

Link: (4 December 2023, Guzman, J.).[38]

Name	Files	References
Berenice of stakeholder collaboration	2	2
Berrens of technology capacity	2	2
Berrens of time	4	4
Berrens of unclear farmwork	6	8
Berrens to a new adaptation	5	8
Barrens of awareness	8	10
Barriers of finance	8	8
Benefits of SDG 11	2	2
Benefits of SDG 9	6	7
Ethical consideration	4	5
Familiar with SDG	8	12
Infrastructure improvement	1	1
Key factors to success	4	4
Measurement tools	3	5
Policies	7	7
Practices and Initiatives in SDG 11	5	13
Relevance to construction	1	1
Role of stakeholder	3	3
SDG 11 Challenges	8	8
SDG 9 Challenges	8	11
Stakeholder challenges	5	5
Stakeholder challenges effectivity	5	5
Successful project	6	6

Description of the Participants

In eight participants 5-6 years' experience is in two participants, 7-7 years' experience in four participants, and 10-11 years' experience in two participants.

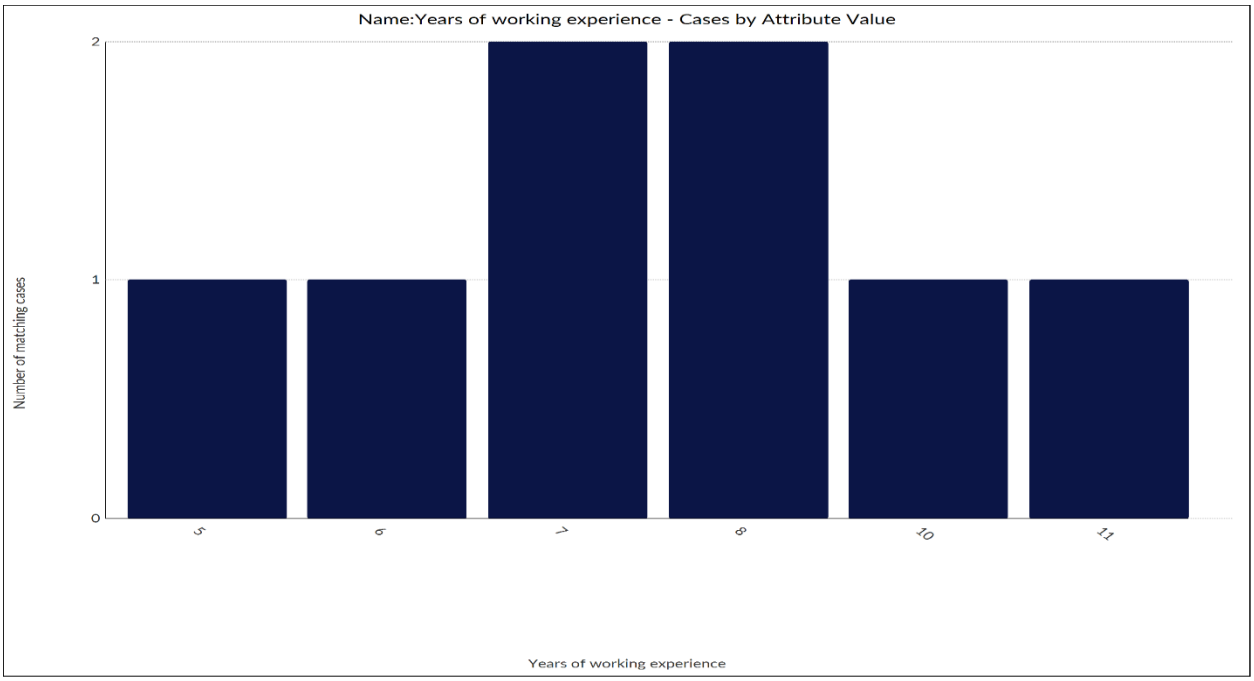

Figure 9. Participants' years of work experience.

Of eight participants, three are working for an average of 40 hours a week, one is 48 hours, three are working for an average of 50 hours and one is working for an average of 60 hours.

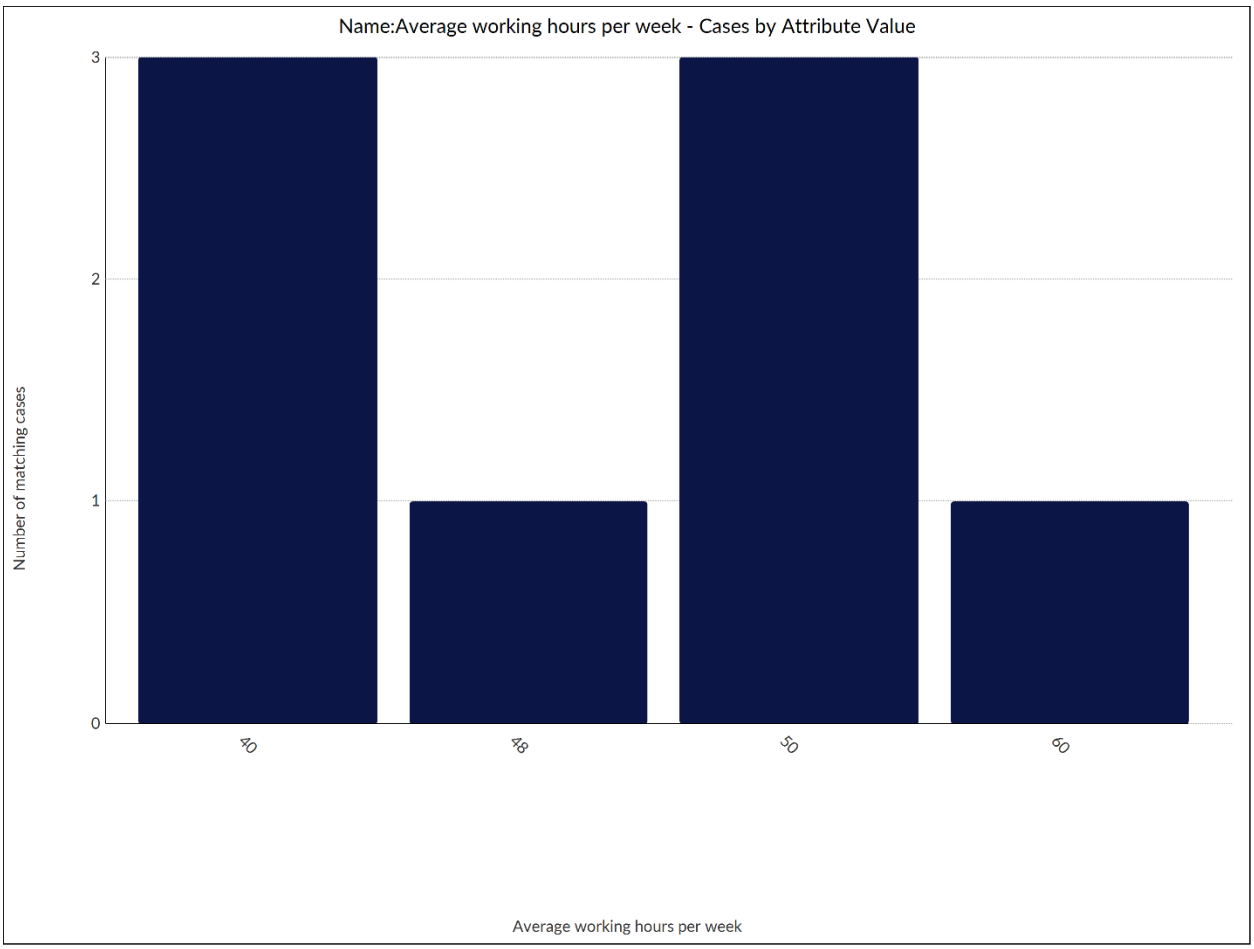

Figure 10.Participants average working hours per week.

Of eight participants, 50% are from the sector and 50% are from the Private sector.

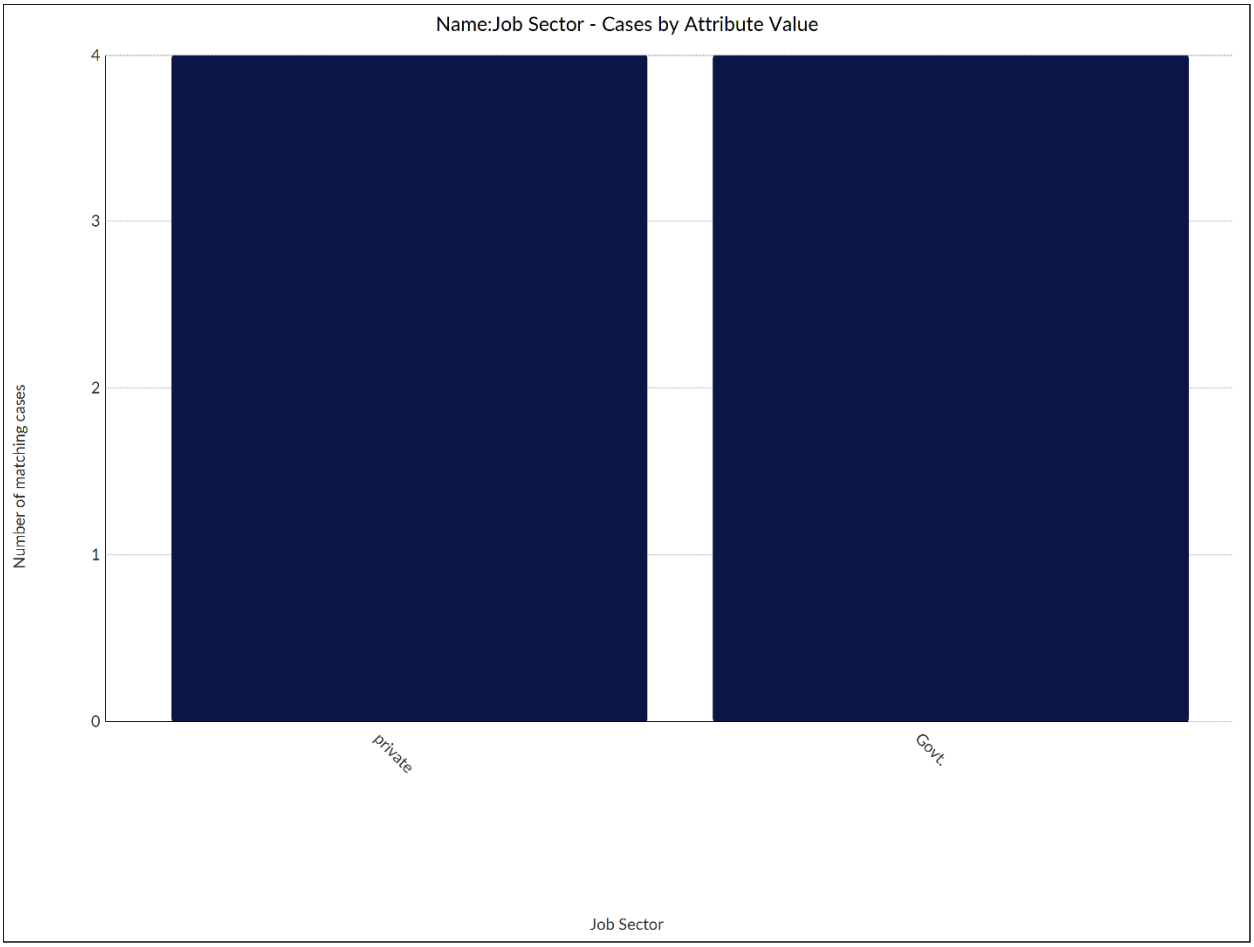

Figure 11. Participants work sectors.

Results

The main themes that emerged after conducting the reflexive thematic analysis process included

Efficiency of SDG

Challenges with opportunities

Best Practices.

