

INVESTIGATING INTEGRATION OF SUSTAINABILITY IDEAS IN DESIGN OF CONSTRUCTION PROJECTS

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Abstract - Sustainable construction design is a concept which reduces the negative impact on the environment, increases durability and comfort for the community. Construction sector is a key to create a healthy, happy and thriving economic climate in the communities. Importance should be given to the future success and a critical role for creating enhanced sustainability in various projects. The important aim for adopting sustainable infrastructure design is to progress, integrate the ideas, information of sustainability with principles implemented into practices used and entirely eradicating adverse environmental impact throughout the lifecycle of any construction projects. Construction clients and governments recognize the significant impact the design, construction and occupation of buildings have on the environment and society. The construction industry and governments have a central role in driving the sustainable development agenda. Good sustainable design can deliver buildings with low running costs-an attribute that is highly attractive to both the society and businesses. The concluding remark for this research is that there is an essential need for accepting and implementing sustainable infrastructure design which will have a positive impact on environment in design phase throughout the lifecycle of construction projects

Key Words: *sustainable building , sustainability principles , conceptual framework; resource conservation; technologies*

1. INTRODUCTION

The construction industry is a vital element of an economy and has significant impact on the environment. Sustainable approach has a high potential to make a valuable contribution to sustainable development. The idea of sustainability involves enhancing the quality of life, thus allowing people to live in a healthy environment, with improved social, economic and environmental conditions. Industry practitioners have begun to pay attention to controlling and correcting the environmental damage due to their activities. Architects, designers, engineers and others have a unique opportunity to reduce environmental impact through the implementation of sustainability objectives at the design development stage of a project. While current sustainability initiatives, strategies and processes focus on wider global aspirations and strategic objectives, they are noticeably weak in addressing micro-level i.e., at project specific level. This research therefore compliments existing research in the field of sustainability for implementing sustainability ideas at the project phase-specific level i.e., at the design stage of a project.

2. SUSTAINABLE DESIGN

Also called as Environment Responsive Design, it is integration of conceptual and schematic designs delivering services, built environment and materials complying with principles of ecological sustainability. The sole purpose of adopting sustainable design embodies removal of adverse environmental impact completely, through proficient and sensitive formulation of design specifications.

While designing for environment sustainability, it is imperative that appropriate standards and data is accounted that provides intelligent baseline weighed on similar levels, giving perspective if design is actually sustainable in long run. An expeditious growth of economic activity and human population, depletion of natural resources, damage to ecosystem and loss of biodiversity, sustainable design is prevalent reaction to global environmental crisis.

Primarily, limits of sustainable design implementation allocate to increased complexity of efficiency improvements, secondly drawback of implementing new technologies in societal built around old environment, accounts for rather than just switching to new sustainable design, rather flow of information and invention development should be achieved, adhering to values of sustainability, thus delivering sustainable goal.

3. SUSTAINABLE INFRASTRUCTURE DESIGN

Reintegration, reprocess and optimization of existing infrastructure, consistent with principals of urban sustainability and global sustainable development is what defines sustainable infrastructure design. It provides critical problems solutions, manages risk more efficiently, while working in direction of achieving sustainability goals.

Encompassing infrastructure rehabilitation, infrastructure economic analysis, energy used, reduced infrastructure costs, preserving existing infrastructure from environmental degradation, durable material selection, minimising waste and materials, and remediation of environmentally damaged soil and water, such responsible design balances these social, economic and environmental issues.

With prevailing proficient planning, designing and construction of sustainable infrastructure in developed as well as developing countries evident prime importance is delivering better and more responsible infrastructure. Infrastructure must be sustainable making positive impact in future, precondition for supporting and creating better economic times. Utilizing a sustainable design, encourages decisions at each phase of the design process that will reduce negative impacts on the environment and health of occupants, without compromising the bottom line. It is an integrated, holistic approach which positively impacts all phases of a project's life-cycle, including design, construction, operation and decommissioning. Therefore, investigating how these sustainability ideas are incorporated in design stage of a project is further proposed in this research

3. RESEARCH PROCESS:

This research has chosen both the qualitative and quantitative research strategy to obtain the desired results. The primary data focuses literature survey and case studies and the interpretation of the same is done from 25 papers covering various sustainability ideas incorporated in construction industry. The secondary data, on the other hand, uses questionnaire survey containing both objective and subjective analysis



Fig.1 Block Diagram of Research Methodology

4. RESEARCH METHODS AND TOOLS:

➤ **Questionnaire Section: Sustainability Ideas investigation in Indian Infrastructure Projects**

Serial Number	Impact in terms of cost, time, and scope
1	Non-Conventional technologies & reusing material
2	Rating system to evaluate criteria for design, construction & assessment
3	BIM and Standard performance evaluation
4	LEED, ASHARE and GRIHA Guidelines
5	Infrastructure performance matrix
6	Blended Infrastructure projects
7	Green Credentials improvement
8	Sustainability Performance of Green Space or Green Infrastructure (GI) Projects.
9	Smart Highways
10	Energy efficient generation of electricity
11	Smart Grid Integration working on intelligent M2M communication.
12	Smart Infrastructure for generation, transmission & distribution of Power.
13	Sustainable Water Treatment Plants
14	Design Challenges in Urban Sustainability

15	Design process and sustainable notions necessary for urban public spaces development
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➤ IDENTIFICATION OF SUSTAINABLE DESIGN IDEAS THROUGH LITERATURE REVIEW

TABLE 2

Categorization of Sustainability Ideas from Literature Survey

CATEGORY	SUSTAINABLE DESIGN IDEA
1. Material Selection	Sustainable Road Design: Promoting Recycling and Non-Conventional Materials
	An Investigation on Cell-Filled Pavements.
2. Technological consideration	Rating System for Indian Green Highways
	Integration of Rating Systems and Building Information Modelling
	Airport Sustainable Design, Green Technologies & Smart Sustainable Design Airports
	Assessing green infrastructure performance
	Integrated Sustainable Urban Project
3. Design & Project Management Consideration	Role of design in sustainability transitions projects
	Advancing-Performance-Based Sustainable and Resilient Infrastructure Design
	Sustainable Bridge Design
	Sustainable Development- Green Design
	Sustainable safe road design manual
4. Energy consideration	Infrastructure-Integrated Photovoltaic (IIPV)
	Smart Highway of the Future: Utilizing Green Energy
	Smart Grid Initiatives in India
	Energy Infrastructure- An Overview
5. Social consideration	Effective Instructions in Design Process of Urban Public Spaces
	Sustainable Redevelopment of Public Spaces in City Centres

6. Water consideration	Design of the future energy-efficient, cost-effective, reliable, resilient, and sustainable full-scale wastewater treatment plants.
	Creating an innovation platform for sustainability- in urban water projects

CONCLUSIONS

From the questionnaire survey analysis in this research, it was demonstrated that sustainability ideas pertaining to design methodology of using blended infrastructure, residential and urban sustainability attained high level of acceptance from Industry professionals, such that they are currently in construction practices in Indian construction sector. This study complements the current literature such that it provides synchronization of sustainability ideas with survey analysis data, with the perception to designers for adopting these ideas and also achieving sustainability goals through various adoption methods for infrastructure sustainability. The research provides a future scope of incorporating the above stated Sustainability Ideas in conjunction with sustainability goals.

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