Research Papers

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Original Research Article

Identification of issues and priority actions for Restoration of freshwater ecosystem: River Ganga (Kanpur to Bihar)

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ABSTRACT

In order to reduce Pollution of river Ganga and its Ecosystem which has been disturbed by human interventions and anthropogenic activities, had led to the degradation of the water quality of freshwater ecosystem. GOI launched Ganga Action Plan in 1985 were at-tempts had been made to control, improve and maintain ecological integrity of the ecosystem by physical, chemical and biological methods. Rapid urbanization, industrialization besides agriculture using chemical fertilizers and pesticides, which is directly released in the basin, have degraded the water quality. The paper deals with the impact of technical interventions in the form of liquid and solid wastes, carried by the river are the issues and challenges for the ecosystem. Besides these, there are some suggestions and recommendations to minimize the ecological degradation of the river to restore its ecology. The measures include active as well as passive restoration techniques to bring back the sustainable ecosystem of River Ganga

KEYWORDS

Species-diversity | Various Pollutants | Threats | Disturbances in Ecology | Conservation tools

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Introduction

Ganga river basin-is the freshwater ecosystem and is the largest of these. It originates from the ice caves at Gaumukh (N30º55′, E 79º7′) and traverses a distance of ≈2510 km from its source to its mouth (Ganga Sagar), draining eleven states of India. The river Ganga is home to a vast variety of living organisms from simple microscopic flora and fauna to a large assemblage of higher invertebrates and vertebrates .River quality is day by day deceased due to domestic and industrial effluents pollution threatens not only humans, but also more than 130 fish species, 83 amphibian species and the endangered Ganga river dolphin. Due to industrialization, the number of factories and population has increased rapidly. The riverine systems has be greatly infected with pollutants released from industrial, domestic, mining and agricultural effluents.

Common carp and Tilapia are are commercially exploited species in Ganga which are used to evaluate the health of aquatic ecosystems because pollutants are building up in the food chain and are responsible for adverse effects and death in the freshwater ecosystems. The entire stretch of river Ganga (main stream) can be viewed into three segments where each segment is further divided into 5 stretches. These three segments not only differ in their geomorphology, ecology and theology but are different in terms of issues that need to be addressed:

A. Upper Ganga ≈ 294 km Gaumukh to Haridwar

B. Middle Ganga ≈ 1082 km Haridwar to Varanasi (Kanpur to Bihar) stretch

C. Lower Ganga ≈ 1134 km Varanasi to Ganga Sagar.

Fig-1: Represents critically polluted stretch, Source: Status paper on river Ganga

Originally the ecological setup of river Ganga

Ganga is a prime example of lotic ecosystem. It is referred as running water ecosystem, which has current were in, water is in motion. Before 30 years, the values of dissolved oxygen (DO) - exhibited a more or less stable pattern in Ganga. The average values ranged between 6.8-7.2 mg/l. The values were generally above 4.0 mg/l. Higher values were recorded in winters at Haridwar, Allahabad, Varanasi and Patna. There were only minor fluctuations. Biochemical oxygen demand (BOD) - depicts the pollution status of a stream and is measured as oxygen equivalent of organic matter. The values exhibited higher pollution level higher which was recorded at Kanpur downstream 15.5 mg/l, 14.15 mg/l, 16.39 mg/l and Coliform- the variation in total coliforms was 48333, 916667 and 835333 mpn/100 ml .The stretch from Kanpur – Varanasi- Bihar remains critical and needs focused attention.

Further, Ganga passes along 29 class-I cities and about 48 towns. Most of the cities had no Sewage

Treatment Plants or even if the plants existed, they were not functional or needed augmentation. There were several polluted stretches along its course where Ganga was critically polluted at Middle Ganga stretch {Kanpur-Bihar} as shown in (Fig-1)

Among the pollutants, toxic metals are of serious concern because they accumulate through the food chain and create environmental problems. Higher concentrations of heavy metals such as Mercury, Cadmium, Nickel, Lead, Arsenic, Zinc, Copper, Chromium. From industries forms

Water Quality Data of Ganga River During 1986-2008

Sl No	Station/ Location	Distance in km	1986		1993		2002		2005		2008		Standard values	
			DO (mg/l)	BOD (mg/l)	DO (mg/l)	BOD (mg/l)	DO (mg/l)	BOD (mg/l)	DO (mg/l)	BOD (mg/l)	DO (mg/l)	BOD (mg/l)	DO (mg/l)	BOD (mg/l)
1	Rishikesh (0 km)	0	8.1	1.7	9.0	1.3	8.2	1.2	8.5	1.0	8.1	1.2	5.0	3.0
2	Haridwar D/s (30 km)	30	8.1	1.8	7.2	1.4	7.8	1.7	8.1	1.4	7.9	1.4	5.0	3.0
3	Garhmukteshwar (175 km)	175	7.8	2.2	8.5	1.6	7.5	2.1	7.8	2.0	7.8	1.9	5.0	3.0
4	Kannauj U/S (430 km)	430	7.2	5.5	7.2	2.3	7.7	1.2	8.5	1.7	6.5	2.9	5.0	3.0
5	Kannauj D/S (433 km)	433	6.5	5.1	8.4	2.5	6.5	4.2	7.6	4.5	6.2	3.1	5.0	3.0
6	Kanpur U/S (530 km)	530	7.2	7.2	7.5	1.9	6.3	3.8	6.2	4.3	4.9	3.4	5.0	3.0
7	Kanpur D/S (548 km)	548	6.7	8.6	5.2	24.5	6.7	4.9	4.7	5.4	6.0	4.1	5.0	3.0
8	Allahabad U/S (733 km)	733	6.4	11.4	6.9	1.8	13.0	8.0	8.5	5.5	8.4	4.8	5.0	3.0
9	Allahabad D/S (743 km)	743	6.6	15.5	7.2	1.9	8.2	3.8	8.4	3.1	7.7	3.2	5.0	3.0
10	Varanasi U/S (908 km)	908	5.6	10.1	8.2	0.8	10.8	3.0	8.6	2.0	7.5	2.2	5.0	3.0
11	Varanasi D/S (916 km)	916	5.9	10.6	7.6	1.0	7.5	2.5	8.3	2.3	7.3	3.0	5.0	3.0
12	Patna U/S (1188 km)	1188	8.4	2.0	8.2	1.2	7.1	1.9	7.4	2.0	6.0	1.7	5.0	3.0
13	Patna D/S (1198 km)	1198	8.1	2.2	8.0	1.5	7.1	2.0	8.0	2.2	5.9	2.4	5.0	3.0
14	Rajmahal (1508 km)	1508	7.8	1.8	8.5	0.7	7.9	1.5	7.4	1.8	6.2	2.0	5.0	3.0
15	Patna (2050 km)	2050	7.3	1.0	7.1	0.9	7.3	2.7	7.0	3.0	6.9	2.2	5.0	3.0
16	Ulberia (2500 km)	2500	5.8	1.1	6.1	0.9	5.4	1.9	5.4	2.6	5.3	3.6	5.0	3.0

Table 1: Represents water quality data of Ganga River during 1986- 2008
Source: Status paper on river Ganga

Present scenario

According to the latest update received by CPCB, the actual measured discharge of wastewater is 6087mld, which is much higher than the estimated discharge of wastewater in 2013. CPCB estimates shows that 64 industries in the mainstream of Ganga consume 1123mld of water and discharge 500mld of effluent. STPS are ineffective because of factors like lack of electricity, lack of connectivity with drain etc. that contributes 90%of Ganga water pollution. 3000mld of domestic wastewater is discharged into the river, which is roughly half of its total load. (14).

YEAR	2009	2013
SEWAGE GENERATION(MLD)	2638	2723
TREATMENT CAPACITY(MLD)	1174	1208
GAP (MLD)	1464	1514
% GAP	55	55

Table 2: CPCB estimates the domestic sewage load on river Ganga from 2009-2013.
Source: Status paper on River Ganga

Fig 2: Represents factors causing pollution
Source: Author

Harmful complex compounds, which critically effect different biological functions and are of potential risk to aquatic ecosystem, animal, and humans.

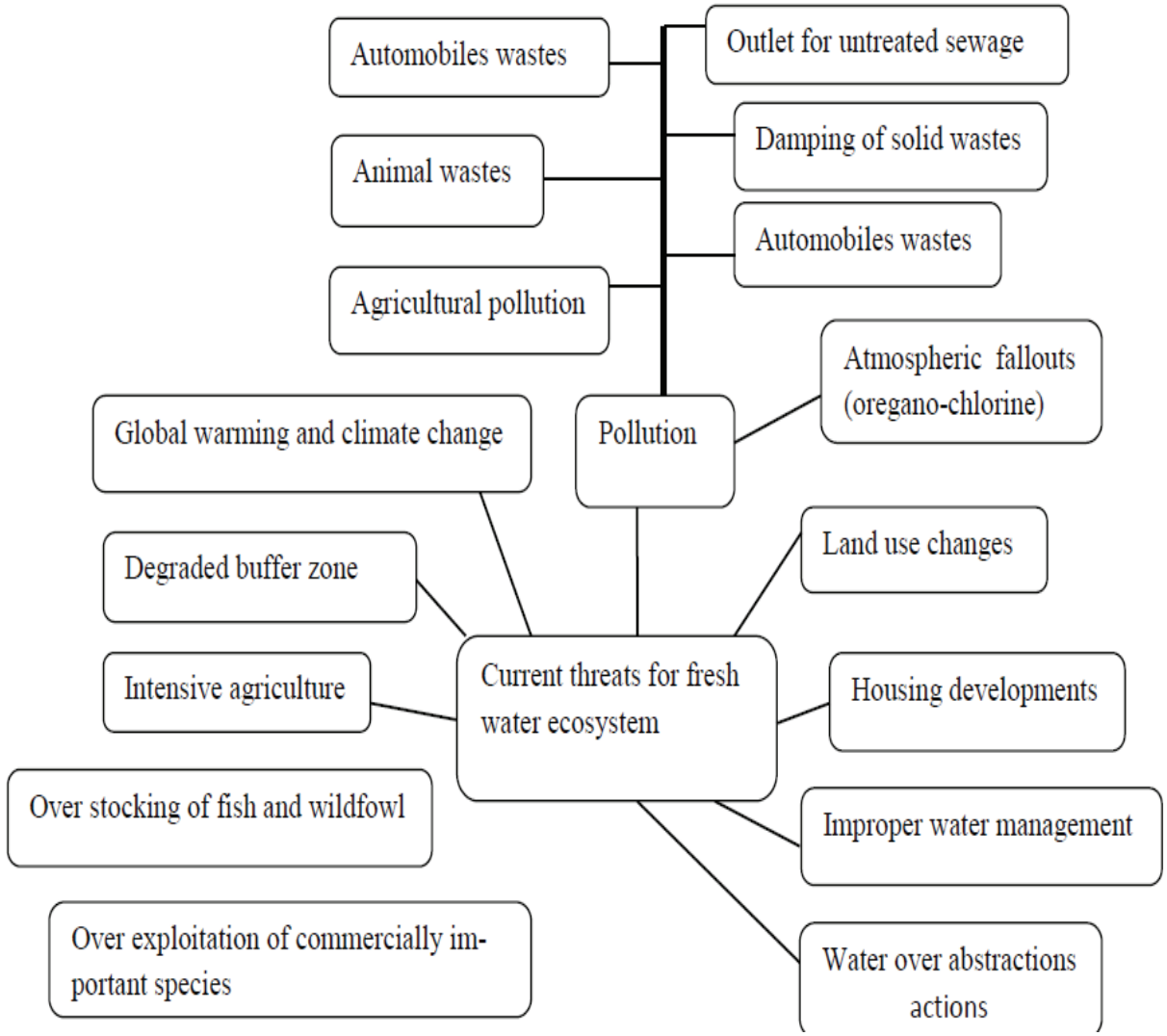


Fig 3: Represents summary of factors, which are threats for the sustainable functioning of River.
Source: Author