Name	Files	References
Efficiency of SDG	8	44
Challenges with opportunities	8	79
Best Practices	7	14

Efficiency of SDG

Initial Themes of 'Efficiency of SDG

Name	Files	References
Efficiency of SDG	8	44
Relevance to construction	1	1
Practices and Initiatives in SDG 11	5	13
Measurement tools	3	5
Key factors to success	4	4
Familiar with SDG	8	12
Benefits of SDG 9	6	7
Benefits of SDG 11	2	2

Coverage file for Efficiency of SDG

	Name	In Folder	References	Coverage
	Ashik Mahmud	Files\\interview transcript	4	14.20%
	ATM Nowsher Ali	Files\\interview transcript	5	15.59%
	Farid Uddin	Files\\interview transcript	7	19.67%
	Md. Atikur Rahman	Files\\interview transcript	4	17.20%
	Md. Dabirul Islam	Files\\interview transcript	2	14.85%

	Md. Tusher Ahmed	Files\\interview transcript	3	13.67%
	Md.Kawser Ali	Files\\interview transcript	5	20.49%
	Sha Nawaz Chowdhury	Files\\interview transcript	14	29.00%

Participants Answer analysis:

<Files\\interview transcript\\Ashik Mahmud> - § 4 references coded [14.20% Coverage]

Reference 1 - 2.25% Coverage

1. aware of the Sustainable Development Goals, particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities).

Reference 2 - 4.29% Coverage

2. Current sustainability practices in Bangladesh's construction projects involve the use of eco-friendly materials, energy-efficient designs, and waste reduction measures. These practices contribute to SDG-11 alignment by promoting resilient infrastructure and environmentally conscious urban development.

Reference 3 - 3.64% Coverage

3. Impact assessment involves evaluating factors such as energy efficiency, waste reduction, and community well-being. Specific indicators and metrics may include carbon footprint reduction, social impact assessments, and adherence to green building standards.

Reference 4 - 4.02% Coverage

4. Aligning construction projects with SDGs in Bangladesh brings numerous benefits, including enhanced resilience, improved living conditions, and economic growth. SDG-9 alignment contributes to sustainable development by fostering innovation, infrastructure development, and job creation.

<Files\\interview transcript\\ATM Nowsher Ali> - § 5 references coded [15.59% Coverage]

Reference 1 - 3.82% Coverage

well-versed with the Sustainable Development Goals, especially SDG 9 and SDG 11, and their significance in the context of the construction industry in Bangladesh.

Reference 2 - 4.24% Coverage

Current practices include the adoption of green building standards, waste reduction, and renewable energy integration. These initiatives contribute directly to SDG-11 alignment.

References 3-4 - 4.92% Coverage

We measure impact through a comprehensive evaluation that considers environmental, social, and economic factors. Key indicators include resource efficiency, community well-being, and economic contributions.

Reference 5 - 2.62% Coverage

SDG-9 alignment contributes to sustainable development by fostering innovation and infrastructure development.

<Files\\interview transcript\\Farid Uddin> - § 7 references coded [19.67% Coverage]

Reference 1 - 1.47% Coverage

Sustainable Development Goals (SDGs), including SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities).

Reference 2 - 1.48% Coverage

SDG 9 involves improving infrastructure, promoting technological innovation, and ensuring that industrialization is environmentally sustainable.

Reference 3 - 2.38% Coverage

SDG 11 aims to make cities and human settlements inclusive, safe, resilient, and sustainable. In the context of Bangladesh, where rapid urbanization is occurring, SDG 11 is highly relevant to urban planning and construction activities.

Reference 4 - 3.36% Coverage

Green Building Certification, Urban Planning and Zoning Regulations, Waste Management Practices, Affordable Housing Projects, Use of Sustainable Materials, Public Transportation Infrastructure, Resilient Infrastructure Design,Community Engagement and Participation,Energy-Efficient Building Design,Technology Adoption.

Reference 5 - 1.76% Coverage

Measuring the impact of construction projects on Sustainable Development Goals (SDGs), such as SDG 11 and SDG 9, often involves using a combination of indicators and metrics.

Reference 6 - 8.05% Coverage

Green Building Certifications:

Indicators: Certification levels (LEED, EDGE, etc.).

Carbon Footprint:

Indicators: Total greenhouse gas emissions.

Waste Management:

Indicators: Percentage of construction waste recycled or reused.

Public Transportation Metrics:

Indicators: Expansion of public transportation infrastructure.

Resilience to Climate Change:

Indicators: Implementation of climate-resilient infrastructure.

Community Engagement:

Indicators: Level of community participation in project planning.

Energy Efficiency:

Indicators: Adoption of energy-efficient technologies.

Technology Adoption:

Indicators: Use of advanced construction technologies.

Social Impact Metrics:

Indicators: Employment generation, skills development, and community well-being.

Reference 7 - 1.17% Coverage

baseline data, set specific targets, and regularly monitor and report progress using these indicators and metrics.

<Files\\interview transcript\\Md. Atikur Rahman> - § 4 references coded [17.20% Coverage]

Reference 1 - 5.97% Coverage

In Bangladesh, the Sustainable Development Goals (SDGs), particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities), hold significant relevance to the construction industry. SDG 9 underscores the imperative for resilient infrastructure and inclusive industrialization, while SDG 11 emphasizes sustainable urbanization and community development.

Reference 2 - 2.94% Coverage

Given Bangladesh's dynamic urban growth and infrastructure demands, these goals serve as pivotal guidelines for fostering sustainable practices and advancements within the construction sector.

Reference 3 - 2.12% Coverage

• Government Leadership:

• Community Engagement:

• Public-Private Partnerships:

• Environmental Considerations:

• Capacity Building:

Reference 4 - 6.17% Coverage

1. Enhanced Infrastructure: Builds resilient systems vital for economic growth.

2. Innovation Hub: Promotes advanced technologies, boosting competitiveness.

3. Urban Development: Creates inclusive cities with improved living standards.

4. Job Creation: Generates employment, reducing poverty and inequality.

5. Environmental Sustainability: Prioritizes eco-friendly practices, mitigating climate impact.

<Files\\interview transcript\\Md. Dabirul Islam> - § 2 references coded [14.85% Coverage]

Reference 1 - 10.83% Coverage

The Sustainable Development Goals (SDGs), especially SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities), are highly relevant to Bangladesh's construction industry. SDG 9 emphasizes resilient infrastructure and inclusive industrialization, while SDG 11 focuses on sustainable urbanization and community development, providing crucial guidelines for the sector's sustainable growth.

Reference 2 - 4.02% Coverage

specifically contributes to sustainable development by fostering resilient infrastructure, inclusive industrialization, technology transfer, and connectivity.

<Files\\interview transcript\\Md. Tusher Ahmed> - § 3 references coded [13.67% Coverage]

Reference 1 - 2.35% Coverage

Sustainable Development Goals (SDG) 9 and 11, focus on Industry, Innovation, and Infrastructure, as well as Sustainable Cities and Communities, respectively.

Reference 2 - 3.67% Coverage

These goals are highly relevant to the construction industry in Bangladesh as they emphasize the need for resilient infrastructure development, inclusive industrialization, sustainable urbanization, and innovation adoption within the construction sector.

Reference 3 - 7.65% Coverage

1. Promotes Sustainable Infrastructure: Enhances resilience, accessibility, and efficiency of infrastructure projects.

2. Drives Innovation: Encourages adoption of advanced technologies, fostering competitiveness and efficiency in the construction sector.

3. Improves Urban Development: Enhances quality of life in urban areas through inclusive and sustainable city planning.

4. Creates Employment: Generates job opportunities, particularly for marginalized communities, contributing to economic growth and poverty reduction.

<Files\\interview transcript\\Md.Kawser Ali> - § 5 references coded [20.49% Coverage]

Reference 1 - 3.82% Coverage

I am well acquainted with SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities), particularly in the context of the construction industry in Bangladesh.

Reference 2 - 1.85% Coverage

Key success factors often involve partnerships, innovative designs, and community engagement.

Reference 3 - 5.37% Coverage

Current sustainability practices in Bangladesh's construction projects include eco-friendly materials, energy-efficient designs, and waste reduction measures, contributing to SDG-11 alignment through resilient infrastructure and environmentally conscious urban development.

Reference 4 - 4.12% Coverage

Measuring the impact of construction projects on SDG alignment involves assessing factors such as energy efficiency, waste reduction, carbon footprint, social impact, and adherence to green building standards.

Reference 5 - 5.33% Coverage

Aligning construction projects with SDGs in Bangladesh brings benefits like enhanced resilience, improved living conditions, and economic growth. SDG-9 alignment contributes to sustainable development by fostering innovation, infrastructure development, and job creation.

<Files\\interview transcript\\Sha Nawaz Chowdhury> - § 14 references coded [29.00% Coverage]

Reference 1 - 2.23% Coverage

my last knowledge update in January 2022, I am familiar with the Sustainable Development Goals (SDGs), including SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities).

Reference 2 - 1.34% Coverage

These goals are part of the United Nations' broader agenda to address global challenges and promote sustainable development.

Reference 3 - 1.48% Coverage

Relevance to Construction in Bangladesh: Construction contributes to building resilient infrastructure for economic growth and development.

Reference 4 - 1.26% Coverage

Relevance to Construction in Bangladesh: Construction is crucial for urban development in a rapidly growing population.

Reference 5 - 1.32% Coverage

- Green Building Certification:
- Contribution: Enhances energy efficiency, reduces environmental impact, aligning with SDG-11.

Reference 6 - 1.13% Coverage

Energy-Efficient Design:

- Contribution: Reduces carbon footprint, and supports sustainable urban environments.

Reference 7 - 0.89% Coverage

- Contribution: Minimizes environmental impact, and aligns with SDG-11 on waste reduction.

Reference 8 - 0.84% Coverage

- Contribution: Promotes sustainable resource use, and aligns with SDG-11 principles.

Reference 9 - 0.74% Coverage

- Contribution: Revitalizes urban spaces, and supports sustainable land use.

Reference 10 - 0.91% Coverage

- Contribution: Addresses housing needs, and aligns with SDG-11 for sustainable communities.

Reference 11 - 0.82% Coverage

- Contribution: Ensures social inclusivity, and aligns with SDG-11 community goals.

Reference 12 - 0.86% Coverage

- Contribution: Enhances urban efficiency, and aligns with SDG-11 for resilient cities.

Reference 13 - 0.74% Coverage

- Contribution: Reduces congestion, and supports sustainable urban mobility.

Reference 14 - 14.44% Coverage

Economic Growth: Stimulates economic growth through innovation and job creation.

Infrastructure Development: Addresses development needs through resilient infrastructure projects.

Innovation and Technology Transfer: Fosters innovation and knowledge transfer in the construction sector.

Environmental Conservation: Reduces resource consumption, minimizes pollution, and promotes eco-friendly materials.

Climate Resilience: Builds climate-resilient infrastructure to withstand climate change impacts.

Energy Efficiency: Lowers energy consumption and reduces carbon emissions.

Job Creation and Skills Development: Generates employment opportunities and encourages skills development.

Global Competitiveness: Enhances the global competitiveness of Bangladesh's construction industry.

Reduced Environmental Footprint: Minimizes the environmental footprint through responsible development.

Social Inclusion: Considers diverse community needs, promoting social inclusion.

Community Well-Being: Improves living conditions, positively impacting community well-being.

Long-Term Cost Savings: Leads to cost savings through energy efficiency and reduced maintenance expenses.

Aligned Global Goals: Demonstrates commitment to the global agenda for sustainable development.

Responsible Resource Management: Promotes responsible resource use, and minimizing waste.

