Construction Sustainability in Indian Perspective-A Review

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1 Introduction

India is the 7th largest country in the world and has been a home for more than a billion people. Construction industries of India take about 6.5% of country's GDP. During the last few decades, the investors found an open opportunity in bringing sustainability into play, particularly the commercial and residential construction, as these two groups contribute toward a major part of the industry, as both of them consume more energy and ultimately causing more and more emission of gasses. So, it becomes obvious for all the businesses related and the policymakers to endorse sustainability into construction project management. There is a lot of literature available about sustainable construction practices, among which PPMBOK (Project Management Body of Knowledge) is the most common and actively used.

1.1 Concept of Sustainability in Project Management

The word sustainability is derived from the Latin word 'sustinere' which means 'to hold'. In the context of the construction project, it means the act of balancing the social, economic, and most importantly the environmental facets of any project without compromising the needs of future generations. Due to the growing urbanization of cities, the level of pollution, and resource exploitation, it has become the need of the hour to implement the sustainable practices of project management into our construction industries. This article attempts to bring forward the scenario of

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A. K. Agnihotri et al. (eds.), *Proceedings of Indian Geotechnical and Geoenvironmental Engineering Conference (IGGEC) 2021, Vol. 2*, Lecture Notes in Civil Engineering 281,
https://doi.org/10.1007/978-981-19-4731-5_29

sustainable construction practices in Indian industries and also the obstacles faced by the industries in implementing sustainability in their projects.

2 Literature Review

Sádaba et al. [1] performed a detailed literature analysis with over 100 references to examine the relationships between the two fields. In this article, the author tries to put forward a new set of guidelines for project managers to deal with the projects in a pretty sustainable way. Also, the author has a future agenda of how project management can lead to sustainability in construction companies and construction projects.

Sharma et al. [2] to find a use of 'Adobe' as a sustainable building material, several tests on the commonly used building material in rural hilly areas were performed, i.e., 'Adobe'. The tests such as sieve analysis, proctor compaction test, compressive strength test, etc. The tests conclude that the use of Adobe as a sustainable material can help rural construction in many sustainable ways.

Mokal et al. [3] analyzed the need for using eco-friendly materials in our construction practices. In this article, the author finds some eco-friendly materials which can be used as a substitute to conventional building materials without compromising the strength and durability of the structure. Materials such as lime, eco-friendly tiles, sand-lime bricks, etc. are the materials that can be used to replace the conventional building materials so that the sustainability of projects can be achieved.

Boks et al. [4] in their review of literature in the context of design for sustainability (DFS) and project management, tried to find the gap between the project management literature and design for sustainability.

Banihashemi et al. [5] in their work have highlighted the most vital factors in attaining sustainable project management. Their work engrossed on the significant methods of integrating sustainability into construction project management. Factors such as the role of clients, first-class workmanship, tactical direction, health and safety procedures, project manager's knowledge, etc. were recognized as some of the chief focuses in making a sustainable construction project management.

Ogunde et al. [6] surveyed different construction companies by giving them questionnaires and receiving the data in terms of feedback. This data was used to analyze different success factors such as project manager's involvement, client's interest, effective communication, efforts of workforce, etc.

Reddy et al. [7] worked on the measure of finding innovative methods of using sustainable building construction materials in building modern cities. Also, waste production by the Indian construction sector is a major cause of pollution. So, using sustainable materials could reduce wastage and hence lead to sustainable construction.

Gupta et al. [8] carried out a case study in which the whole intention was to make efforts for using sustainable building materials rather than using natural resources. He also found that natural resources tend to be cheaper and readily available over

indigenous materials such as low VOC paint, LED lighting system, etc. Moreover, the use of green building designs is also helpful for attaining eco-friendly construction.

Reddy et al. [9] worked on building a Sustainable Building Assessment Tool (SBAT) to compare the level of sustainability of any building structure. The already present and widely used assessment tools like GRIHA, LEED, and IGBC seem to have limitations against Indian construction. So, here arises the need of developing a Sustainable Building Assessment Tool.

Agarchand and Laishram [10] carried out their study on infrastructure develop through public–private partnership (PPP). Though the construction in this mode in this mode is going at a good pace there arises there need for establishing the guidelines for sustainable construction practice. The work was carried by the means of literature review and interview.

Chawla et al. [11] carried out a study in which various issues in connection with the sustainability aspect of the project were identified. These issues were found between the year 1987–2018. Threats, opportunities, and challenges related to sustainable construction project management were pointed out in this study.