Food Chain in Fresh water Ecosystem (Kanpur-Bihar stretch)

Fish population predominates depending upon grazing and detritus food chain. The next portion has Turtles, Crocodiles, Ghariyals and Gangetic Dolphin along with active breeding sites. Thus, there is one-way flow of energy through the biotic community and recycling of nutrients between the biotic and abiotic components of the ecosystem. Thus any ecosystem requires a continuous flow of energy to fuel life processes and to replace energy loss as heat.

Phytoplankton's (Algae, diatoms) ➔ Zooplanktons➔ Small Fish ➔ Carnivorous fish ➔ Grass ➔ Rabbit ➔Fox

The ultimate source of energy is Sun. The ultimate fate of energy in ecosystem is for it to be lost as heat, metabolism, reproduction, etc. energy and nutrients are passed from one organism to the another through the food chain as one eats another. Inorganic nutrients are cycled, Energy is not. Decomposers remove the last energy from the remains of organisms.

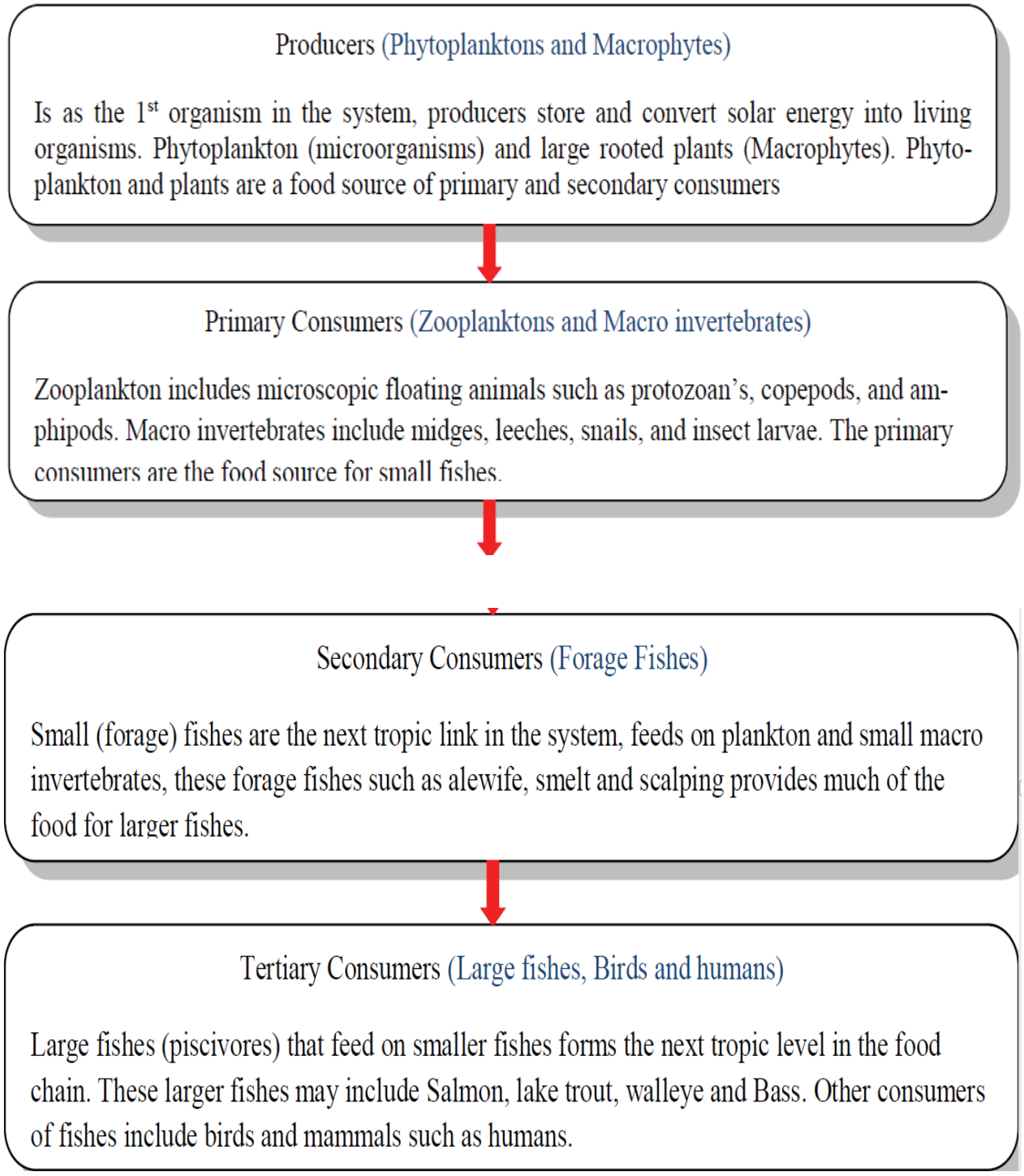


Fig 4: Represents the hierarchy of food chain in the eco-system
Source: Author

How Water Pollution affects the Fresh water Ecosystem?

Wastewater and runoff carry micro plastics into waterways. ➔ Plastic objects are broken down into smaller pieces by sunlight and surf/detergent actions.➔Marine plastics are often mistaken for food.➔Persistent bio accumulative and toxic Compounds in freshwater ecosystem preferably sorbs to plastics. ➔ Bioaccumulation may be amplified by plastics shuttling pollutants into marine organisms. ➔ Potential plastic mediated-Bioaccumulation. ➔At the same time, constituents of the plastic processes accumulate themselves such as additives leach into the tissues of the organisms that consume particles. Similarly

compounds of heavy metals that are found in this stretch from industries and are toxic.

organism excretes waste or dies, the nitrogen in its tissues is in the form of organic nitrogen Various

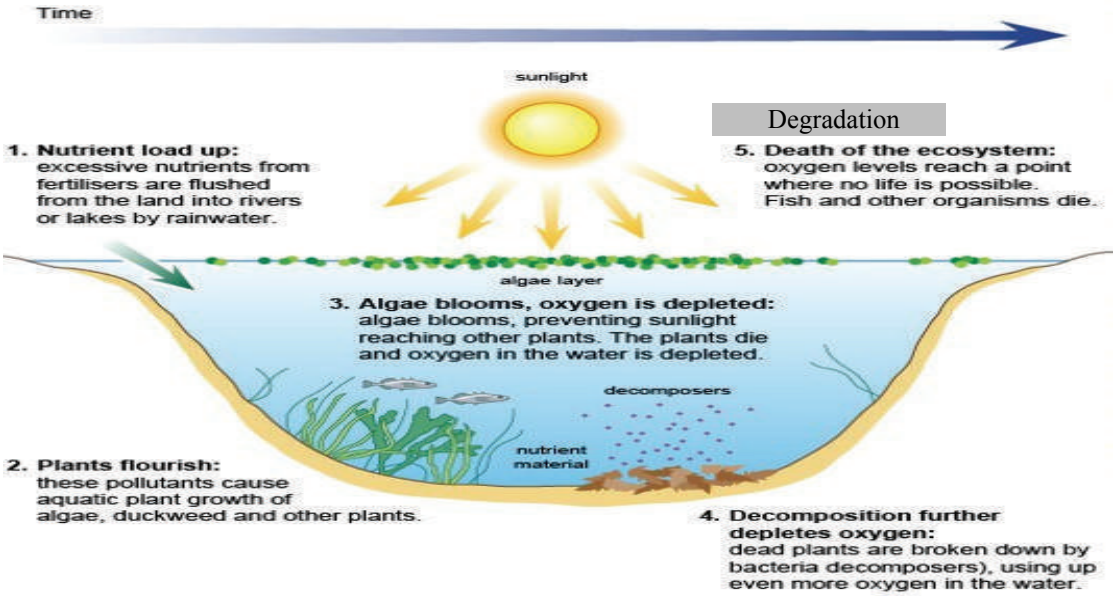


Fig 5: represents factors responsible for degradation of freshwater ecosystem
Source: Effects of Pollution in Freshwater ecosystem

Characteristics of Pollutants which leads to Disturbances of Natural Processes

Algae are microscopic plants that usually aquatic, unicellular, and lack stems, roots and leaves. Nitrates and Phosphates enter the system (such as sewage, fertilizers from agricultural run-offs) increased nutrients causes surface plant growth and algal blooms. It occurs in freshwater environment when an algal species out competes other species and reproduces rapidly. It kills fish and other aquatic life by decreasing available sunlight to water and by using all the available oxygen in the water, due to which water becomes cloudy and turns green, yellow brown or red, which lead eutrophication. It occurs when nitrite leaches into the water body and causes severe reduction in species diversity and water quality. Which results into the disturbance of Nitrogen cycle and Carbon cycle of the river. In aquatic environments (like freshwater- river), blue-green algae is an important free-living nitrogen fixer. Bacteria (called Nitrogen-fixing bacteria) form symbiotic relationships with host plants. The bacteria live in nodules found in the roots of the legume family of aquatic plants.When an fungi and prokaryotes then decompose the tissue and release inorganic nitrogen back into the ecosystem as ammonia in the process known as ammonification (Fig-8).The ammonia then becomes available for uptake by plants and other microorganisms for growth.