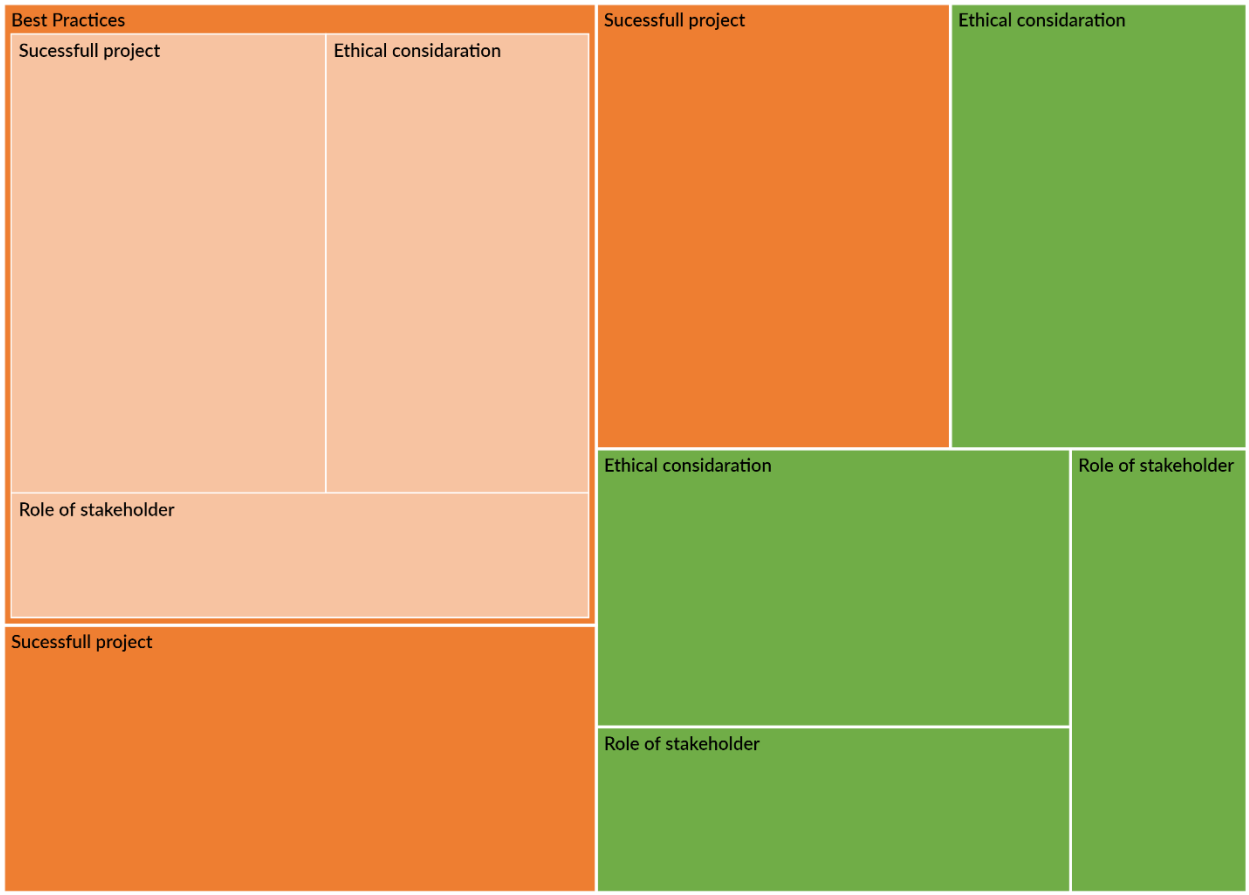

Figure 12.Hierarchy chart for efficiency of SDG Themes

Challenges with opportunities

Initial Themes of - Challenges with opportunities

Name	Files	References
Challenges with opportunities	8	79
Stakeholder challenges effectivity	5	5
Stakeholder challenges	5	5
SDG 9 Challenges	8	11
SDG 11 Challenges	8	8
Policies	7	7
Infrastructure improvement	1	1
Barriers of finance	8	8
Barriers of awareness	8	10
Barriers to new adaptation	5	8
Barriers to unclear farmwork	6	8
Barriers of time	4	4
Barriers to technology capacity	2	2
Barriers to stakeholder collaboration	2	2

Coverage file for Challenges with opportunities

	Name	In Folder	References	Coverage
	Ashik Mahmud	Files\\interview transcript	10	14.12%
	ATM Nowsher Ali	Files\\interview transcript	8	18.40%
	Farid Uddin	Files\\interview transcript	10	18.21%

	Md. Atikur Rahman	Files\\interview transcript	8	14.05%
	Md. Dabirul Islam	Files\\interview transcript	9	16.78%
	Md. Tusher Ahmed	Files\\interview transcript	11	21.76%
	Md.Kawser Ali	Files\\interview transcript	8	18.63%
	Sha Nawaz Chowdhury	Files\\interview transcript	15	33.93%

Participants Answer analysis:

<Files\\interview transcript\\Ashik Mahmud> - § 10 references coded [14.12% Coverage]

References 1-2 - 1.87% Coverage

outdated infrastructure, limited innovation, urbanization challenges, and ensuring sustainable practices in the construction process.

Reference 3 - 0.27% Coverage

limited awareness,

Reference 4 - 0.31% Coverage

financial constraints,

Reference 5 - 0.28% Coverage

lack of incentives.

Reference 6 - 0.31% Coverage

resistance to change,

Reference 7 - 0.28% Coverage

traditional mindset

Reference 8 - 2.43% Coverage

Ongoing collaboration between the government and industry stakeholders is crucial to ensure policies are practical, enforceable, and contribute to sustainable development.

Reference 9 - 4.13% Coverage

Effective collaboration with architects, engineers, labor unions, and local communities involves fostering open communication, sharing knowledge, and creating a platform for joint decision-making. Engaging stakeholders in the planning phase enhances the chances of successful SDG-9 alignment.

Reference 10 - 4.23% Coverage

Challenges faced by construction stakeholders can be effectively addressed through education and awareness programs, incentivizing sustainable practices, and providing support for the adoption of innovative technologies. Collaboration platforms can facilitate knowledge exchange and problem-solving.

<Files\\interview transcript\\ATM Nowsher Ali> - § 8 references coded [18.40% Coverage]

References 1-2 - 4.78% Coverage

The main challenges include balancing economic development with environmental and social considerations, regulatory complexities, and the need for innovative technologies to meet sustainability targets.

References 3-4 - 1.48% Coverage

Barriers include financial constraints, a lack of awareness,

Reference 5 - 0.91% Coverage

the need for stronger policy frameworks

Reference 6 - 2.25% Coverage

Regular reviews and stakeholder consultations are essential for ensuring practicality and impact.

Reference 7 - 3.47% Coverage

Effective collaboration involves fostering strong partnerships, promoting knowledge exchange, and engaging in inclusive decision-making processes.

Reference 8 - 5.53% Coverage

Challenges include overcoming resistance to change, upskilling the workforce, and creating awareness. Addressing these requires a comprehensive approach involving training, awareness campaigns, and incentivizing sustainable practices.

<Files\\interview transcript\\Farid Uddin> - § 10 references coded [18.21% Coverage]

Reference 1 - 0.80% Coverage

Developing and upgrading infrastructure to meet growing urbanization demands.

Reference 2 - 6.64% Coverage

Limited Technological Adoption: The construction industry traditionally lags in adopting innovative technologies,

Resource Constraints: Many construction projects, particularly in developing regions, face resource limitations, affecting the implementation of sustainable and innovative solutions.

Skills and Education: There is a need for skilled labor and education in modern construction techniques, including green building practices and the use of advanced technologies.

Environmental Impact: Traditional construction methods often have a significant environmental footprint. Adapting to more sustainable materials and practices poses a challenge.

Reference 3 - 5.44% Coverage

Unplanned Urbanization:

Infrastructure Gaps: Many cities lack essential infrastructure, including efficient public transportation, waste management, and green spaces, hindering efforts to create sustainable communities.

Affordability of Housing:

Climate Change Resilience: Ensuring resilience in infrastructure and city planning requires significant investment and strategic planning.

Community Engagement: Challenges arise when communities are not adequately involved in decision-making processes related to urban development.

Reference 4 - 0.22% Coverage

Financial Constraints:

Reference 5 - 0.35% Coverage

Traditional Construction Practices:

Reference 6 - 0.30% Coverage

Fragmented Industry Practices:

Reference 7 - 0.17% Coverage

Short-Term Focus:

Reference 8 - 0.23% Coverage

Resistance to Change:

Reference 9 - 0.37% Coverage

Capacity Building:

Public Awareness:

Reference 10 - 3.67% Coverage

Green Building Standards:

Urban Planning and Zoning Regulations:

Energy Efficiency Standards:

Waste Management Policies:

Affordable Housing Initiatives:

Incentives for Sustainable Practices:

Effectiveness of Policies:

Enforcement and Compliance:

Public Awareness and Education:

Government Commitment:

Industry Collaboration:

Adaptability and Review:

<Files\\interview transcript\\Md. Atikur Rahman> - § 8 references coded [14.05% Coverage]

Reference 1 - 1.44% Coverage

Resource Limitations:

Poor Planning:

Environmental Impact:

Climate Resilience

Reference 2 - 1.05% Coverage

5. Social Equity:

6. Regulatory Hurdles:

7. Technology Barriers:

Reference 3 - 1.26% Coverage

Insufficient funds hinder investments in sustainable practices aligned with SDGs.

Reference 4 - 1.73% Coverage

Lack of awareness and technical expertise among stakeholders inhibits the adoption of SDG-aligned opportunities.

Reference 5 - 1.30% Coverage

Weak enforcement and unclear policies discourage the integration of sustainable practices.

Reference 6 - 2.88% Coverage

the National Building Code, Environmental Conservation Act, Green Building Code, National Housing Policy, and National Sustainable Development Strategy promote SDG alignment in construction.

Reference 7 - 2.15% Coverage

Financial Constraints:

Lack of Awareness and Expertise:

Regulatory Complexity:

Resistance to Change:

Short-term Focus:

Reference 8 - 2.24% Coverage

Financial Support:

Capacity Building:

Regulatory Simplification:

Promoting Innovation: promote innovation.

Long-term Planning:

<Files\\interview transcript\\Md. Dabirul Islam> - § 9 references coded [16.78% Coverage]

References 1-2 - 5.98% Coverage

resource limitations, poor planning, environmental impact, climate resilience, social equity, regulatory hurdles, and technology barriers. Addressing these challenges necessitates collaborative efforts and policy reforms across sectors.

References 3-4 - 1.00% Coverage

limited financial resources, awareness.

Reference 5 - 0.40% Coverage

expertise gaps,

Reference 6 - 0.55% Coverage

regulatory frameworks,

Reference 7 - 0.45% Coverage

short-term focus,

Reference 8 - 5.02% Coverage

National Building Code, Environmental Conservation Act, Green Building Code, National Housing Policy, and National Sustainable Development Strategy to promote SDG alignment in the construction sector.

Reference 9 - 3.37% Coverage

opportunities, including financial constraints, lack of awareness, regulatory complexity, resistance to change, and short-term focus.

<Files\\interview transcript\\Md. Tusher Ahmed> - § 11 references coded [21.76% Coverage]

Reference 1 - 1.53% Coverage

limited resources, inadequate infrastructure planning, environmental impact, resilience to climate change,

Reference 2 - 1.14% Coverage

social inequality, regulatory frameworks, and technological adoption barriers.

Reference 3 - 1.63% Coverage

Financial Constraints: Limited funding options and high initial costs deter investment in sustainable practices.

Reference 4 - 1.46% Coverage

2. **Awareness and Capacity Gaps:** Insufficient knowledge and expertise hinder effective implementation.

Reference 5 - 1.31% Coverage

3. **Regulatory Complexity:** Unclear policies and inconsistent enforcement create uncertainty.

Reference 6 - 1.27% Coverage

Resistance to Change: Traditional practices and reluctance to innovate hinder adoption.

Reference 7 - 1.24% Coverage

Short-term Focus: Immediate gains often prioritize cost over long-term sustainability.

Reference 8 - 1.21% Coverage

7. Fragmented Engagement: Limited collaboration among stakeholders impedes progress.

Reference 9 - 6.22% Coverage

1. **National Sustainable Development Strategy (NSDS):** Guides sustainable construction practices.

2. **Building Construction Act:** Regulates safety, land use, and environmental standards.

3**. National Housing Policy:** Encourages affordable and sustainable housing solutions.

4. **Environmental Conservation Act:** Controls waste management and pollution.

5**. Green Building Code:** Promotes environmentally friendly construction practices.

Reference 10 - 1.57% Coverage

financial constraints, lack of awareness, regulatory complexity, resistance to change, and short-term focus.

Reference 11 - 3.18% Coverage

stakeholders can provide financial support, offer capacity-building initiatives, simplify regulations, promote innovation, and emphasize long-term benefits, fostering sustainable development in the construction sector.

<Files\\interview transcript\\Md.Kawser Ali> - § 8 references coded [18.63% Coverage]

References 1-2 - 3.41% Coverage

infrastructure, limited innovation, urbanization issues, sustainable construction practices, financial constraints, and the need for increased collaboration among stakeholders

References 3-4 - 0.82% Coverage

limited awareness, financial constraints,

Reference 5 - 0.37% Coverage

traditional mindset

Reference 6 - 4.12% Coverage

While there may be policies promoting SDG alignment in the construction sector, their effectiveness depends on collaboration between the government and industry stakeholders to ensure practical implementation.