Syamimi and Ling [12] worked on finding the main factors that would force the construction companies to incorporate sustainable construction project management. According to their article government policies, client awareness, high fuel cost, international pressure, the high reputation of organizations, etc. are some of the important drivers that would make organizations implement sustainable construction.

Solaimani and Sadighi [13] investigated the need for Lean construction practices while keeping in view the other aspects too, such as concerns of stakeholders, the concern of people, and preventing this planet from exploiting its resources.

Jat and Mane [14] worked basically toward the choice of clients while choosing a conventional approach of construction or green building approach because the choice of any customer would surely have a major impact on the price of construction. Though the green building is more expensive than the conventional buildings but in the long run green builds require less maintenance as compared to conventional buildings.

Gupta et al. [15] in their two-year research work focused on identifying the need, tools, obstacles, and limitations of mainstreaming sustainable social house building. Due to the constant pressure of the growing population, the need for timely completion and sustainable projects has taken a peek. So, it becomes necessary to make sustainable construction practices very common among clients.

Hirpara et al. [16] acknowledged the crucial factors affecting the culture of sustainable construction projects. Due to the rapid urbanization, the resources are utilized at a continual pace, which is going to lead to environmental depletion in the coming years of construction. Through a questionnaire survey, the data collected was used to identify the most important factors governing the sustainable construction approach.

Chourasia [17] worked on finding the possibility of using bamboo in construction needs while listing the various properties of bamboo-like easily available, its strength (tensile and bending), durable, etc. due to its engineering properties such as tensile strength, bamboo has been used in past also as a building material. In his work, the author has mentioned methods of improving the engineering properties of bamboo.

Patidar [18] researched and collected some data from some selected green buildings in India. These buildings tend to be GRIHA-certified buildings. Upon the findings, it was found that GRIHA-certified buildings had both environmental and economic benefits. The work of the author focuses on the effectiveness of GRIHA-certified architectures in comparison to contemporary architectures.

Goel et al. [19] reviewed and assessed the status of sustainable construction practices in India. With the help of inductive and qualitative analysis, three categories were formed viz: social, economic, and environmental. These categories unveiled huge deviation among the prevailing construction practices and the required construction practices for a sustainable construction project.

Manna and Banerjee [20] have put forth the green building movement and the criteria for the certification process of green buildings. The author has mentioned many green building rating systems in their work and elaborated on the role of these rating systems. Criteria like the selection of sustainable sites, water efficiency, energy and atmosphere, materials and resources, etc. are required for any building to get green building certification.

Mistri et al. [21] analyzed the lack of factors for a successful construction project management and observed the impact of these factors on achieving sustainable project management. The author highlights the skill shortage among artisans as the first lacking factor in achieving sustainable construction. Analytic Hierarchy Process (AHP) was used to divide the causes of skill shortage into different categories.

Nayak and Kayarkatte [22] carried out a comprehensive literature review to find state the status of sustainable green building construction in India. The author's works also rely on finding the role of rating systems in India in making India a green country along with finding the limitations of green buildings. In the end, the authors suggest some strategic policies to get Indio more into green building construction.

Gangwar et al. [23] to study India's rating system for green buildings also put an overview about the principles of design of sustainable housing in India. The systems like GRIHA, IGBC, and Eco-Housing Assessment Criteria were selected for the study.

Aghaegbuna et al. [24] carried out a study to find the obstacles faced by the construction project managers in achieving both the sustainability and success of a construction project. The work was carried out by circulating a questionnaire among the construction companies.

Akula Prakash et al. [25] defines a sustainable building as "the plan and development of structures utilizing strategies and materials that are asset productive and that will not bargain the wellbeing of climate or the related wellbeing and prosperity of the structure's inhabitants". In his work, he tries to mention the deterrents in attaining sustainable construction.

Nithya et al. [26] worked on finding a way to avoid wastage in construction industries in India. Their work also emphasizes the prevailing technology in India taking care of the waste generated from construction industries. Different types of wastes were identified by the author. This study also enlightens some of the initiatives taken by the government of India for infusing zero wastage policies in Indian construction industries to provide a sustainable future.

3 Conclusion

Keeping in view the existing literature, this article carried out an exploratory review on the importance and utilization of sustainable project management in the design for sustainability approach. This study aimed to find out the challenges faced by the construction companies and project managers in practicing sustainable construction project management and the methods and efforts to be taken to make sustainable construction project management a sound practice of management in the construction companies. The challenges such as labor-related challenges, work-related challenges, time-related challenges, etc. need to be taken care of. Further for the actual field-work, a survey questionnaire is to be prepared and circulated among the construction companies across India and get actual data for the research.

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