Further, as result disturbed Nitrogen cycle in surface water, extra nitrogen can lead to nutrient over-enrichment. This leads to fish-kills, harmful algal blooms, and species shifts in aquatic and land ecosystems. Some forms of nitrogen (like NO_3^- and NH_4^+) also enter the atmosphere to become smog- nitric oxide (NO), Greenhouse gas- nitrous oxide (N_2O) and Acid Rain- (nitrogen oxides) thus degrades the climate.

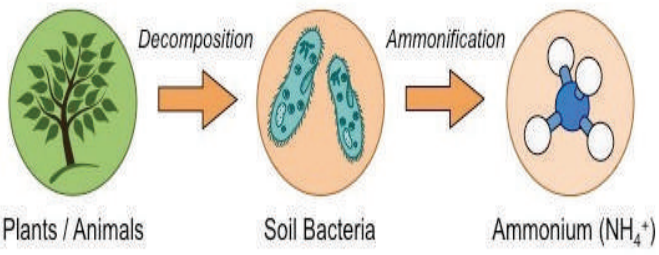


Fig-6: Represents Process of Ammonification
Source: Nitrogen Cycle ppt.

In addition, Dissolved oxygen, also called DO, is vital to the health of aquatic ecosystem. Plants and animals need oxygen to survive. A low level of Dissolved oxygen in the rivers is affected by weather and temperature. It is important to monitor DO, since it can be used as an indicator of water quality. Algae produce oxygen during the day through photosynthesis but also quickly consume oxygen at night during respiration. Bacteria decompose the algae after the bloom dies, using a significant amount of oxygen in the process, which results in lack of available oxygen for other plants and animals Carbon dioxide, also called CO2, is found in water as a dissolved gas. It can dissolve in water 200 times more easily than oxygen. Aquatic plants depend on carbon dioxide for life and growth, just as fish depend on oxygen. Plants use carbon dioxide during the process of photosynthesis. Sometimes carbon dioxide levels in water become too high. Pollution causes too much carbon dioxide. Resulting into disturbance of CO2 cycle, which leads to the unhealthy state of ecosystem. In these conditions, fish have a hard time getting the oxygen they need from the water. Because of which they suffocate and die.

How pollution affects Abiotic component

Cold water holds more oxygen than warm water because Salmon needs a high level of oxygen to survive; they live in fast-moving, cold streams and rivers. Whereas warm-water fish such as bluegills, crappie, perch, walleye, catfish and carp can tolerate lower levels of dissolved oxygen in the water. Dissolved oxygen (DO) used as an indicator of water quality. Anoxia occurs when oxygen levels are low and often results when dry, hot weather causes water to warm and evaporation increases. If these conditions are severe, large "fish kills" (floating dead fish) may result due to lack of oxygen Carbon dioxide, also called CO2, is found in water as a dissolved gas. It can dissolve in water 200 times more easily than oxygen. Aquatic plants depend on carbon dioxide for life and growth, just as fish depend on oxygen. Thus for a healthy and sustainable ecosystem balance between Biotic and Abiotic has to be maintained.

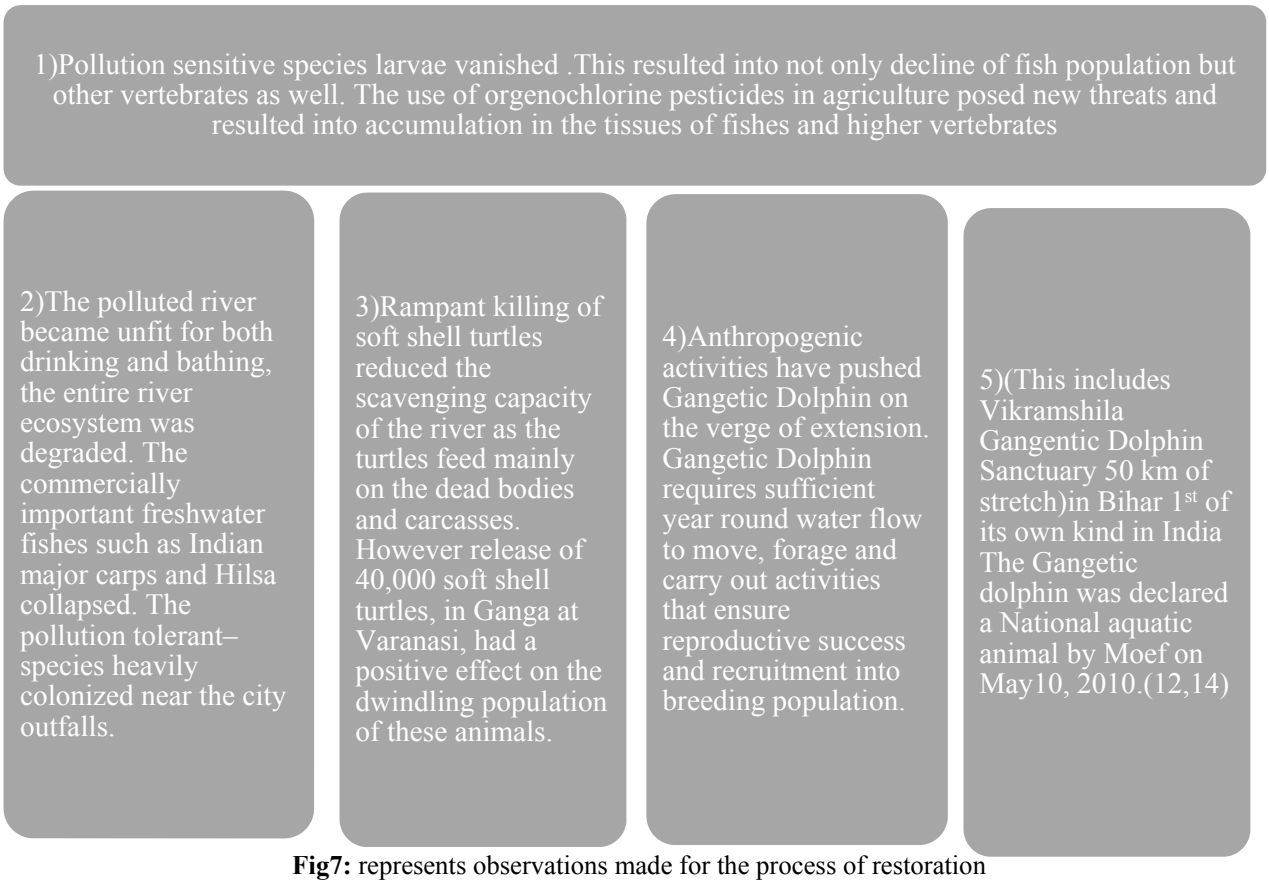


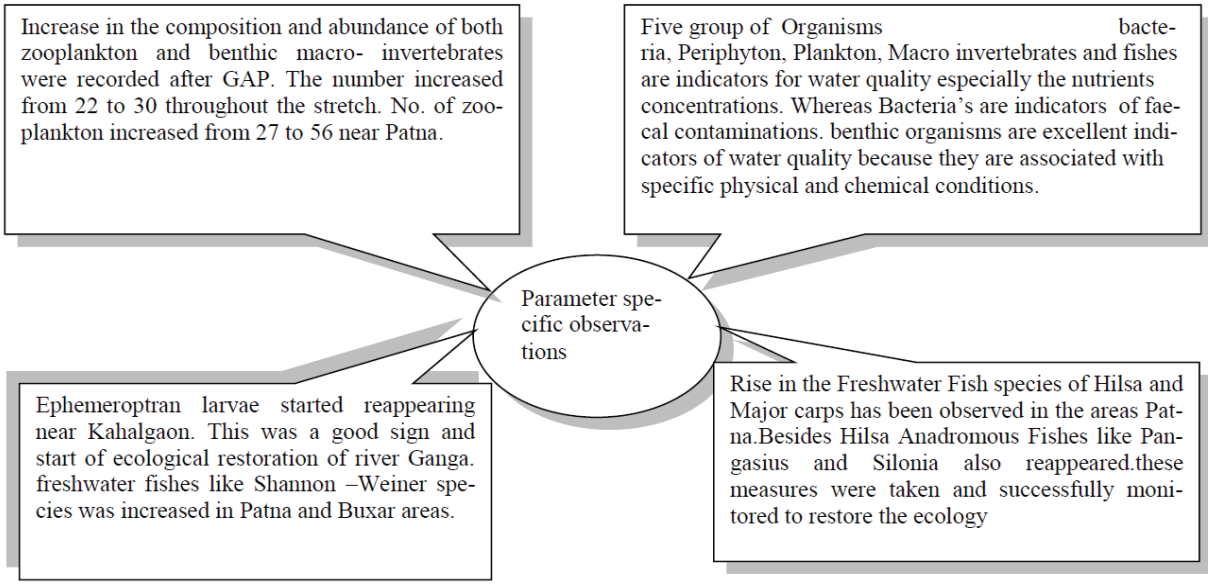
Fig7: represents observations made for the process of restoration
Source: Author

The BOD levels were higher and maximum values were recorded at Kanpur (Fig-2).

Observations

Among the five zones in the middle stretch of river Ganga, a total of 143 fish species belonging to 58 genera and 24 families were recorded. 29 species are threatened due to pollution in fresh water eco system. Schemes for Interception, diversion and Activated Sludge Process (ASP) and Oxidation Ponds were adopted for treatment of sewage, low cost sanitation, 28 electric crematoria and 5 Riverfront developments were successfully taken under Ganga Action Plan, phase I.

Parameter Specific Observations



Restoration Measures (Tools)

The following restoration measures seem inevitable in river ecosystem to bring river Ganga to sustainable, stable and healthy condition.

a. To provide enough space for endemic(prevalent) species of both flora and fauna for growth and migration through Environmental Flows (E-Flows) by maintaining the lateral, vertical and longitudinal connectivity in the entire stretch of Ganga system.

b. To provide connectivity with wetlands. Restoration of wetlands may be made point of focus to ensure breeding sites of fish and other aquatic animals.

c. From the above study, it is evident to identify all the species including zoo benthos, fishes and aquatic higher vertebrates, which come under rare, endangered and threatened category, should be conserved to maintain ecological integrity.

d. Breeding sites for fish and other higher aquatic vertebrates should be identified and con-served. Soft and hard-shelled turtles lay eggs in the flood plains during the post monsoon period.

e. To assess and monitor river health, primary data collection for all parameters including bio monitoring from selected stretches should be done by recognized and reputed research institutions through empowering and involving local riverside communities.

f. Use of chemical fertilizers and pesticides in agricultural in flood plains and riparian zone be regulated and restricted.