Reference 7 - 4.20% Coverage

Effective collaboration with architects, engineers, labor unions, and local communities in the construction sector involves open communication, knowledge sharing, and joint decision-making during the planning phase.

Reference 8 - 5.72% Coverage

Challenges for construction stakeholders in integrating SDG-9-aligned opportunities can be addressed through education, incentivizing sustainable practices, and providing support for adopting innovative technologies. Collaboration platforms facilitate knowledge exchange and problem-solving.

<Files\\interview transcript\\Sha Nawaz Chowdhury> - § 15 references coded [33.93% Coverage]

Reference 1 - 4.21% Coverage

1. Financial Constraints:

- Limited resources for adopting innovative technologies and sustainable practices.

2. Regulatory Barriers:

- Stringent regulations and bureaucratic processes affecting rapid adoption.

3. Lack of Awareness:

- Insufficient understanding of the benefits of sustainability in construction.

4. Resistance to Change:

- Traditional practices are resistant to adopting new, innovative methods.

Reference 2 - 3.22% Coverage

1. Infrastructure Gaps:

- Existing gaps in infrastructure, hindering resilience and connectivity.

2. Rapid Urbanization Pressures:

- Challenges in meeting the infrastructure needs of rapidly growing cities.

3. Social Inequality:

- Unequal access to industrialization benefits and potential for social disparities.

Reference 3 - 0.97% Coverage

1. Environmental Impact:

- Consequences of construction processes if not managed sustainably.

Reference 4 - 0.86% Coverage

1. Financial Constraints: Limited funds for sustainable practices and upfront costs.

Reference 5 - 0.66% Coverage

1. Lack of Awareness: Insufficient understanding of SDG benefits.

Reference 6 - 0.70% Coverage

1. Resistance to Change: Reluctance to adopt new, innovative methods.

Reference 7 - 0.81% Coverage

1. Short-Term Focus: Emphasis on immediate gains over long-term sustainability.

Reference 8 - 0.58% Coverage

1. Insufficient infrastructure for innovative solutions.

Reference 9 - 0.42% Coverage

1. Lack of coordination among stakeholders.

Reference 10 - 0.49% Coverage

1. Misalignment with local norms and preferences.

Reference 11 - 0.57% Coverage

1. Limited suitable land for sustainable urban projects.

Reference 12 - 0.53% Coverage

1. Uncertainties and policy changes disrupting plans

Reference 13 - 0.47% Coverage

1. Lack of training for SDG-aligned practices.

Reference 14 - 0.66% Coverage

Inadequate systems for progress tracking and accountability.

Reference 15 - 18.79% Coverage

1. Financial Constraints:

- Challenge: Limited budget for sustainability.
- Solution: Introduce financial incentives and green financing.

2. Lack of Awareness:

- Challenge: Insufficient understanding of benefits.
- Solution: Conduct awareness campaigns and educational initiatives.

3. Regulatory Barriers:

- Challenge: Complex regulations.
- Solution: Advocate for supportive regulations and engage with policymakers.

4. Resistance to Change:

- Challenge: Resistance to adopting new methods.
- Solution: Provide training, and showcase successful case studies.

5. Short-Term Focus:

- Challenge: Emphasis on short-term gains.
- Solution: Highlight long-term cost savings and benefits.

6. Limited Technological Capacity:

- Challenge: Lack of technology infrastructure.
- Solution: Invest in technology transfer and capacity building.

7. Inadequate Collaboration:

- Challenge: Limited collaboration.
- Solution: Encourage partnerships, and facilitate knowledge-sharing.

8. Social and Cultural Factors:

- Challenge: Differing social norms.
- Solution: Conduct thorough community engagement, and align with local values.

9. Land Use Challenges:

- Challenge: Limited suitable land.
- Solution: Prioritize brownfield development, and engage with local communities.

10. Political Instability:

- Challenge: Political uncertainties.
- Solution: Advocate for stable and supportive policies.

11. Resource Scarcity:

- Challenge: Scarcity of skilled labor and materials.
- Solution: Invest in skills development, and explore alternative materials.

12. Capacity Building Needs:

- Challenge: Insufficient training.
- Solution: Support continuous professional development, and collaborate with educational institutions.

13. Monitoring and Reporting Gaps:

- Challenge: Lack of robust mechanisms.
- Solution: Establish clear metrics, regular monitoring, and reporting.

Figure 13.Hierarchy chart for challenges with opportunities themes.

Best Practices

Initial Themes of- Best Practices

Name	Files	References
Best Practices	7	14
Successful project	6	6
Role of stakeholder	3	3
Ethical consideration	4	5

Coverage file for Best Practices

	Name	In Folder	References	Coverage
	Ashik Mahmud	Files\\interview transcript	3	10.77%
	ATM Nowsher Ali	Files\\interview transcript	3	13.56%
	Farid Uddin	Files\\interview transcript	2	2.76%
	Md. Atikur Rahman	Files\\interview transcript	1	1.98%
	Md. Dabirul Islam	Files\\interview transcript	1	9.22%
	Md. Tusher Ahmed	Files\\interview transcript	1	9.97%
	Md.Kawser Ali	Files\\interview transcript	3	11.94%

Participants answer analysis.

<Files\\interview transcript\\Ashik Mahmud> - § 3 references coded [10.77% Coverage]

Reference 1 - 2.19% Coverage

projects that focus on eco-friendly and energy-efficient building designs, incorporate green spaces, and promote affordable housing contribute significantly.

Reference 2 - 4.58% Coverage

Stakeholders, including construction companies, government agencies, NGOs, and local communities, play a vital role in promoting SDG-11 alignment. Collaboration is essential to drive sustainable practices, implement regulations, and engage communities in the decision-making process to ensure projects meet the SDG criteria.

Reference 3 - 3.99% Coverage

Ethical considerations in researching SDG alignment in construction projects include respecting the rights of local communities, ensuring transparency, and avoiding any harm to the environment. Research should be conducted ethically, with a focus on promoting sustainable practices.

<Files\\interview transcript\\ATM Nowsher Ali> - § 3 references coded [13.56% Coverage]

Reference 1 - 5.10% Coverage

Examples of successful projects in Bangladesh include [provide specific examples], where community engagement, sustainable design, and efficient infrastructure planning were key factors contributing to their success.

Reference 2 - 4.68% Coverage

Stakeholders play a pivotal role. Collaboration between construction companies, government agencies, NGOs, and local communities is essential for effective implementation and alignment with SDGs.

Reference 3 - 3.77% Coverage

Ethical considerations include ensuring transparency, respecting local cultures, and prioritizing community well-being in research and project implementation.

<Files\\interview transcript\\Farid Uddin> - § 2 references coded [2.76% Coverage]

Reference 1 - 2.05% Coverage

Informed Consent:

Community Engagement:

Data Privacy and Confidentiality:

Transparency:

Avoiding Harm:

Equity and Inclusion:

Benefit Sharing:

Integrity in Reporting:

Long-Term Impact Assessment:

Reference 2 - 0.72% Coverage

Compliance with Regulations:

Cultural Sensitivity:

Open Communication

<Files\\interview transcript\\Md. Atikur Rahman> - § 1 reference coded [1.98% Coverage]

Reference 1 - 1.98% Coverage

1. Hatirjheel-Begunbari Integrated Development Project (HBIDP):

2. Purbachal New Town Project:

3. Khulna Water Supply Project:

<Files\\interview transcript\\Md. Dabirul Islam> - § 1 reference coded [9.22% Coverage]

Reference 1 - 9.22% Coverage

Successful examples of construction projects aligned with SDG 11 in Bangladesh include the Hatirjheel-Begunbari Integrated Development Project (HBIDP), the Purbachal New Town Project, and the Khulna Water Supply Project. Key success factors include government leadership, community engagement, public-private partnerships, environmental considerations, and capacity building.

<Files\\interview transcript\\Md. Tusher Ahmed> - § 1 reference coded [9.97% Coverage]

Reference 1 - 9.97% Coverage

Bashundhara Residential Area, Dhaka: Integrated green spaces, pedestrian pathways, and waste management systems showcase sustainable urban development. Key factors include comprehensive planning, community engagement, and green infrastructure integration.

Padma Bridge Project: Focuses on connectivity and environmental sustainability through habitat restoration and pollution mitigation. Government support, public-private partnerships, and innovation contribute to its success.

Rooftop Gardening Initiatives: Promote urban green spaces, air quality, and food security. Success factors include government backing, community involvement, and innovation in sustainable practices.

<Files\\interview transcript\\Md.Kawser Ali> - § 3 references coded [11.94% Coverage]

Reference 1 - 3.22% Coverage

Successful SDG 11-aligned construction projects in Bangladesh include those focusing on eco-friendly designs, energy efficiency, green spaces, and affordable housing.

Reference 2 - 4.84% Coverage

Stakeholders, including construction companies, government agencies, NGOs, and local communities, play a crucial role in promoting SDG-11 alignment by fostering collaboration, implementing regulations, and engaging communities in decision-making.

Reference 3 - 3.88% Coverage

Ethical considerations in researching SDG alignment in construction projects in Bangladesh include respecting local communities' rights, ensuring transparency, and avoiding harm to the environment.

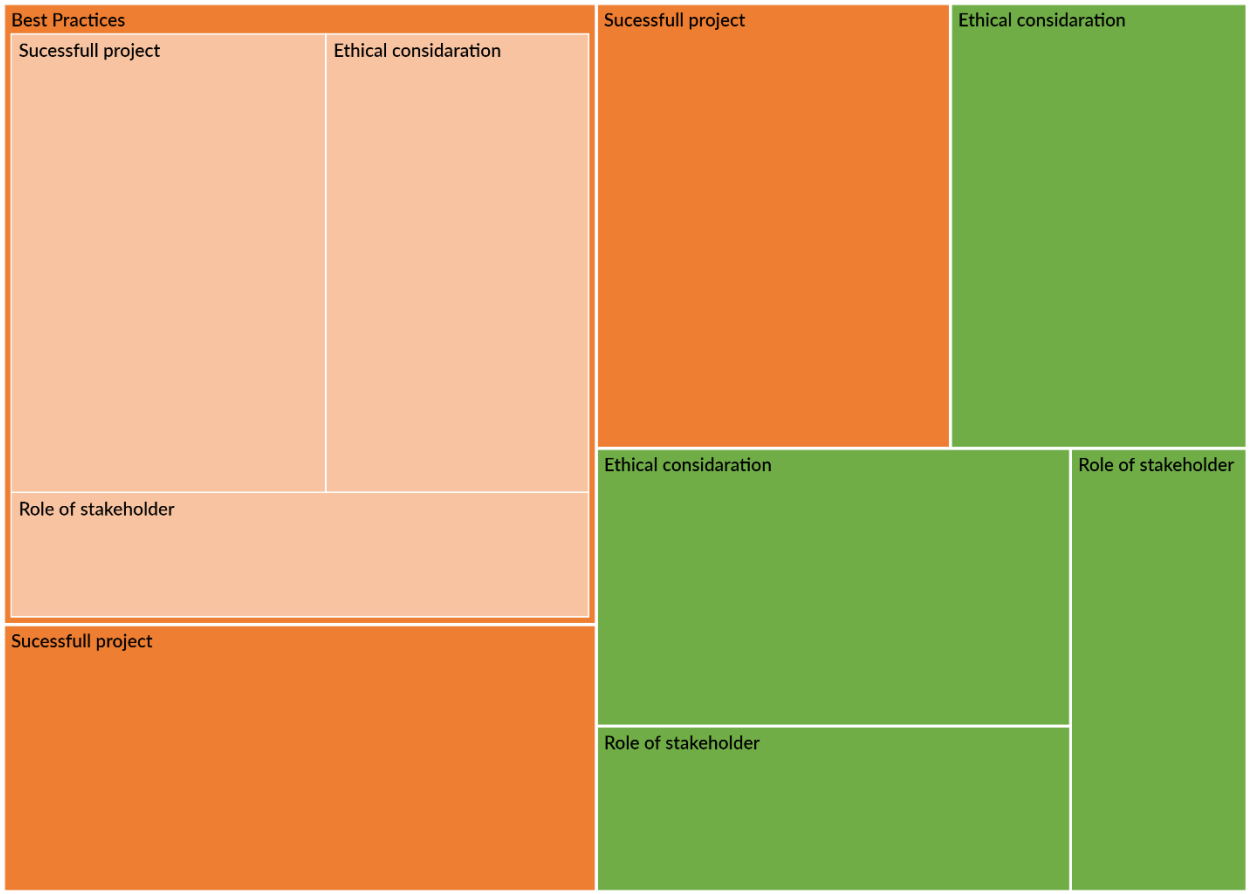

Figure 14Hierachy chart for best practices themes.