Conclusion

The study indicates that the River Basin has started showing signs of recovery and physio-chemical conditions of the river has improved discernibly. Fish diversity and biomass has started showing increasing trends in spite of many adverse factors, besides pollution invasion of exotic species is another big threat for the river biota.

The river basin is one of the most thickly populated areas of the world. It sustains thousands of aquatic species of flora and fauna including many endemic and charismatic mega-fauna like the Ganges dolphin, (12,14) Gavials etc. However, since 1950s the river is facing threats of erosion of its ecological integrity due to anthropogenic pressures in the form of construction of dams, barrages and embankments; loss of forest cover in its catchment area leading to heavy siltation, pollution from industrial effluents and domestic sewage degrading the water quality to the extent that the river water is not fit for even bathing purpose. Nevertheless, the river harbours rich and abundant aquatic biodiversity. The ecological changes cannot be attributed entirely to GAP but definitely it played an important role(14,16).The Eco-Restoration of big river like Ganga is subsequent of this recovery, and requires constant efforts, monitoring time and patience.

Recommendations and Suggestions

a. Large daily fluctuations in flow should be avoided. Equilibrium between sediment erosion and deposition is necessary to maintain essential habitat features.

b. Access to flood plains should be preserved to ensure natural spawning and rearing habitat for fishes, which are prey base of the dolphins. Enhancing the capacity and governance framework for Gangetic Dolphin conservation is needed.

c. Information on the pre development ecological conditions of a river is essential for evaluating migration efforts and to implement future development decisions. Post development empirical studies are needed to monitor the operational aspects as well as the effects on upstream and downstream populations of cetaceans and their habitat.

d. Effective construction of fish passage structure is necessary. Conventional fish ladders de-signed may not be successful because most fishes do not jump. In the middle stretch of the river Ganges (Allahabad), which used to form a good share in catches below Allahabad, has almost disappeared after inception of Farakka barrage despite fish ladders were installed. Steps should be taken to improve fish pass way so that the fishes may negotiate upstream areas.

e. Cumulative and synergistic impacts of multi development should be considered in assessment of environmental impact.

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Transforming PMAY-G: Enhancing Implementation Mechanisms For Palghar District's Tribal Communities

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Abstract: This research paper delves into the Pradhan Mantri Awaas Yojana - Grameen (PMAY-G) scheme in India, focusing on its implementation in Palghar District and its impact on tribal communities. The paper aims to explore the challenges and opportunities associated with PMAY-G, emphasizing the importance of inclusive and sustainable rural development. Drawing on case studies, it proposes strategies to enhance the implementation mechanisms, with an emphasis on community involvement and local empowerment. By redefining the discourse on rural housing and tribal development, we contribute to the betterment of living conditions and well-being for tribal communities in Palghar District.

Index Terms **- PMAY-G, Rural Housing, Tribal Communities, Sustainable Development, Implementation Mechanisms, Inclusive Development.**

I. INTRODUCTION

The Pradhan Mantri Awaas Yojana - Grameen (PMAY-G) stands as a cornerstone in India's efforts to provide housing to the rural population. In this context, Palghar District, with its significant tribal population, offers a unique and challenging landscape for the implementation of the scheme. This paper explores the significance of PMAY-G for tribal communities in Palghar District and addresses the research question of how its implementation mechanisms can be enhanced to promote more inclusive and sustainable rural development.

1.1 Significance of PMAY-G for Palghar District's Tribal Communities

PMAY-G is a government housing scheme aimed at providing pucca houses with basic amenities to families living in rural areas. In the context of Palghar District, which comprises a substantial tribal population, the scheme holds immense importance. It is not only a means of ensuring shelter but also a pathway to socio-economic empowerment for marginalized tribal communities.

1.2 Research Question and Aim

The central research question guiding this paper is: How can the implementation mechanisms of PMAY-G be improved to better serve the tribal communities in Palghar District? To address this question, this paper will explore the challenges and opportunities associated with the scheme in this specific context, analyze case studies, and propose strategies for enhancing its implementation mechanisms.

II. 2. LITERATURE REVIEW

2.1 PMAY-G and Its Objectives

The Pradhan Mantri Awaas Yojana - Grameen (PMAY-G) is a flagship housing scheme in rural India. It aims to provide financial assistance to construct pucca houses for families living below the poverty line. The objectives of PMAY-G include improving the living standards of rural households and promoting sustainable rural development.

2.2 Challenges in Implementing PMAY-G in Tribal Areas

The implementation of PMAY-G in tribal areas presents unique challenges. These include issues related to land ownership, awareness among beneficiaries, and the suitability of traditional tribal housing practices for the PMAY-G scheme. These challenges can hinder the successful execution of the scheme in tribal regions.

2.3 Housing Schemes and Tribal Development in India

Several housing schemes have been launched in India to address the housing needs of marginalized populations, including tribal communities. These schemes often serve as tools for social inclusion, poverty alleviation, and improving overall living conditions in tribal areas.

2.4 The Specific Context of Palghar District and Its Tribal Communities

Palghar District is home to a diverse tribal population, including Warli, Katkari, and Bhil communities. Understanding the unique socio-cultural and geographical context of Palghar District is crucial to assess the effectiveness of PMAY-G in addressing the housing needs of its tribal communities.

III. 3. CONCEPTUAL FRAMEWORK

3.1 Key Concepts

To understand the dynamics of PMAY-G in Palghar District, several key concepts need to be defined:

- PMAY-G: The Pradhan Mantri Awaas Yojana - Grameen (PMAY-G) is a government scheme for rural housing that aims to provide financial assistance to construct pucca houses for eligible families.

- Tribal Communities: Tribal communities refer to indigenous or native communities living in specific geographic areas with distinct cultural practices, languages, and social structures.

- Rural Housing: Rural housing encompasses housing initiatives and policies designed to provide improved housing conditions for people in rural areas, often with a focus on affordability, accessibility, and sustainability.

- Sustainable Development: Sustainable development is a holistic approach to development that aims to meet the needs of the present without compromising the ability of future generations to meet their own needs.

3.2 Conceptual Framework

The conceptual framework for this paper revolves around the challenges and opportunities associated with the implementation of PMAY-G in tribal areas of Palghar District. It also highlights the importance of inclusive development and sustainability in rural housing initiatives.

IV. 4. PMAY-G IMPLEMENTATION IN PALGHAR DISTRICT

4.1 Mechanisms of PMAY-G Implementation

In Palghar District, the implementation of PMAY-G involves several mechanisms, including beneficiary selection, financial assistance, and monitoring of house construction. These mechanisms are designed to ensure that eligible tribal families receive the intended benefits.

4.2 Tailored Features for Tribal Communities

PMAY-G implementation in Palghar District includes certain features tailored to the tribal context. These may involve adaptations in construction techniques, materials, and design to align with tribal housing preferences and practices.

4.3 Progress and Challenges

Analyzing the progress and challenges of PMAY-G implementation in Palghar District is essential to understanding its effectiveness. Progress indicators include the number of houses constructed, while challenges may encompass issues like land rights, awareness, and socio-cultural factors.

V. 5. CHALLENGES AND OPPORTUNITIES

5.1 Challenges in Implementing PMAY-G in Tribal Areas of Palghar District

Several challenges exist in implementing PMAY-G in tribal regions of Palghar District, such as:

- Land Ownership: Land rights and ownership can be complex issues, and securing land for house construction can be a challenge for tribal beneficiaries.

- Awareness and Accessibility: Limited awareness about the scheme, coupled with the geographical remoteness of some tribal areas, can make it difficult for beneficiaries to access PMAY-G.

- Traditional Housing Practices: The PMAY-G scheme may not always align with traditional tribal housing practices, which can lead to resistance or a lack of acceptance.

5.2 Opportunities for Improving PMAY-G Implementation

Opportunities for enhancing PMAY-G implementation include:

- Awareness Campaigns: Increasing awareness among tribal communities

about the scheme, its benefits, and the application process.

- Customized Training: Providing training and support to tribal beneficiaries in construction techniques that align with PMAY-G requirements.

- Community Involvement: Encouraging active involvement of local communities in the planning and execution of PMAY-G projects.

- Sustainable Housing Practices: Promoting eco-friendly and sustainable housing practices to ensure long-term viability of the constructed houses.

- Monitoring and Evaluation: Implementing effective monitoring and evaluation mechanisms to track the progress and success of PMAY-G projects in tribal areas.

VI. 6. CASE STUDIES

6.1 Case Studies of Tribal Communities Benefiting from PMAY-G

This section presents case studies of specific tribal communities in Palghar District that have benefited from the PMAY-G scheme. These case studies highlight their successes and the challenges they faced in utilizing the scheme for improved housing. Moreover, it examines how improved housing conditions have impacted the overall well-being of these communities.

VII. 7. Enhancing Implementation Mechanisms

7.1 Strategies for Enhancing PMAY-G Implementation

Proposed strategies for enhancing the implementation mechanisms of PMAY-G in tribal areas of Palghar District include:

- Community Engagement: Involving tribal communities in the decision-making processes and house construction, fostering a sense of ownership.

- Local Empowerment: Empowering local tribal leaders and self-help groups to take the lead in implementing PMAY-G projects.

- Customization: Tailoring the design and construction of houses to better align with tribal preferences and practices.

- Sustainable Practices: Promoting sustainable and eco-friendly construction practices to ensure long-term viability.

- Advocacy and Awareness: Advocating for improved awareness campaigns and governmental support for tribal beneficiaries under PMAY-G.

- Evaluative Framework: Developing an evaluative framework to assess the long-term impact and sustainability of PMAY-G houses in tribal areas.

VIII. 8. Methodology

8.1 Research Methodology

The research methodology for this paper involves a comprehensive literature review of existing documents, reports, case studies, and government publications related to PMAY-G implementation. Additionally, primary data sources include interviews and surveys conducted among tribal beneficiaries in Palghar District.

8.2 Data Analysis Techniques

The analysis includes both qualitative and quantitative approaches. Qualitative data from interviews and case studies are analyzed thematically, while quantitative data from surveys are analyzed using statistical methods.

IX. 9. Discussion

9.1 Analysis of Findings

The findings from the case studies and surveys are analyzed in light of the research objectives. They provide insights into the successes, challenges, and opportunities associated with PMAY-G implementation in tribal areas of Palghar District.

9.2 Implications of Enhancing PMAY-G Implementation

The implications of enhancing PMAY-G implementation for tribal communities in Palghar District are discussed, including the potential for improved living conditions, economic empowerment, and inclusive development in these regions.

9.3 Significance of the Research

This research holds significance in the context of tribal development and rural housing in India. It highlights the need for context-specific approaches in rural housing schemes to cater to the diverse cultural and geographical landscape of the country.