4.6. SUMMARY OF CORE THEMES

The data analysis from the interviews with participants in the construction industry in Bangladesh has elucidated several core themes related to the alignment of construction projects with Sustainable Development Goals (SDGs). These themes encapsulate the experiences, challenges, and best practices identified by the participants and serve as a foundational framework for understanding SDG alignment within the construction sector in Bangladesh. The core themes identified are:

A. Efficiency of SDG Alignment:

Relevance to Construction: Participants acknowledged the critical relevance of SDGs, particularly SDG 9 and SDG 11, to the construction industry, emphasizing the need for infrastructure improvement and sustainable urban development.

Practices and Initiatives: A variety of sustainability practices and initiatives, such as green building certifications and the use of sustainable materials, were highlighted as contributing factors to SDG alignment.

Measurement Tools: The importance of using specific indicators and metrics, such as green building certifications and carbon footprint assessments, to measure the impact of construction projects on SDG alignment was emphasized.

B. Challenges with Opportunities:

Stakeholder Collaboration: The need for effective stakeholder collaboration emerged as a significant theme, with barriers identified in technology capacity, time management, and the adoption of new practices.

Financial and Awareness Barriers: Financial constraints and a lack of awareness among stakeholders were cited as major obstacles to integrating SDG-aligned opportunities into construction projects.

Policy and Regulation: The effectiveness of existing policies and regulations in promoting SDG alignment was questioned, with a call for more adaptable and periodically reviewed policies.

C. Best Practices:

Successful Projects: Participants provided examples of successful construction projects that align with SDGs, highlighting key factors such as government leadership, community engagement, and innovative designs.

Role of Stakeholders: The critical role of stakeholders, including construction companies, government agencies, NGOs, and communities, in promoting SDG alignment was underscored.

Ethical Considerations: Ethical considerations in researching SDG alignment, such as informed consent and community engagement, were deemed essential for ensuring responsible and meaningful study outcomes.

4.7. CHAPTER SUMMARY

This chapter delved into the experiences and perspectives of construction industry participants in Bangladesh regarding the alignment of construction projects with Sustainable Development Goals (SDGs). Through a qualitative analysis of semi-structured interviews, several core themes were identified, offering insights into the efficiency of SDG alignment, challenges and opportunities, and best practices within the sector.

The study highlighted the critical relevance of SDGs to the construction industry and identified various sustainability practices contributing to SDG alignment. However, significant challenges, such as stakeholder collaboration, financial constraints, and regulatory barriers, were also uncovered, indicating areas where further efforts are needed.

Best practices from successful construction projects provided valuable lessons on fostering SDG alignment, emphasizing the importance of stakeholder engagement, ethical considerations, and innovative approaches. These findings contribute to a deeper understanding of how the construction sector in Bangladesh can effectively align with SDGs to advance the country's sustainable development agenda.

CHAPTER 05-SUMMARY AND CONCLUSION

5. INTRODUCTION

Despite the challenges in directly extracting a specific "Summary of Study" section from the provided document, we can construct a synthesized summary based on the overarching themes discussed in our conversation regarding the research on aligning construction projects with Sustainable Development Goals (SDGs) in Bangladesh. The focus of the study is on SDGs 9 (Industry, Innovation, and Infrastructure) and 11 (Sustainable Cities and Communities), utilizing a qualitative approach to explore the intricacies of integrating SDG principles within the construction sector. A key finding of the research is the potential within Bangladesh's construction industry to align with these SDGs, particularly through the adoption of eco-friendly building materials, energy-efficient design practices, and inclusive urban planning strategies aimed at sustainable community development. However, the study also identifies significant barriers to this alignment, including financial and technological constraints, regulatory challenges, and the need for enhanced collaboration among various stakeholders. The research is underpinned by the Triple Bottom Line (TBL) theory, which emphasizes the importance of balancing economic, social, and environmental considerations, contributing valuable insights to the discourse on sustainable development in construction. The critical role of multi-stakeholder engagement is highlighted as essential for overcoming the challenges identified, pointing to the necessity of collaborative efforts among government bodies, the private sector, civil society, and local communities to effectively integrate SDG-oriented practices into construction projects. This

summary encapsulates the primary findings and thematic emphasis of the research, providing an overview of the study's contributions to understanding SDG alignment within Bangladesh's construction industry.

5.1. OVERVIEW

The research adopts a comprehensive qualitative approach to explore the alignment of construction projects with Sustainable Development Goals (SDGs) in Bangladesh, focusing on capturing a wide array of perspectives and experiences from stakeholders within the construction industry. This includes construction companies, government agencies, and local communities. The study employs a range of non-numerical data collection methods such as interviews,

document analysis, and observations to achieve a deep and nuanced understanding of the challenges and opportunities related to SDG alignment.

The research strategy primarily revolves around conducting semi-structured interviews with key stakeholders, chosen for their ability to provide a diverse and in-depth view of the construction sector's current practices, challenges, and potential pathways to align with SDGs. These interviews are designed to be flexible and open-ended, allowing participants to share their experiences, perceptions, and suggestions freely. The methodological choice of semi-structured interviews is supported by the research's inductive approach, facilitating the emergence of themes and patterns directly from the data, thereby ensuring that the findings are grounded in the real-world experiences of the stakeholders involved.

The study's time horizon is cross-sectional, aimed at offering a snapshot of the current state of SDG alignment within the construction sector. This approach was chosen for its efficiency in data collection and analysis, and its ability to provide timely insights that can inform immediate policy and practice considerations. Despite the inherent limitation of not capturing long-term trends, this time horizon aligns well with the research's objectives to deliver a comprehensive understanding of the current landscape of SDG alignment in Bangladesh's construction sector.

5.2. CONCLUSION AND DISCUSSION

The research findings underscore the critical role of the construction sector in Bangladesh in aligning with Sustainable Development Goals (SDGs), particularly SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities). The study reveals both

the sector's potential to contribute to sustainable development and the multifaceted challenges it faces in integrating SDG-aligned practices.

Implications for SDG-aligned Practices Integration:

Promotion of Sustainable Infrastructure:

The construction sector is pivotal in promoting sustainable infrastructure and urban development, as highlighted by the focus on eco-friendly and ` (Team, O. W. in D., & Roser, M. (2023) 40 This aligns with SDG 11's aim to make cities inclusive, safe, resilient, and sustainable.

Innovation and Capacity Building:

The emphasis on innovative technologies and capacity building within the sector supports SDG 9 by fostering innovation and building resilient infrastructure. (Gatley, N. 16, July 2021) 41 This is crucial for Bangladesh's economic development and competitiveness in the global market.

Community Engagement and Ethical Considerations:

The findings highlight the importance of community engagement and ethical considerations in construction projects. Engaging local communities and ensuring transparency and fairness in project implementation is essential for the inclusive development envisioned by the SDGs.

Barriers to SDG-aligned Practice Integration:

Financial Constraints and Resource Limitations: Financial constraints and resource limitations are significant barriers to adopting sustainable practices. Addressing these requires innovative financing solutions and efficient resource management to make sustainable construction viable.

Limited Technological Adoption and Skills Gap: The construction sector's traditional resistance to adopting modern technologies and the existing skills gap hinders the integration of SDG-aligned practices. Promoting education and training in modern construction techniques is vital for overcoming these challenges.

Regulatory and Policy Challenges: The effectiveness of policies and regulations in promoting SDG alignment varies, with participants calling for more adaptable and periodically reviewed

policies. Streamlining regulatory frameworks and ensuring they support sustainable development goals is crucial.

Potential Contributions to Sustainable Development:

Economic Growth and Job Creation: By aligning with SDGs, the construction sector can stimulate economic growth and create job opportunities, contributing to poverty reduction and economic development. (Vincent,9 July 2020) .42

Environmental Sustainability: Sustainable construction practices can significantly reduce the environmental impact of the sector, contributing to climate action and environmental sustainability goals.

Social Inclusion and Community Well-being: The construction sector's alignment with SDGs can enhance social inclusion and improve community well-being by providing affordable housing and inclusive urban spaces.

In conclusion, the construction sector in Bangladesh holds significant potential to contribute to the country's sustainable development agenda through the integration of SDG-aligned practices. However, overcoming the identified barriers requires a collaborative effort from all stakeholders, including the government, private sector, civil society, and international partners. Future research should focus on developing actionable strategies to overcome these barriers, exploring innovative financing mechanisms, and fostering international collaborations to share best practices and technological innovations in sustainable construction.

5.3. THEORETICAL IMPLICATIONS

The research proposal explores the challenges and opportunities in aligning construction projects with Sustainable Development Goals (SDGs) in Bangladesh, particularly focusing on SDGs related to sustainable cities and communities, and industry, innovation, and infrastructure. The study is rooted in the Triple Bottom Line (TBL) theory, which emphasizes evaluating organizations and industries not only on their financial performance but also on their social and environmental impacts (Slaper & Hall, 2011)43. This theoretical framework is particularly

relevant to the construction industry in Bangladesh, where there is a critical need to balance economic viability with social equity and environmental sustainability.

The findings from this research are expected to contribute to existing theories by providing empirical evidence on how construction projects can embrace the TBL approach to achieve sustainable development and address the SDGs. By investigating the alignment of construction practices with SDGs, the research addresses a gap in understanding the multifaceted challenges faced by the construction industry in integrating sustainable development principles. The study's focus on the TBL theory and its application within the construction industry in Bangladesh offers a novel perspective on advancing sustainable development through the construction sector. (The "Triple-Bottom-Line" Approach to a Sustainable Construction Strategy, n.d.).44

Moreover, the research underscores the importance of collaborative efforts among stakeholders, including government, private sector, and civil society, to overcome challenges in SDG alignment. It highlights the need for adaptable policies, capacity building, and ethical considerations in conducting construction projects aligned with SDGs. These findings challenge the traditional view of construction as solely a profit-driven endeavor, advocating for a more holistic approach that considers the social and environmental dimensions of sustainable development.

Overall, the research contributes to the theoretical understanding of sustainable development in the construction industry by showcasing the application of the TBL theory in a developing country context. It provides insights into the practical challenges and opportunities in aligning construction practices with global sustainability goals, thereby enriching the discourse on sustainable construction and development theories.

5.4. STRENGTHS AND WEAKNESSES

The research on aligning construction projects with Sustainable Development Goals (SDGs) in Bangladesh offers valuable insights but also presents certain limitations that must be acknowledged for a comprehensive understanding of its scope and impact.

Strengths:

Comprehensive Approach: The research adopts a qualitative case study methodology, providing a deep and nuanced understanding of the challenges and opportunities related to SDG

alignment within the construction sector in Bangladesh. This approach allows for the capture of diverse perspectives from various stakeholders, including construction companies, government agencies, and local communities. (What Is Comprehensive Approach | IGI Global, n.d.)45

Relevance to Sustainable Development: By focusing on the alignment of construction projects with SDGs, particularly those related to sustainable cities and infrastructure, the study addresses a critical area for sustainable development in a rapidly urbanizing country like Bangladesh.

Theoretical Contribution: The research is grounded in the Triple Bottom Line (TBL) theory, contributing to the theoretical discourse on sustainable development by providing empirical evidence of how construction projects can integrate economic, social, and environmental considerations.

Stakeholder Engagement: Highlighting the importance of collaborative efforts among stakeholders for SDG alignment, the study underscores the need for multi-stakeholder approaches in advancing sustainable construction practices.

Weaknesses and Limitations:

Geographic Scope: The study's geographic scope is limited to Bangladesh, which may restrict the direct applicability of its findings to other regions with different socio-economic and environmental contexts.

Sample Size and Diversity: The research's depth is contingent on the selected case studies and the range of stakeholders interviewed. A limited sample size or lack of diversity among participants could impact the comprehensiveness of the findings.

Cross-sectional Time Horizon: Adopting a cross-sectional approach provides a snapshot of the current state of SDG alignment within the construction sector but does not capture the long-term evolution of these practices or their impact over time.

Potential for Bias: The qualitative nature of the research and reliance on semi-structured interviews may introduce subjective biases, both in the participants' responses and the researchers' interpretations.

Dynamic Industry Context: The fast-paced and evolving nature of the construction industry means that the relevance of the research findings could diminish over time as modern technologies, regulations, and sustainability practices emerge.

Acknowledging these strengths and limitations is crucial for contextualizing the research findings and understanding their contributions to the field of sustainable development and construction. Future research efforts could aim to address these limitations by expanding the geographic scope, incorporating longitudinal studies, increasing the sample size and diversity of participants, and continuously updating the research framework to reflect the latest industry trends and sustainability practices.

5.5. RECOMMENDATIONS FOR FUTURE RESEARCH

Drawing from the general context and common practices in the field of sustainable development and construction can suggest potential areas for further investigation:

Longitudinal Studies: Future research could benefit from adopting a longitudinal approach to track the evolution of SDG-aligned practices in the construction industry over time. (Banati & Oyugi, 2019)46 This would provide insights into the long-term impacts of these practices on sustainable development and help identify trends and changes in stakeholder engagement, policy effectiveness, and technological adoption.

Broader Geographic Coverage: Expanding the research to include multiple geographic regions, both within Bangladesh and in other countries with similar development contexts, would enhance the understanding of diverse challenges and opportunities in aligning construction projects with SDGs. Comparative studies could reveal best practices and innovative solutions applicable across different settings.

Focus on Specific SDG Targets: While the research broadly addresses SDGs related to sustainable cities, communities, and infrastructure, future studies could delve deeper into specific SDG targets. Investigating how construction projects can contribute to aspects of these goals, such as improving water management, enhancing energy efficiency, or promoting inclusive urbanization, would provide more focused insights.

Stakeholder Engagement and Collaboration: Further research could explore more effective strategies for multi-stakeholder engagement and collaboration, examining the roles of various

actors, including the private sector, government agencies, civil society, and local communities, in advancing SDG alignment.

Impact of Policy and Regulation: Investigating the impact of specific policies and regulations on the adoption of SDG-aligned practices in construction would offer valuable guidance for policymakers. This includes assessing the effectiveness of incentives, standards, and compliance mechanisms in promoting sustainable development.

Innovative Financing Mechanisms: Future studies could explore innovative financing mechanisms that enable the adoption of sustainable construction practices. This could include public-private partnerships, green bonds, and other financial instruments that support SDG alignment.

Technology and Innovation: Investigating the role of emerging technologies and innovation in promoting SDG alignment in construction projects would be beneficial (Jain,15 July 2023) 47. This includes the use of green building materials, renewable energy sources, and digital technologies for efficient project management and operation.

By addressing these areas, future research can build on the findings of the current study, addressing its limitations and contributing to a more comprehensive understanding of how the construction industry can effectively contribute to the global sustainable development agenda.

5.6. CHAPTER SUMMARY

This chapter explored various aspects of the research on aligning construction projects with Sustainable Development Goals (SDGs) in Bangladesh. The study adopts a qualitative case study methodology to delve into the challenges and opportunities inherent in integrating SDG principles within the construction industry. The Triple Bottom Line (TBL) theory serves as the theoretical foundation, emphasizing the importance of considering economic, social, and environmental impacts.

Key findings highlight the significant potential of the construction sector to contribute to sustainable development by adhering to SDG-aligned practices. However, the research also identifies several barriers to this alignment, including financial constraints, limited technological adoption, regulatory challenges, and the need for enhanced stakeholder collaboration.

The study's strengths include its comprehensive approach, theoretical contributions, and emphasis on multi-stakeholder engagement. Nonetheless, limitations such as the geographic scope of the study, potential biases, and the dynamic nature of the construction industry are acknowledged. These limitations offer avenues for future research, suggesting the need for longitudinal studies, broader geographic coverage, and exploration of innovative financing mechanisms and technologies.

In summary, the research contributes valuable insights into the complexities of SDG alignment in Bangladesh's construction sector. It underscores the need for collaborative efforts among all stakeholders and highlights areas for further investigation to advance sustainable development within the industry.

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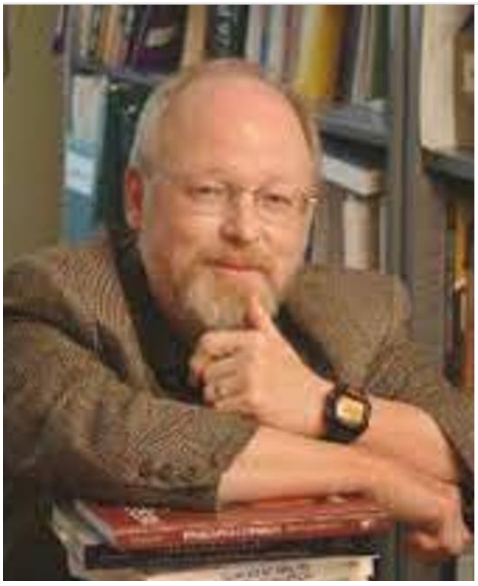
APPENDIX A: QUALITATIVE

1.



Definition of Qualitative : Creswell 2018

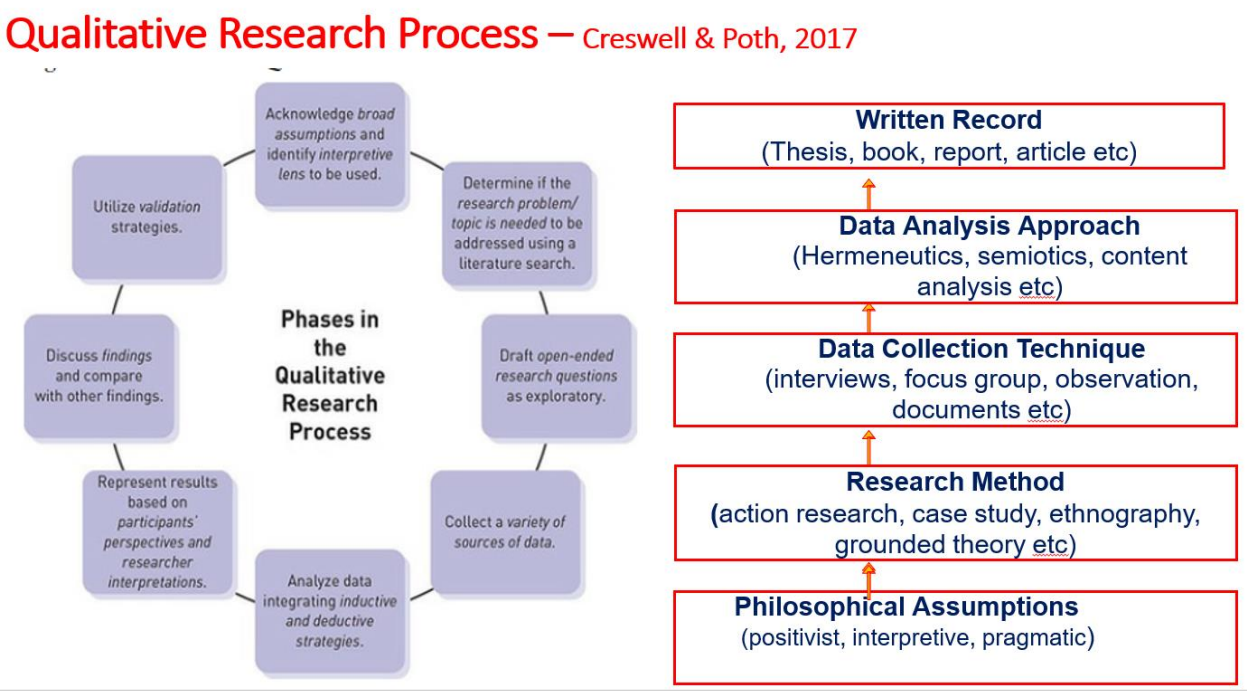
Qualitative research is an approach for exploring and understanding the meaning individuals or groups ascribe to a social or human problem.

The process of research involves:

- Emerging questions and procedures,
- Data typically collected in the participant's setting
- Data analysis inductively building from particulars to general themes, and the researcher making **interpretations of the meaning of the data**.

The final written report has a flexible structure.

2.



APPENDIX B: RESEARCH QUESTIONS

I. How familiar are you with the Sustainable Development Goals (SDG 9: Industry, Innovation, and Infrastructure & **SDG 11: Sustainable Cities and Communities**) and their relevance to the construction industry in Bangladesh?

II. In your opinion, what are the main challenges faced by the construction sector in aligning with SDG 9: Industry, Innovation, and Infrastructure & **SDG 11: Sustainable Cities and Communities**?

III. Can you provide examples of construction projects that have successfully aligned with SDG 11 in Bangladesh? What were the key factors that contributed to their success?

IV. What are the barriers or obstacles that hinder the integration of SDG9 & 11-aligned opportunities into construction projects in Bangladesh?

V. How do you perceive the role of stakeholders, such as construction companies, government agencies, NGOs, and local communities, in promoting SDG-11 alignment in the construction sector?

VI. What are the current sustainability practices and initiatives implemented in construction projects in Bangladesh? How do these practices contribute to SDG-11 alignment?

VII. How do you measure or assess the impact of construction projects on SDG alignment? Are there any specific indicators or metrics used?

VIII. What are the potential benefits or advantages of aligning construction projects with SDGs in Bangladesh? How can SDG-9 alignment contribute to sustainable development in the country?

IX. Are there any specific policies or regulations in place to promote SDG alignment in the construction sector? How effective are these policies in practice?

X. How can the construction sector in Bangladesh effectively collaborate with other stakeholders, such as architects, engineers, labor unions, and local communities, to enhance SDG-9 alignment in construction projects?

XI. What ethical considerations are important to address when researching the alignment of construction projects with SDGs & eleven in Bangladesh?

XII. What are the challenges faced by construction stakeholders in integrating SDG-9-aligned opportunities into their projects, and how can these challenges be effectively addressed?

APPENDIX C: ACADEMIC DOCUMENTS

Office Record	*Receipt*
Date Received: Received by:	Student name: Student number: Received by: Date:

ACADEMIC RESEARCH ETHICS DISCLAIMER

Instruction:

The following declaration should be made in cases where applicant and the supervisor(s)/lecturer(s) of the research project/assignment conclude that it is not necessary to apply for research ethics approval for the research project/assignment.

Project/Assignment Title:

Exploring Challenges and Opportunities in Aligning Construction Projects with SDGs in Bangladesh

Declaration:

We confirm that the University's guidelines for research ethics approval have been consulted and that all ethical issues and implications in relation to the above project/assignment have been considered. We confirm that research ethics approval need not be sought.

Tanzin Mahmood Siddiquei		27.02.2024
Name of Research Project/Assignment Applicant	E-signature	Date
Hemalata Vasudavan		2/3/2024
Name of Research Project Supervisor/ Assignment Lecturer	E-signature	Date

Office Record	Receipt – APU Fast-Track Ethical Approval
	Student name:
Date Received:	Student number:
	Received by:

APU/APIIT FAST-TRACK ETHICAL APPROVAL FORM (STUDENTS)

Tick one box (level of study):

√☐ POSTGRADUATE (PhD / MPhil / Masters)

☐ UNDERGRADUATE (Bachelors degree)

☐ FOUNDATION / DIPLOMA / Other categories

Tick one box (purpose of approval):

√☐ Thesis / Dissertation / FYP project

☐ Module assignment

☐ Other: _____

Title of Programme on which enrolled … … … Masters of Project Management … … … … … …

Tick one box: √ ☐ Full-Time Study or ☐ Part-Time Study

Student Researchers- please note that certain professional organizations have ethical guidelines that you may need to consult when completing this form.

Supervisors/Module Lecturers - please seek guidance from the Chair of the School Research Ethics Committee if you are uncertain about any ethical issue arising from this application.

		YES	NO	N/A
1	Will you describe the main procedures to participants in advance, so that they are informed about what to expect?	√		
2	Will you tell participants that their participation is voluntary?	√		
3	Will you obtain written consent for participation?			√
4	If the research is observational, will you ask participants for their consent to being observed?			√
5	Will you tell participants that they may withdraw from the research at any time and for any reason?	√		
6	With questionnaires and interviews will you give participants the option of omitting questions they do not want to answer?	√		
7	Will you tell participants that their data will be treated with full	√		

	confidentiality and that, if published, it will not be identifiable as theirs?			
8	Will you allow participants to be debriefed i.e. to find out more about the study and its results?	√		

If you have ticked No to any of Q1-8**,** you should complete the full Ethics Approval Form.