X. 10. CONCLUSION

In conclusion, the Pradhan Mantri Awaas Yojana - Grameen (PMAY-G) plays a vital role in addressing the housing needs of tribal communities in Palghar District. By exploring the challenges and opportunities of PMAY-G implementation in this unique context, this research paper has proposed strategies to enhance its mechanisms, with an emphasis on community involvement and sustainability. These enhancements have the potential to improve the overall well-being and living conditions of tribal communities. Ensuring that PMAY-G aligns with the preferences and practices of these communities is essential for its long-term success.

10.1 Avenues for Future Research

While this paper offers a comprehensive exploration of PMAY-G in Palghar District, there are several avenues for future research. Further studies can delve into the long-term impacts of improved housing, the role of community participation, and the scalability of the proposed strategies to other tribal regions in India. Additionally, interdisciplinary research is needed to address the multifaceted challenges and opportunities that PMAY-G presents in the context of rural and tribal development.

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Comprehensive Study of Zero Energy Buildings or Carbon Neutral Buildings (CEB) by using Life Cycle Assessment Tool

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Abstract: ***'Zero Energy Buildings' or 'Carbon Neutral Buildings' (CEB) does this concept really exists? In recent times, Zero-Energy Building concept has become a popular catchphrase to describe the synergy between energy-efficient building and renewable energy utilisation to achieve a balanced energy. There are various definitions of 'zero energy' buildings. In most cases, the definition refers only to the energy that is used in the operation of the building, ignoring the wider perspective of energy use related to pre-construction and post-construction of the building which includes issues such as extraction, manufacturing, processing and transportation of materials which also requires some amount of energy. This sum amount of energy which exists in materials from its initial raw stage till its final finished product which is been used at site possess energy which is termed as "Embodied Energy". This research paper mainly focuses on the Hypothetical concept of "Zero Energy" Buildings with its qualitative assessment through life cycle assessment tool.***

Keywords: Zero Energy, Embodied Energy, Qualitative assessment, Life Cycle Assessment, Constructional phases (pre and post)

1. Introduction

Energy is one of the most important factors in economic growth and social development in all countries. A building consumes energy at different levels in every stage of the life-cycle, whereas building materials occupy a great share of this consumption. The choice of building materials can have multiple effects on a building's energy consumption over the different phases of its life cycle. Therefore, the amount of energy consumed by materials used in buildings during their life cycle is an important parameter in determining the energy efficiency of the zero energy building. As the number of these buildings increases, the need to consider embodied energy from building materials also increases, especially if an overall goal is to reduce the building's life cycle energy use. The life cycle assessment of advanced building materials and systems is paramount to significantly improving overall environmental building performance. This paper focuses on qualitative study of a zero energy building, which aims to achieve significant benchmarks not only due to current construction and operation phases but also because the materials which possess some amount of energy in the form of embodied energy used to construct these zero energy buildings have higher environmental impacts than those of traditional buildings.

2. Energy Consumption in a Building

In this era of climate change and environmental degradation, a large variety of mitigation measures such as, initiatives targeting sustainable building are urgently required. These include the construction of green buildings, utilization of building, rating systems, energy codes, and many other prescriptions. Net Zero Building projects (NZEBs) are targeting to push the envelope further, by being self-sufficient, not just in terms of their electricity consumption but with an overall minimal dependence on other natural resources. Energy consumption is rapidly increasing due to the increase in population and urbanization. In zero energy building design, the use of energy efficient building material plays an important role since the construction materials can positively support the construction in which they are used by reflecting their environmental features with their all other features into the construction. For this reason, energy saving, it is important to select energy efficient building material in the beginning of design. Energy requirements vary from region to region, depending on climate, dwelling type and level of developments, buildings consume energy at different phases and for different purposes.

1) In the manufacturing phase of construction-energy is consumed for having raw material of construction and manufacturing materials its transportation and building of the construction.
2) In the phase of using-energy is consumed for providing proper inner air quality in accordance with indoor visual, thermal, acoustic comfort conditions, and for maintenance, restoration, and renewal of the construction
3) In the phase of destruction of the construction-energy is consumed for destroying building and debris removal, obliteration of the construction waste, recovery of some construction materials/components in the recycling process.

3. Aim

The focus of the study is to understand the concept of a living zero energy building and to quantify the embodied energy within it.

3.1 Objective

a) To select an example of a zero energy building.
b) To identify and understand different parameters based on the living example selected.
c) To analyse and focus on some amount of energy that is been used in the operation of the building.

d) To identify the factors based on loss of energy during the operation of the building.

3.2 Definitions

a) Zero energy: A zero-energy building, also known as a zero net energy (ZNE) building, net-zero energy building (NZEB), net zero building or zero-carbon building is a building with zero net energy consumption, meaning the total amount of energy used by the building on an annual basis is roughly equal to the amount of renewable energy created on the site.
b) Embodied energy: This sum amount of energy which exists in materials/buildings from its initial raw stage till its final finished product which is been used at site possess energy which is termed as "Embodied Energy". It includes processes such as extraction, manufacturing, processing and transportation of materials which also requires some amount of energy.
c) Qualitative assessment: Qualitative assessment refers an inquiry- process of understanding social or human problem, based on building a complex, holistic picture, formed in words, reporting and detailed views of informants. Also explores and tries to understand beliefs, experiences, attitudes, behaviours and interactions. The end result is mostly non numerical data.
d) Life cycle assessment: It is a technique to assess environmental impacts associated with all the stages of a product's life from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling.

3.3 Living example of Zero Energy

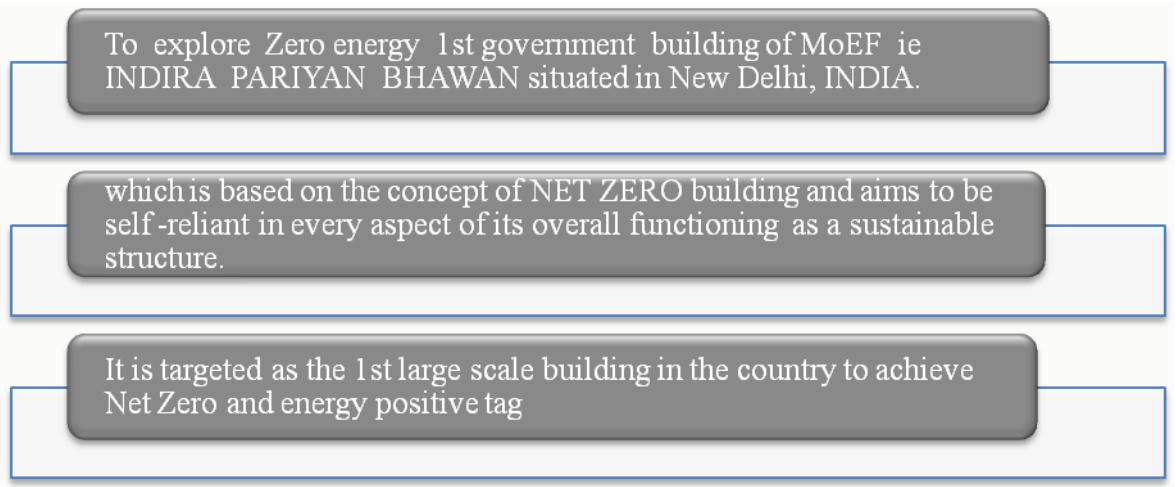

Figure 1: Represents building features
Source: Author

3.4 Background

Integrated Design Team
Client: Ministry of Environment and Forest (MoEF)
Project Coordinator: CPWD
Principal Architect: PWD
Landscape Architect: CPWD
Project Management: CPWD
Structural Design: Central Design Organisition, CPWD
MEP consultant: Spectral Services Consultants.
Green building design and certification Consultant: Deependra Prashad Architects and Planners

The land, on which the building is constructed, was originally a single storey decrepit government housing which under a change of land use was reassigned for the government office function. Despite the change in land use, the mandate of the Ministry's building remained as providing minimum change and disturbance to the surrounding ecosystem, including the predominantly green character of the surroundings, while still optimally utilizing the tight urban site of almost a hectare.

Figure 2: Represents Site plan
Source: Indira Paryavaran Kendra.pdf

This building reflects the growing role of the ministry in regulating and channelizing India's development into a sustainable paradigm. This mandate was carried forward by the Central Public Works Department at every level to design a building which is not just energy efficient but is also able to create more energy onsite than it consumes over a functional year. Apart from aiming to be a Net Zero Building, the project has also achieved the 5-star GRIHA Green Rating and is targeting the LEED India NC Platinum rating system through a slew of measures both in the passive and the active design of building envelope, the usage of materials, service provision, and also by following a range of environment-friendly processes within the construction programme.

Figure 3: represents Front Elevation of Kendra
Source: Indira Paryavaran Kendra.pdf

3.5 Descriptive Approach

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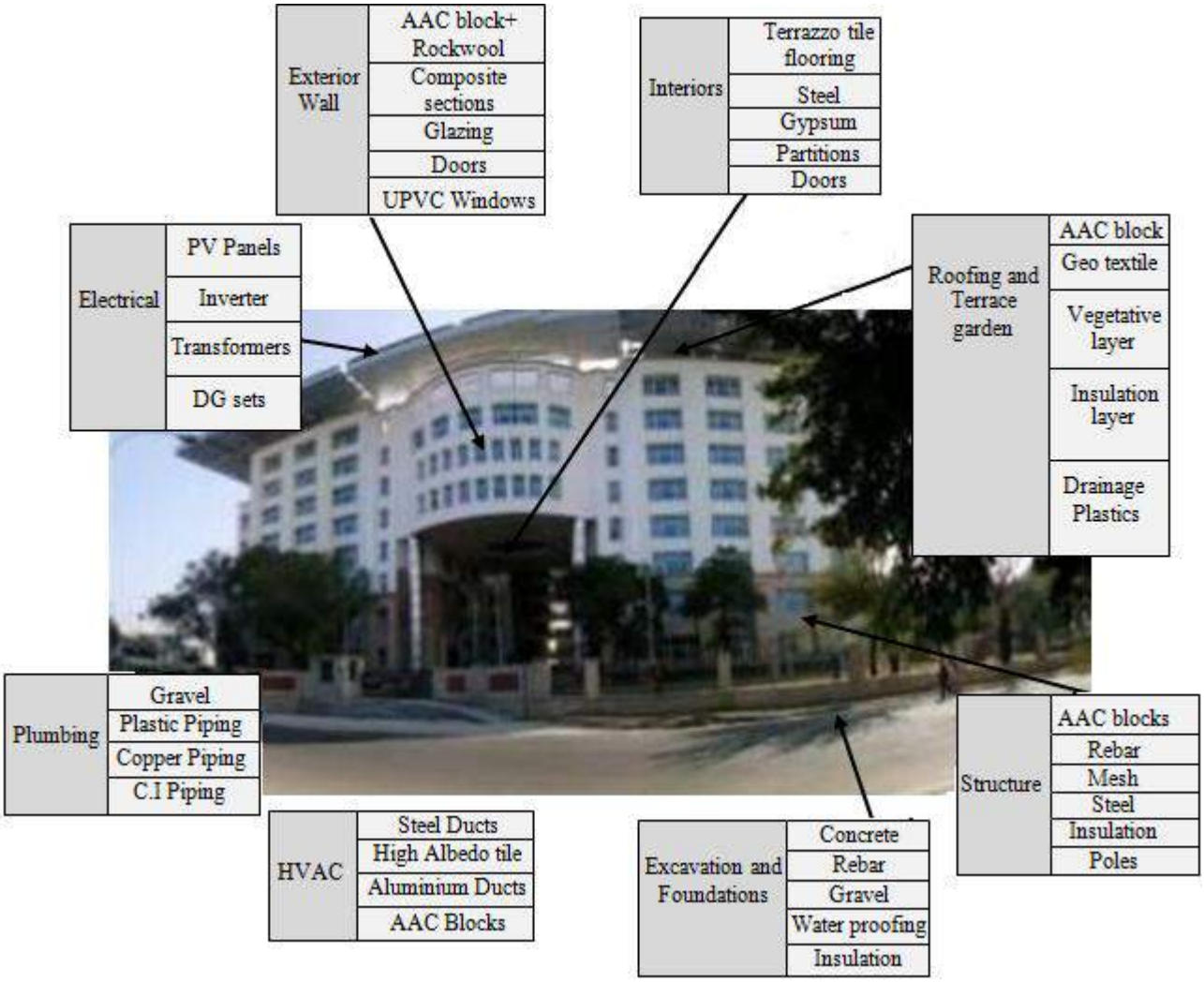

Figure 4: Illustrative material phase case-study
Source: Author

3.6 Qualitative Analysis

In this paper the definition of zero energy building is extended to include the embodied energy of the building and its components together with the annual energy use, which will serve to introduce a life cycle perspective and therefore brings the concept of 'net energy', as used into the built environment within a consistent methodology. Energy used in the building in operation plus the energy embodied within its constituent materials and systems, including energy generating ones, over the life of the building is equal to or less than the energy produced by its renewable energy systems within the building over their lifetime.

Building components such as envelope finishes, and services, which may not hold higher embodied energy initially, require a significant recurring energy. (It is the energy consumed in the maintenance, replacement and retrofit processes post construction). At the end of its service life, a building is demolished and its constituent materials are sorted, treated, and transported for reuse, recycling, or disposal to landfills or incinerators. Both the electricity and fuel are consumed directly and indirectly in the demolition and disposal processes is never taken into account.

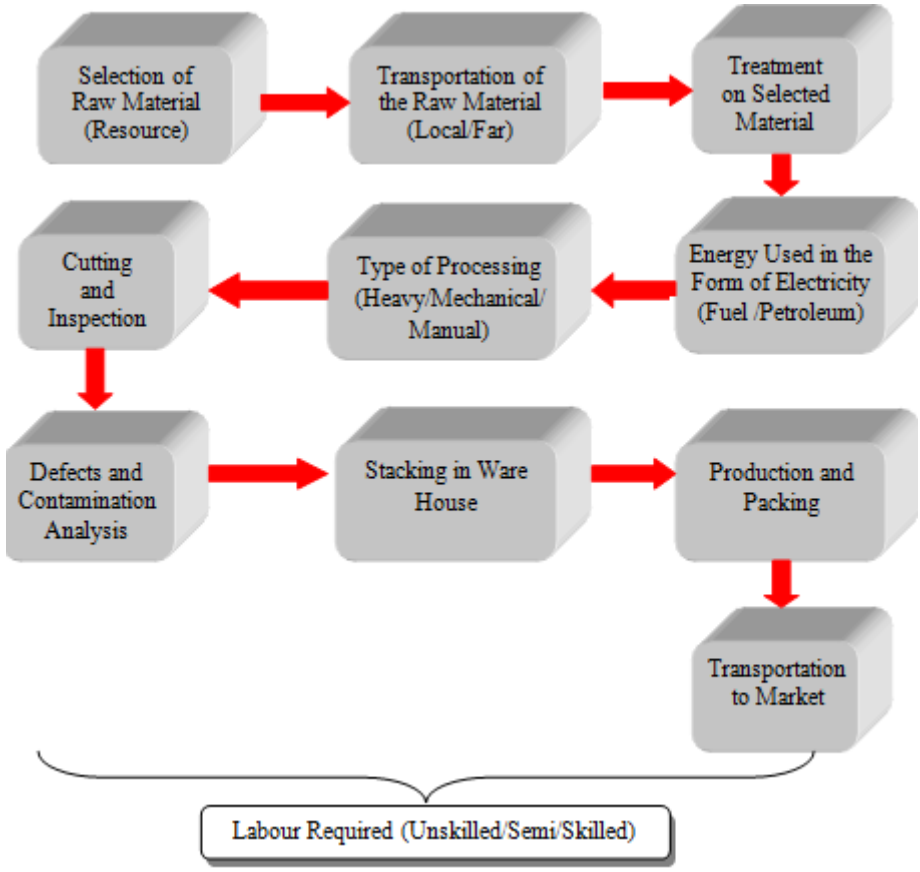

Figure 5: Stage wise material phases
Source: Author

4. Life Cycle Assessment

One method to assess the overall environmental impacts is with Life Cycle Assessment.LCA is a tool used to quantify the environmental inputs and outputs from the raw materials extraction and manufacturing of the product through the product's use phase and ultimately disposal. In a whole-building LCA, environmental impacts can be calculated at all phases-raw materials extraction and processing, product shipment to site, construction, use/maintenance, and demolition/disposal.LCA provides a standardized method for comparing the relative sustainability of all products or processes used during Pre and Post Constructional phases of the building.LCA can also identify points in a product or process cycle where environmental impacts are relatively high and changes could be made to improve the sustainability of the overall system. Thus it focuses on the environmental impacts of IPK building materials. For eg:- where the major components of the analysis, ranging from structural elements to interior flooring as well as ductwork for the Heating, Ventilation and Air Conditioning (HVAC) system and piping for plumbing. It is important to note that the PV panels do not include the cost, labour and maintenance of mounting system or the monitoring system and the associated materials with those PV system parts. Also landscaping elements which require recurrent energy, interior finishes such as carpet tiling and paints do not calculate the embodied energy required during its implementation phase. Represent a small quantity of the building's total mass. The boundaries for this study include material extraction and product processing and manufacturing defined herein as "materials phase" of the Kendra. Transportation of the building materials to the construction site, construction waste, and materials used for construction itself (eg: temporary materials) are not included. **The building material phase is becoming increasingly important as the impacts associated with the use phase of low-energy buildings decreases.** A net - zero building construction and its role in reducing operational energy led to the development of high-performance buildings, which support environmentally responsible and resource-efficient building design that aims to reduce greenhouse gas emissions and other negative environmental impacts which leads energy loss in nature. This energy loss in nature during the operational phases of construction ie during pre-construction or post-construction is never taken into account.

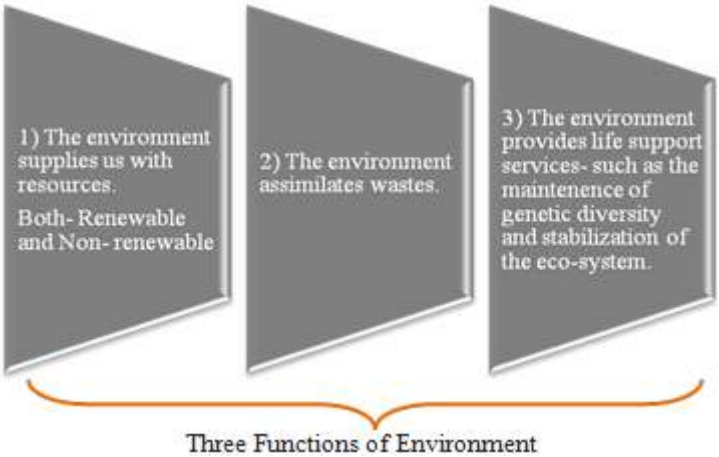

Figure 6: Interlinked Functions of Environment
Source: Author

5. Environmental Inter-linkages

The three functions of the environment are clearly linked. The transformation of resources to wastes (low entropy to high entropy) are caused by the activities of production and consumption. Absence of 2nd function, namely failure to assimilate wastes, will affect the 3rd function of the environment. Also, in a **Spaceman economy**, the earth is viewed as a single spaceship, without unlimited reserves for any resources and without unlimited capacity to assimilate wastes. Within this spaceship, if civilizations should survive, every effort has to be made to recycle wastes, reduce wastes, and conserve exhaustible energy and resource sources. Boulding's Spaceship Earth analysis was formalised in the material balance models of Ayers (1960).This balance models are based on 1st and 2nd laws of Thermodynamics. The material balance approaches are a process as a physically balance approaches between inputs and outputs.