		YES	NO	N/A
9	Will your project/assignment deliberately mislead participants in any way?		√	
10	Is there any realistic risk of any participants experiencing either physical or psychological distress or discomfort?		√	
11	Is the nature of the research such that contentious or sensitive issues might be involved? This includes research that could induce psychological stress, anxiety, or humiliation, or cause more than minimal pain.		√	
12	Does your research involve the use of sensitive materials? Eg, records of personal or sensitive confidential information,		√	
13	Does your research require external agency approval?		√	
14	Does your research use hazardous or controlled substances?		√	
15	Does your research require you to visit participants in their homes or non-public spaces?		√	
16	Does your research use genetically modified organisms?		√	
17	Does your research investigate illegal activities or behaviors?		√	
18	Does your research involve discussion or collection of information on potentially sensitive, embarrassing, or distressing topics, administrative or secure data? This includes research involving respondents through the Internet where visual images are used, and where sensitive issues are discussed		√	
19	Does your research involve invasive or potentially intrusive procedures?		√	
20	Does your research involve the administration of substances?		√	
21	Will your research be involved in the collection/ processing of human tissue samples?		√	
22	Will your participants be receiving financial compensation for participating in your research?		√	
23	Will your research data be used in the future after the conclusion of		√	

	your project?			
24	Will your research involve in processing sensitive data belonging to an organization/person?	√		
25	Will your research be collecting photographs, videos, and audio recordings of the participants?	√		
26	Will the participants' particulars be known to any third party?	√		
27	Will the participants' data confidentiality be made known to the public?	√		
28	Will the research be conducted where the safety of the researchers may be in question?	√		
29	Will the research be conducted outside of the UK and/or Malaysia?	√		
30	Will your research involve human participants at premises other than those of the University?		√	

If you have ticked Yes to any of Q9 – 30**,** you should complete the full Ethics Approval Form. About question 10 this should include details of what you will tell participants to do if they should experience any problems (e.g. who they can contact for help). You may also need to consider risk assessment issues.

			YES	NO	N/A
31	Does your project/assignment involve work with animals?			√	
32	Do participants fall into any of the following special groups? **Note that you may also need to obtain satisfactory clearance from the relevant authorities**	Children (under 18 years of age)		√	
		People with communication or learning difficulties			
		Patients			
		People in custody			
		People who could be regarded as vulnerable or cannot make decisions for themselves			
		People engaged in illegal activities (eg drug taking)			
		Groups of people whose relationship with each other allows one to influence the other such as: Carers and patients with chronic conditions; teachers and their students; prison authorities and prisoners; employers and employees			

		Deceased person's body parts or other human tissues including bodily fluids (e.g. blood, saliva).			
		groups where permission of a gatekeeper is normally required for initial access to members.			
		Human participants who are off-campus APU staff or students who wish to carry out investigations involving human participants at premises other than those of the University			
33	Does the project/assignment involve external funding or external collaboration where the funding body or external collaborative partner requires the University to provide evidence that the project/assignment had been subject to ethical scrutiny?			√	

If you have ticked Yes to any Q31-33**,** you should complete the full Ethics Approval Form. There is an obligation on the student and supervisor to bring to the attention of the APU School Research Ethics Committee any issues with ethical implications not covered by the above checklist.

STUDENT RESEARCHER

Provide in the boxes below (plus any other appended details) the information required in support of your application. THEN SIGN THE FORM.

Please Tick Boxes

I consider that this project/assignment has no significant ethical implications requiring a full ethics submission to the APU School Research Ethics Committee.	√
I am aware of APU's liability policy and will make the necessary arrangements for insurance coverage of all researchers and participants of the project/assignment.	
Give a brief description of participants, the procedure of recruitment, and the procedure of data collection (methods, tests used, etc) in up to 150 words. The participants from construction-related projects and construction equipment suppliers were interviewed. The data was recorded and transcribed for analysis and results.	
I also confirm that: i) All key documents e.g. consent form, information sheet, questionnaire/interview, and all material such as emails and posters for recruitment of participants are	√

appended to this application. Or ii) Any key documents e.g. consent form, information sheet, questionnaire/interview schedules which need to be finalized following initial investigations will be submitted for approval by the project/assignment supervisor/module lecturer before they are used in primary data collection.	√

Signed… … Print Name… Tanzin Mahmood Siddiquei … Date… 27.02.2024

(Student Researcher)

Within this document, any variation to the items considered that affect the ethical issues of the stated research will require submission of a revised research plan and research methodology details; as a consequence, new ethical consent may need to be sought.

The completed form (and any attachments) should be submitted for consideration by your Supervisor/Module Lecturer

SUPERVISOR/MODULE LECTURER

PLEASE CONFIRM THE FOLLOWING:

	Please Tick Box
I consider that this project/assignment has no significant ethical implications requiring a full ethics submission to the APU School Research Ethics Committee	
I have checked and approved the key documents required for this proposal (e.g. consent form, information sheet, questionnaire, interview schedule)	

SUPERVISOR AND SECOND ACADEMIC SIGNATORY

STATEMENT OF ETHICAL APPROVAL (please delete as appropriate)

1) **THIS PROJECT/ASSIGNMENT HAS BEEN CONSIDERED USING AGREED APU PROCEDURES AND IS NOW APPROVED**

2) **THIS PROJECT/ASSIGNMENT HAS BEEN APPROVED IN PRINCIPLE AS INVOLVING NO SIGNIFICANT ETHICAL IMPLICATIONS, BUT FINAL APPROVAL FOR DATA COLLECTION IS SUBJECT TO THE SUBMISSION OF KEY DOCUMENTS FOR APPROVAL BY SUPERVISOR (see Appendix A)**

Signed… *HMV*… … … … … … … … … … … Print Name… … Hemalata Vasudavan… …Date…2/3/2024 … … …

(Supervisor/Lecturer)

VVRAJ

Signed… … … … … … … … … … … … Print Name …Vijayaraj Vijayasingam Date… 7/03/2024
(Second Academic Signatory

Office Record	Receipt – Appendix A (APU Fast-Track Ethics Form)
Date Received:	Student name: Student number:
Received by:	Received by: Date:

APPENDIX A

AUTHORISATION FOR THE USE OF KEY DOCUMENTS

Completion of Appendix A is required when for good reasons key documents are not available when a fast-track application is approved by the supervisor/module lecturer and second academic signatory.

I have now checked and approved all the key documents associated with this proposal e.g. consent form, information sheet, questionnaire, interview schedule

Title of project/assignment… … … …

Office Record	Receipt
Date Received:	Student name:
Received by whom:	Student number:
	Received by:
	Date:

This form must be completed by the researcher, and submitted (in the case of undergraduate– and postgraduate projects/assignments) to the designated supervisor, who should consider it and if approved, then forward it to the APU School Research Ethics Committee. The latter should keep it on file as an agreed record of the research being undertaken. Proposals for staff research projects that require ethical approval should also be considered by this Committee.

1. RESEARCHER

Tick one box (level of study):	Tick one box (purpose of approval):
√ POSTGRADUATE (PhD / MPhil / Masters)	√ Thesis / Dissertation / FYP project
☐ UNDERGRADUATE (bachelor's degree)	☐ Module assignment
☐ FOUNDATION / DIPLOMA / Other categories	☐ Other: _____

Title of Programme on which enrolled … … … Masters of Project Management … … … … … …

Tick one box: √ ☐ Full-Time Study or ☐ Part-Time Study

2. RESEARCH PROJECT

Please offer a brief paragraph indicating answers to the following questions where relevant:

- Where the research is to be carried out;
- Whether adequate facilities are in place enabling the project/assignment to be properly carried out;
- Whether procedures are in place given the occurrence of any adverse event;
- Names of other individuals or organizations involved in the project/assignment;
- Whether other approvals have been gained or are to be sought.

Answer:

The research proposal titled "Exploring Challenges and Opportunities in Aligning Construction Projects with SDGs in Bangladesh" delves into the intricate dynamics between the construction sector and sustainable development in Bangladesh, emphasizing the need for aligning construction projects with the United Nations' Sustainable Development Goals (SDGs). The research aims to identify and scrutinize the challenges and opportunities that emerge in integrating SDG principles within the construction industry, thereby contributing to sustainable, inclusive, and resilient urban development in Bangladesh.

3. PURPOSE OF RESEARCH PROJECT / ASSIGNMENT

Please offer a brief paragraph indicating:

1. The aims and objectives of the project/assignment;
2. Its rationale;
3. The research question or specific hypotheses to be tested;
4. The background to the project/assignment.

Answer:

The rationale behind this study stems from the critical role the construction industry plays in Bangladesh's economy and its significant impact on environmental and social facets. Given the country's progress in achieving the Millennium Development Goals and the broader, interconnected nature of the SDGs, this research seeks to bridge the gap between current construction practices and the sustainability objectives outlined by the SDGs. By investigating the current state of construction projects in relation to SDG alignment, the study aims to offer insights that could guide policymakers, stakeholders, and practitioners toward more sustainable development practices within the sector.

NB. It is not the job of the APU School Research Ethics Committee to consider the methodology of the research project/assignment. However this Committee does need assurance that the appropriate methodology has been properly considered before it can consider whether the project/assignment is ethically justifiable.

4. BRIEF OUTLINE OF THE PROJECT

Please offer a summary of the procedures it is proposed to follow in carrying out the project/assignment. Such descriptions might vary according to the nature of the project/assignment and the academic area involved, but they should normally include at least the following:

1. The design of the project/assignment (including, where appropriate, issues of statistical power);
2. The procedures to be followed;
3. The participation of subjects in the project/assignment;
4. How the design of the project/assignment and the procedures to be followed are likely to assess the research question or test the hypothesis in question or establish some significant result.

Answer:

To achieve its objectives, the proposed research will employ a comprehensive methodology that includes an investigation into the existing literature, case studies, and empirical data collection through interviews and surveys within the Bangladeshi construction industry. This approach aims to identify specific challenges such as resource utilization, environmental impact, and societal implications of construction projects, alongside exploring potential opportunities for innovation, sustainability, and resilience in line with SDG targets.

5. RECRUITMENT OF SUBJECTS

This section should contain clear information indicating the basis on which the proposed participating subjects are appropriate to the project/assignment. Normally researchers should adequately answer the following questions:

1. The number of subjects involved in the study (including the adequacy of the sample size) and how it is proposed to recruit them;
2. Whether there are any inclusion or exclusion criteria, together with their justification;
3. The age range of subjects; the gender balance of subjects; and the state of health of subjects;
4. Whether there is any inducement to participate in the study;
5. Whether the project/assignment involves any special groups requiring some additional justification or permission (e.g. whether subjects are especially vulnerable, i.e. children, students, the elderly, those with learning difficulties or mental health problems, those with some disadvantage or dependency, those in hospital or those in prison).

Answer:

The research involves construction industry stakeholders in Bangladesh, including companies, government agencies, NGOs, and local communities affected by construction projects. Participants are chosen for their direct involvement or impact by construction practices and projects in relation to the SDGs. The document d specify the number of subjects involved like construction, their age range like between 25-60 years old, and work experience. There is mention of participation or specific criteria detailed within the provided excerpts. Additionally, the research does not explicitly state if it involves vulnerable groups that would require additional justification or permission for participation. The focus is on qualitative insights from these stakeholders to understand the alignment of construction practices with the SDGs and the barriers and opportunities encountered.

NB. Researchers must also ascertain from their Supervisor whether or not they need to obtain clearance from relevant authorities to enable this project/assignment to proceed. If this is the case the application must make clear whether or not, it has been obtained. Any data collection or other activities requiring this clearance must not begin until it has been obtained

6. PARTICIPATION OF SUBJECTS

Please provide two documents. These are an Information Sheet and a Consent Form, and each should be attached to your application. The first must ensure that the subject has a proper understanding of their participation in the project/assignment, and the second that they have given informed and voluntary consent to their involvement in it. Some notes for guidance follow.

INFORMATION SHEET

This will be provided to the subject prior to taking consent, and must explain the broad purpose of the project/assignment, the basis on which the subject has been chosen, what is required of the subject in the project/assignment, whether there are any possible disadvantages or risks in taking part, the benefits gained by taking part (either to the subject, the researcher or the scientific community), what will happen if something goes wrong, what happens to any information obtained about the subject, the expected results of the study, who is responsible for it, and a contact name. The Information Sheet must be written in a clear, informative, and intelligible way.