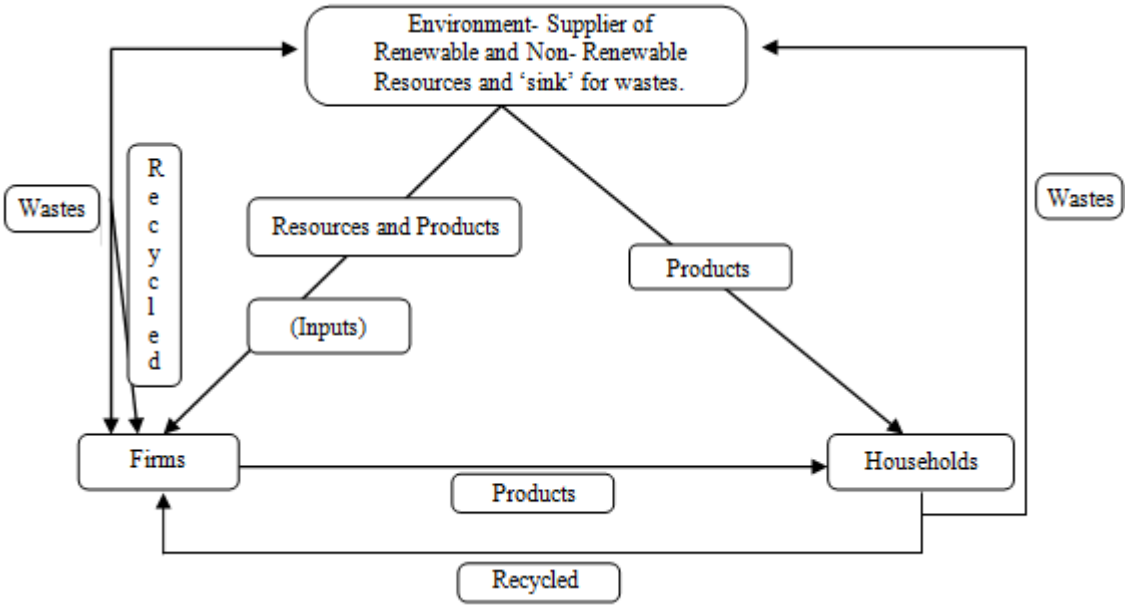

Figure 7: A Material Balance Model
Source: Environmental Economics

The material balance approach depicted in figure (Fig-7) depicts production of output from organic and inorganic inputs through various energy conservation and production process resulting into the discharge of solids, liquids and gaseous wastes. Similar wastes results from consumption activities too. Thus material and energy are drawn from the environment, used for production and consumption activities and returned back to the **environment as sink for wastes**. Matter and energy used in production and consumption activities by human beings must eventually end up in environmental systems.

6. Conclusions

This study analyzed the life cycle environmental impacts of the materials phase of a net-zero energy building. It is important to identify those materials within the building system that have the greatest effect on a building's environmental impacts in order to target specific areas for minimizing environmental impacts in future construction. As more building are designed to meet net-zero energy goals, the embodied energy of the materials plays an increasingly important role which has never been calculated or taken into account. Many studies in the past have largely

focused on use phase energy, as that building life cycle phase typically dominated analyses. We now need to reconsider the important interplay between building materials and use phase performance to truly design and operate net-zero energy buildings. An important and necessary aspect of "net-zero energy" designation is the quantification of embodied energy, illustrated via this case study and using life cycle assessment. Life cycle assessment is a necessary aspect to net-zero energy buildings to understand how the embodied energy of materials is allocated during a building's use phase.

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Examining The Nexus Of Food, Space, And Architecture: Cost Implications On Construction Site Health And Safety

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Abstract: The construction industry is an intricate web of operations, where the convergence of architectural design, spatial planning, and the logistics of construction projects are vital. In this paper, we examine the often underestimated yet essential element within construction sites – food. We investigate the interplay of food, space, and architecture and analyze their profound implications on the health and safety of construction workers. Moreover, we explore how this nexus significantly influences project costs, underlining the potential cost savings that stem from improved health and safety measures. The research ultimately underscores the critical importance of recognizing the intricate relationship between food, spatial design, architecture, and the broader construction context.

Index Terms **- Construction, Health and Safety, Architecture, Food, Cost Implications, Spatial Design, Workers.**

I. INTRODUCTION

The construction industry is not only a fundamental driver of economic growth but also an intricate arena where multiple disciplines intersect, resulting in complex, often overlooked, relationships. It is a sector where architects design buildings, planners organize spatial layouts, engineers oversee construction processes, and workers toil to bring visions to life. Within this multifaceted web of activities, an essential yet frequently underestimated element emerges – food.

Construction workers, while engaged in physically demanding and often hazardous tasks, require sustenance to fuel their efforts. Food, the means by which this sustenance is provided, plays a critical role in the health, well-being, and safety of workers. This paper examines the nexus of food, space, and architecture in construction sites, focusing on its implications for health and safety and the associated cost considerations.

1.1 Background

The construction industry is notoriously prone to health and safety challenges. The Bureau of Labor Statistics (BLS) reported that the construction sector had one of the highest rates of fatal work injuries in the United States in 2019, emphasizing the severity of the issue (BLS, 2020). Addressing these challenges has led to advancements in safety protocols, protective gear, and risk management practices. Nevertheless, the role of food provision, the spaces designated for food consumption, and the architectural planning that influences these aspects remains relatively underexplored.

This paper posits that considering the intersection of food, space, and architecture within construction sites can lead to substantial improvements in worker health and safety, consequently reducing workplace accidents and their associated costs. Understanding these interrelationships is essential for construction stakeholders, including architects, contractors, project managers, and policymakers.

II. 2. THEORETICAL FRAMEWORK

2.1 The Nexus of Food, Space, and Architecture

The nexus of food, space, and architecture in construction sites reflects a multidimensional relationship. It extends from the logistics of food delivery, storage, and consumption within the spatial design of construction sites to the architectural provisions that facilitate these processes. The quality and nutritional value of food provided can influence worker health, impacting their physical capacity and cognitive abilities.

The physical spaces designated for food consumption are integral to this nexus. Factors such as ergonomics, cleanliness, comfort, and shelter from adverse environmental conditions are essential for creating conducive spaces for meals. Architectural planning determines the layout, location, and design of these spaces, influencing worker behavior and overall site dynamics.

2.2 Implications for Health and Safety

The health and safety implications of the food, space, and architecture nexus are profound. Inadequate food and poor spatial and architectural planning can result in worker fatigue, reduced alertness, and increased risk of accidents. For instance, a cramped, uncomfortable space for food consumption can lead to rushed meals or even eating on-site, increasing the likelihood of accidents. Moreover, improper storage or hygiene practices can expose workers to foodborne illnesses, further compromising their well-being.

2.3 Cost Implications

Construction site accidents result in significant financial burdens, including medical expenses, compensation claims, and project delays. Recognizing the interconnectedness of food, space, and architecture can yield potential cost savings. Investing in better food quality, suitable spatial designs, and improved architectural provisions can enhance worker health and safety, thereby reducing accidents and their associated expenses.

III. 3. FOOD IN CONSTRUCTION SITES

3.1 Food Provision and Quality

The provision of food on construction sites is a multifaceted aspect that requires meticulous planning. Workers' nutritional needs should be met to ensure their physical stamina and cognitive alertness. However, in practice, this is not always the case. Meals often lack diversity and nutritional value, leading to suboptimal health among workers. The role of food service providers and their adherence to health and safety standards are critical in addressing this issue.

3.2 Spatial Design for Food Consumption

The spaces designated for food consumption are integral to the health and safety of construction workers. Ergonomics, cleanliness, shelter from environmental factors, and adequate seating contribute to a conducive environment for meals. Properly designed spaces encourage workers to take breaks and consume their meals safely.

3.3 Architectural Influences

Architectural planning within construction sites is central to creating appropriate spaces for food consumption. The layout, location, design, and materials used directly impact the functionality and safety of these spaces. Architects play a vital role in designing eating areas that enhance worker well-being and minimize risks.

IV. 4. Health and Safety Implications

4.1 Worker Well-Being

The provision of nutritious and well-balanced meals on construction sites is directly linked to worker well-being. Inadequate nutrition can lead to fatigue, reduced cognitive abilities, and decreased physical performance. Addressing these nutritional needs can improve overall health and stamina, thereby reducing accident risks.

4.2 Accidents and Injuries

Construction site accidents are a substantial concern, with falls, equipment-related injuries, and structural failures being prevalent. Inadequate worker health and safety, compounded by poor food provision and improper spatial and architectural planning, contribute to these accidents. Accidents result in direct costs related to medical treatment and compensation, as well as indirect costs from project delays and increased insurance premiums.

V. 5. Cost Implications

The nexus of food, space, and architecture within construction sites significantly influences project costs. A focus on improving the quality and nutritional value of food, designing comfortable and safe spaces for consumption, and integrating architectural planning that fosters these goals can yield cost savings. These savings manifest in several ways:

- Reduction in Accidents: By improving worker health and safety through food quality and appropriate spaces, accident rates decrease, leading to direct cost savings related to medical expenses, compensation, and potential litigation.

- Minimization of Delays: Fewer accidents and injuries translate to project schedules that remain on track, reducing the potential for costly delays due to accidents and the associated investigations.

- Enhanced Productivity: Properly nourished and well-rested workers are more productive, further reducing project duration and labor costs.

- Lower Insurance Premiums: Fewer accidents and injuries lead to reduced claims on insurance, resulting in lower insurance premiums and overall project costs.

The cost implications demonstrate the compelling case for construction stakeholders to consider the intricate relationship between food, space, and architecture as

a cost-effective approach to enhancing worker health and safety.

VI. 6. Conclusion

The intricate interplay between food, space, and architecture within construction sites embodies a comprehensive approach that not only addresses immediate health and safety concerns but also has the potential to make substantial contributions to overall project efficiency and cost-effectiveness. This holistic perspective recognizes that seemingly unrelated aspects of a construction project, such as food provision and spatial design, are intimately connected.

By incorporating this multifaceted approach, construction stakeholders can reap numerous benefits, including but not limited to enhanced worker safety, better project efficiency, and substantial cost reductions. The concept of providing high-quality, nutritious food, when seamlessly integrated into the spatial and architectural considerations, becomes a catalyst for driving positive change across various dimensions of construction projects.

6.1 Enhancing Worker Well-being

The provision of high-quality, nutritious food within construction sites is a pivotal element in ensuring the well-being and health of the workforce. Construction is a physically demanding and often strenuous industry, and the nutrition and sustenance of workers are paramount for their safety and productivity. Nutrient-rich meals contribute to higher energy levels, greater concentration, and overall better health, mitigating risks associated with fatigue and accidents. This, in turn, reduces the frequency of worksite injuries and illnesses, enhancing worker well-being.

6.2 Promoting Safety

Safety within construction sites is a primary concern. The careful architectural and spatial integration of food services can serve as a safety enhancement tool. Designing designated areas for food preparation and consumption, in compliance with health and safety standards, minimizes the risk of food-related accidents. Additionally, the availability of proper dining spaces can deter workers from consuming meals in hazardous locations, further mitigating accidents and promoting a safer work environment.

6.3 Cost Efficiency

Construction projects are inherently capital-intensive. However, when viewed holistically, the incorporation of well-planned food services into the project's spatial design can yield cost efficiencies. Nutritious meals result in healthier workers who are less likely to require time off due to illness or injury. This reduces labor turnover, minimizes delays, and ultimately optimizes project timelines. In this context, the inclusion of dedicated spaces for food services also prevents unnecessary downtime associated with workers traveling off-site for meals. As such, time and money are saved, leading to more cost-effective construction processes.