The Information Sheet must include a description of how subjects are involved in each stage of the study. This should relate back to §4 above. Their participation will vary according to the nature of the project/assignment, but will explain what is required of each subject (i.e. what kinds of measurements or observations will be undertaken, and by what means) and especially those that involve some risk or discomfort or which have other ethical implications (i.e. administration of substances, sampling of bodily fluids or tissue, or placebo or control groups, or genetic information).

CONSENT FORM

A properly designed Consent Form must also be attached to this application. It should include [a] the title of the research project/assignment as in Section 2 above, [b] opportunity for confirmation by the subject that they have read and understood the Information Sheet (see above) and have been able to ask questions, [c] that their involvement is voluntary and that they have the right to withdraw at any time without providing reasons and without their rights being affected, and [d] that they understand that personal information about them may be looked at by researchers or other responsible individuals.

The Consent Form should indicate how individual informed and voluntary consent will be obtained. Sometimes (as in the case of Question 5 in §5 above) it will be necessary to indicate how parental or guardian agreement will be obtained.

The Consent Form must include space for properly dated signatures of the subject that they agree to participate in the project/assignment, together with the names of the person taking consent and/or the researcher.

7. INFORMATION AND DATA

The application must contain a clear statement of what information will be collected about each subject, the data obtained as part of the procedures described in §4, how it is proposed the data will be stored, how the data contributes to the project/assignment, together with a statement of how long it will be stored and how eventually discarded.

Please offer answers to the following questions:

1. What information about the subject do you wish her or him to disclose to you in order for the project/assignment to commence?
2. What data will be gained about the subject in the various stages of the project/assignment?
3. What form does this data take (measurements, observations, audio/video tape recording)?
4. How will this data be stored (manually or electronically)?
5. How is protection given to the subject (e.g. by being made anonymous through coding and with a subject identifier code being kept separately and securely)?
6. What assurance will be given to the subject about the confidentiality of this data and the security of its storage?
7. Is assurance given to the subject that they cannot be identified from any publication or dissemination of the results of the project/assignment?
8. Who will have access to this data, and for what purposes?
9. How is the data relevant to the project/assignment and the determination of its results?
10. How will the data be stored, for how long, and how will it be discarde

Answer:

The research proposal outlines a comprehensive approach to data collection, storage, and ethical considerations concerning participant information. Initially, subjects participating in the study will disclose insights related to the integration of Sustainable Development Goals (SDGs) within construction projects in Bangladesh, focusing on various aspects such as project design, sustainability practices, and challenges encountered. The data collection will unfold through semi-structured interviews, capturing detailed narratives on personal experiences, attitudes, and opinions towards SDG alignment in construction practices. This qualitative data, encompassing transcribed interviews, observational notes, and potentially audio recordings, will be stored electronically, with tools like NVivo 14 facilitating the organization and analysis of the gathered information.

To safeguard participant privacy and confidentiality, all collected data will be anonymized, with identifiers stored separately and securely, ensuring that individual participants cannot be recognized in any research outputs. The research team will have exclusive access to this data, used strictly for analysis related to the project's objectives. Participants will be reassured about the stringent measures in place to maintain the confidentiality and security of their data, with clear communication that their identities will remain undisclosed in any publications or dissemination of the research findings. Lastly, the data, crucial for dissecting the intricacies of SDG alignment in the construction sector of Bangladesh, will be retained only as long as necessary for the research and subsequent analyses, after which it will be

securely discarded, adhering to ethical guidelines and data protection standards. This methodical approach underscores a commitment to ethical research practices, prioritizing participant protection and data integrity throughout the study.

8.RISK, HARM AND OTHER ETHICAL CONSIDERATIONS

This final section invites an estimate by the researcher of the perceived benefits or outcomes of the project/assignment weighed against the possible harms caused to the participating subjects or researchers. Please submit two brief paragraphs. The first should identify both [a] any potential risks or hazards that might be caused to subjects or the researcher, in addition to any discomfort, distress or inconvenience to them, together with any ethical problems or considerations that the researcher considers to be important or difficult in the proposed project/assignment; and [b] offer an explanation of how it is proposed to deal with them, along with any justificatory statements.

The second paragraph provides an opportunity for the researcher to highlight any remaining ethical considerations and to respond to them in a way which may assist the School Research Ethics Committee in arriving at some judgement upon the proposal. This second paragraph is not an invitation to take on the work of the Committee, but rather emphasises the expectation that both researcher and Committee share the responsibility for assuring that the proposed research will be carried out ethically and with full regard to ethical principles.

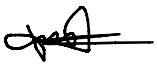
The research on aligning construction projects with Sustainable Development Goals (SDGs) in Bangladesh necessitates thorough ethical considerations to mitigate potential risks to subjects and researchers. The process of obtaining informed consent is paramount, ensuring participants are fully aware of the research's purpose and their roles, thereby minimizing any discomfort or distress. Privacy and data confidentiality are to be rigorously maintained, with measures in place to preserve participant anonymity, addressing potential ethical dilemmas around data handling and participant identification. Ethical challenges, such as ensuring the voluntary nature of participation and avoiding any undue influence or harm to the subjects, are anticipated and will be addressed through transparency, fairness, and adherence to ethical guidelines, with continuous monitoring to maintain ethical integrity throughout the research process.

Further ethical considerations involve the balancing of research benefits against potential harms. The research is committed to contributing positively to the understanding of sustainable development within the Bangladeshi construction sector, aiming for outcomes that benefit stakeholders without causing harm. This includes respecting participant rights, ensuring equitable treatment, and maintaining confidentiality and security of data. The researcher acknowledges shared responsibility with the School Research Ethics Committee in upholding ethical standards, emphasizing the importance of ethical conduct in achieving meaningful and credible research outcomes. The proactive approach to ethical considerations reflects a commitment to conducting the research responsibly, aligning with both academic standards and the broader goal of fostering sustainable development in the construction industry in Bangladesh.

9. SIGNATURES OF RELEVANT PERSONS

I undertake to carry out the project/assignment described above in accordance with ethical principles. I have completed the application in good faith. I accept that providing false information constitutes scientific fraud and will be subject to appropriate disciplinary procedures.

I understand that should any circumstances change which may affect ethical elements of this project/assignment, I must then inform my supervisor/lecturer to ensure that any supplementary ethical approval is sought and approved before further conducting this project/assignment.

Signature of Researcher  Date:28.02.24

I have examined this proposal, and confirm that the rationale and methodology is appropriate and that it can proceed to the stage of ethical consideration.

Signature of Supervisor or Lecturer: JCMV Date:11/3/2024

This research proposal has received ethical approval either by a supervisor on behalf of the Committee or has been considered by the Committee and received ethical approval.

Signature of Chair, APU School Research Ethics Committee Date

(APU: Serial Number)

PLS V1.0

PDRM/BRM & Dissertation Log Sheet – Supervisory Session

Notes on use of the project log sheet:

1. This log sheet is designed for meetings of more than 15 minutes duration, of which there must be at minimum SIX (6) during the course of the project (SIX mandatory supervisory sessions).
2. The student should prepare for the supervisory sessions by deciding which question(s) he or she needs to ask the supervisor and what progress has been made (if any) since the last session, and noting these in the relevant sections of the form, effectively forming an agenda for the session.
3. A log sheet is to be brought by the STUDENT to each supervisory session.
4. The actions by the student (and, perhaps the supervisor), which should be carried out before the next session should be noted briefly in the relevant section of the form.
5. The student should leave a copy (after the session) of the PDRM/BRM & Dissertation Log Sheet with the supervisor and to the administrator at the academic counter. A copy is retained by the student to be filed in the project file.
6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the dissertation, with sheets dated and numbered consecutively.

Student's name: Tanzin Mahmood Siddiquei **Date:** 28.11.2023 **Meeting No:** 01

Dissertation/Project title: … Masters of Project Management ……

Intake : … APDMF2303PM

Supervisor's name: Ms. Hemalata Vasudavan **Supervisor's signature:** HMV……..

Items for discussion (noted by student before mandatory supervisory meeting):

1. Discuss about previous project proposal.
2.
3.

Record of discussion (noted by student during mandatory supervisory meeting):

1. Updating the research proposal part.
2.
3.

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. Review an existing case study and review it under the literature review
2. Take interviews for qualitative research.
3.

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.

(APU: Serial Number)

PLS V1.0

PDRM/BRM & Dissertation Log Sheet – Supervisory Session

Notes on use of the project log sheet:

1. This log sheet is designed for meetings of more than 15 minutes duration, of which there must be at minimum SIX (6) during the course of the project (SIX mandatory supervisory sessions).
2. The student should prepare for the supervisory sessions by deciding which question(s) he or she needs to ask the supervisor and what progress has been made (if any) since the last session, and noting these in the relevant sections of the form, effectively forming an agenda for the session.
3. A log sheet is to be brought by the STUDENT to each supervisory session.
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Student's name: Tanzin Mahmood Siddiquei **Date:** 05.12.2023 **Meeting No:** 02

Dissertation/Project title: … Masters of Project Management ……

Intake : … APDMF2303PM

Supervisor's name: Ms. Hemalata Vasudavan **Supervisor's signature:** HMV……..

Items for discussion (noted by the student before the mandatory supervisory meeting):

1. Update the Previous proposal part.

2.

3.

Record of discussion (noted by the student during the mandatory supervisory meeting):

1. Discuss about interview questions and method.

2.

3.

Action List (to be attempted or completed by the student by the next mandatory supervisory meeting):

1. Add citations in the problem statement.
2. The interview questions - indicate which SDG referring.

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.

(APU: Serial Number)

PLS V1.0

PDRM/BRM & Dissertation Log Sheet – Supervisory Session

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Student's name: Tanzin Mahmood Siddiquei **Date:** 30.01.2024 **Meeting No:** 03

Dissertation/Project title: … Masters of Project Management ……

Intake : … APDMF2303PM

Supervisor's name: Ms. Hemalata Vasudavan **Supervisor's signature:** …HMV……..

Items for discussion (noted by student before mandatory supervisory meeting):

1.
2.
3.

Record of discussion (noted by student during mandatory supervisory meeting):

1. Chapter 4 Data analysis method.
2.
3.

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1.
2.
3.

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.

(APU: Serial Number)

PLS V1.0

PDRM/BRM & Dissertation Log Sheet – Supervisory Session

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6. It is recommended that students bring along log sheets of previous meetings together with the project file during each supervisory session.
7. The log sheet is an important deliverable for the project and an important record of a student's organisation and learning experience. The student **must** hand in the log sheets as an appendix of the dissertation, with sheets dated and numbered consecutively.

Student's name: Tanzin Mahmood Siddiquei **Date:** 02.03.2024 **Meeting No:** 04

Dissertation/Project title: … Masters of Project Management ……

Intake : … APDMF2303PM

Supervisor's name: Ms. Hemalata Vasudavan **Supervisor's signature:** HMV……..

Items for discussion (noted by student before mandatory supervisory meeting):

1. Ethical Approval Letter
2.
3.

Record of discussion (noted by student during mandatory supervisory meeting):

1. Fill up and sign in ethical letter and other documents.
2.
3.

Action List (to be attempted or completed by student by the next mandatory supervisory meeting):

1. Complete action for Chapter 5
2.
3.

Note: A student should make an appointment to meet his or her supervisor (via the consultation system) at least ONE (1) week prior to a mandatory supervisor session – please see document on project timelines. In the event a supervisor could not be booked for consultation, the project manager should be informed ONE (1) week prior to the session so that a meeting can be subsequently arranged.

APPENDIX C: GANTT CHART

Task		September	October	November	December	January	February	March
Chapter 1	Background of research							
	Problem statement							
	Significance & scope							
Chapter 2	Literature review							
Chapter 3	Research Methodology							
Chapter 4	Data Collection for Interview							
	Data transcription							
	Data Analysis Procedures							
	Summary of core themes							
	Chapter Summary							
Chapter 5	Solution and Conclusion							
	Overview of Chapter 4							
	Conclusion and discussion							
	Theoretical implications							
	Strengths and weakness							
	Recommendation for future research							
Finalization	Compilation							
	Final Review							