6.4 Sustainability

The convergence of food, space, and architecture in construction sites extends beyond the immediate project outcomes. By introducing sustainable practices in food provision and optimizing the spatial design for environmental friendliness, construction projects can contribute to broader sustainability goals. Sourcing locally and using energy-efficient appliances in food preparation can reduce the project's carbon footprint. Furthermore, architectural designs that incorporate sustainable materials, energy-efficient features, and waste reduction strategies align with the global drive for more sustainable construction practices.

6.5 A Synergetic Approach

In conclusion, the synergy between food, space, and architecture within construction projects exemplifies a holistic and forward-thinking approach. By recognizing the interconnectedness of these elements, construction stakeholders can elevate the well-being and safety of their workforce, realize significant cost efficiencies, contribute to sustainability goals, and ultimately achieve more successful and harmonious construction projects.

The provision of high-quality, nutritious food, when considered as an integral component of the project's spatial design, goes beyond the mere provision of sustenance. It becomes a cornerstone for fostering a culture of health, safety, and efficiency within the construction industry. Embracing this holistic approach is not only a path to optimized construction projects but also an embodiment of a commitment to the well-being and success of the workers who make these projects a reality.

By recognizing the interplay of food, space, and architecture within construction projects, stakeholders are poised to reshape the industry's future, turning construction sites into environments where health and safety are paramount, costs are controlled, and sustainability is promoted. The impact extends beyond individual projects, resonating across the entire construction sector, exemplifying the transformative power of a holistic perspective.

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Transitioning Beyond Energy Consumption: An In-Depth Analysis Of Responsible Building Envelopes

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Abstract: This research paper explores the evolving landscape of responsible building envelopes and their crucial role in sustainable construction. While traditional building envelope design has primarily focused on optimizing energy efficiency, this paper argues that it is essential to transition beyond a narrow focus on energy consumption. Addressing broader sustainability challenges, including resource utilization, environmental impacts, and occupant well-being, necessitates embracing responsible building envelopes. Responsible building envelopes encompass considerations that extend beyond energy efficiency, such as material choices, life cycle analysis, and the integration of renewable energy sources. Drawing insights from the literature on energy transitions and sustainability principles, this paper aims to provide a comprehensive perspective on responsible building envelopes and their significance in the transition toward sustainable construction practices.

Index Terms **- Building Envelopes, Sustainability, Energy Efficiency, Responsible Design, Material Choices, Renewable Energy, Transition.**

I. INTRODUCTION

The construction industry, often regarded as a cornerstone of economic development and modern living, is currently experiencing a profound paradigm shift. This transformation is not merely a result of industry evolution but is intrinsically linked to a global awakening spurred by the alarm bells of climate change, the specter of dwindling natural resources, and the ever-escalating concerns of environmental degradation. The underpinning premise of this transformation is the reevaluation of established norms within the built environment. Amid this broader transition towards sustainability, one pivotal and transformative aspect stands out - the concept of building envelopes.

Comprising walls, roofs, windows, and doors, building envelopes have traditionally been designed with an unwavering commitment to one primary objective: the optimization of energy efficiency. This fixation on energy efficiency stems from the pressing need to curtail energy consumption, reduce heat loss, and mitigate the carbon footprint of buildings [1]. These objectives, without a doubt, remain integral to the sustainable design of structures. However, the discourse on sustainability has advanced and matured over the years, evolving to encompass a more comprehensive perspective on the built environment.

In today's sustainability-driven paradigm, building envelopes are being redefined. Beyond the singular realm of energy efficiency, responsible building envelopes have emerged as the clarion call of the industry. These responsible building envelopes transcend the conventional boundaries of design, urging stakeholders to consider factors that extend far beyond energy consumption. They beckon designers, builders, and the industry as a whole to reevaluate and broaden the criteria used in designing building envelopes.

In this context, responsible building envelopes demand a multi-faceted approach, encompassing an array of vital considerations. From choices of materials with eco-friendliness at their core to the adoption of life cycle analyses that scrutinize a structure's environmental impact throughout its existence, responsible building envelopes leave no stone unturned. Moreover, they also advocate for the integration of renewable energy sources, seamlessly merging architectural design with sustainability aspirations [2].

This paper delves into this transformative shift by not only scrutinizing the traditional emphasis on energy efficiency in building envelope design but also exploring the limitations that arise from an exclusive focus on energy consumption. As a guide to understanding this shift, the paper introduces the foundational principles of responsible building envelopes. It underlines the critical role played by material choices in this endeavor and elucidates the paramount importance of life cycle analysis in responsible design. Furthermore, the paper embarks on an exploration of the feasibility and implications of integrating renewable energy sources within building envelopes, breathing life into the theoretical construct of sustainability. It is through this exploration that we uncover potential challenges and barriers, acknowledging the roadblocks that must be surmounted to embrace responsible building envelopes as an industry standard.

This in-depth analysis also draws upon insights from the comprehensive body of literature on energy transitions and sustainability principles. By doing so, the paper weaves together various threads of research and thought leadership to provide a holistic perspective on the role of responsible building envelopes in the transition towards sustainable construction practices.

In the following sections, we will embark on this journey towards understanding and advocating for responsible building envelopes, unearthing their significance not only in energy-efficient design but in the broader tapestry of sustainable construction.

1.1 Background

The importance of responsible building envelopes is further underscored when placed within the broader context of energy transitions. Energy transitions represent substantial shifts in how societies produce, distribute, and consume energy. These shifts involve the gradual replacement of existing energy systems with more sustainable and environmentally conscious alternatives. Recent research has highlighted the paramount relevance of such energy transitions, particularly in addressing the pressing concerns of climate change mitigation and promoting the principles of sustainable development [3].

In essence, energy transitions represent the much-needed transformation of our energy landscape. They signal the pivotal departure from fossil fuel-driven energy production to cleaner and more sustainable energy sources, such as renewables, that significantly reduce greenhouse gas emissions. The imperative for these transitions emanates from the urgency of mitigating climate change, reducing environmental pollution, and achieving a more sustainable and equitable energy future.

The alignment of responsible building envelopes with these overarching energy transitions is both significant and transformative. It underscores the paper's central premise that the construction industry can and should play a key role in supporting the transition to more sustainable and responsible energy practices. Building envelopes have long been at the forefront of energy efficiency initiatives, and now, they are uniquely positioned to contribute to the broader energy transition narrative.

This alignment is achieved through challenging the conventional norms of design and construction practices. Responsible building envelopes represent a holistic approach to sustainability that recognizes the interconnectedness of various elements within the built environment. This approach extends far beyond the confines of energy efficiency, encompassing factors like material choices, life cycle impacts, and the integration of renewable energy sources.

Responsible building envelopes, therefore, epitomize the embodiment of these transitions in the construction domain, where architecture meets sustainability. By considering material sustainability, life cycle analysis, and renewable energy integration, building envelopes not only reduce energy consumption but also enable cleaner and more efficient energy production.

As we delve deeper into this paper, we will unravel the nuances of how responsible building envelopes, with their multifaceted approach, can contribute significantly to the broader mission of sustainable development and energy transition. This exploration will help us understand their significance in addressing climate change, promoting the responsible use of resources, and ultimately fostering a more sustainable and equitable future

1.2 Research Objectives

This research paper aims to provide a comprehensive analysis of responsible building envelopes, emphasizing their role in the broader context of sustainability and energy transitions. The objectives of this study are as follows:

- To explore the traditional emphasis on energy efficiency in building envelope design.
- To analyze the limitations of an exclusive focus on energy consumption.
- To introduce the concept of responsible building envelopes and outline its key principles.
- To discuss the importance of material choices in building envelope design.
- To emphasize life cycle analysis as a crucial component of responsible design.
- To investigate the integration of renewable energy sources in building envelopes.
- To discuss potential challenges and barriers to implementing responsible building envelopes.
- To provide insights from the literature on energy transitions and sustainability principles.

II. 2. METHODOLOGY

2.1 Data Collection

The methodology for this research involved a comprehensive review of the existing literature related to building envelopes, sustainability, and energy transitions. A systematic search was conducted in various academic databases, including Google Scholar, ScienceDirect, and JSTOR, to identify relevant articles, reports, and studies.

2.2 Data Analysis

The collected data were analyzed to identify key themes and trends related to responsible building envelopes and their role in sustainable construction. The analysis involved a synthesis of information from various sources, including academic papers, government reports, and industry publications.

III. 3. RESULTS

The results of the data analysis revealed several key findings:

3.1 Responsible Building Envelopes

The concept of responsible building envelopes encompasses a shift in focus from solely optimizing energy efficiency to considering a broader range of sustainability factors. Responsible building envelopes take into account material choices, life cycle impacts, and the integration of renewable energy sources.

3.2 Material Choices

Material choices play a critical role in responsible building envelopes. Sustainable materials that have low environmental impacts are preferred, and the selection of materials should consider factors such as resource availability and recyclability.

3.3 Life Cycle Analysis

Life cycle analysis is a crucial component of responsible design. It involves evaluating the environmental impacts of building envelopes throughout their entire life, from production to disposal. This analysis helps in making informed decisions about materials and design choices.

3.4 Integration of Renewable Energy Sources

Responsible building envelopes can integrate renewable energy sources, such as solar panels or wind turbines, to generate on-site energy. This integration reduces the reliance on traditional energy sources and contributes to the sustainability of the building.

IV. 4. DISCUSSION

In this section, we thoroughly examine the implications of our research findings and their substantial significance for the construction industry. We delve into the multifaceted aspects surrounding responsible building envelopes, addressing not only their potential benefits but also the challenges and barriers that might be encountered in their implementation.

4.1 Overcoming Challenges and Barriers

Implementing responsible building envelopes is not without its challenges. The integration of sustainable materials, life cycle analyses, and renewable energy sources requires a shift in both mindset and industry practices. Some of the significant challenges and barriers that need to be addressed include:

4.1.1 Awareness and Education: One of the primary challenges lies in raising awareness and educating stakeholders within the construction industry about the importance and benefits of responsible building envelopes. Without a comprehensive understanding of the multifaceted advantages, it can be challenging to gain buy-in and support for such a transition.

4.1.2 Initial Costs: Responsible building envelopes may involve higher initial costs due to the use of sustainable materials and the integration of renewable energy sources. However, it is crucial to recognize that these investments are often recouped through long-term energy savings, enhanced occupant well-being, and reduced environmental impacts. Communicating this cost-benefit relationship effectively is essential.

4.1.3 Regulatory Frameworks: Existing regulatory frameworks and standards may not fully align with the principles of responsible building envelopes. Advocating for and navigating changes in regulations to accommodate these innovative practices can be a significant barrier.

4.1.4 Technological Advancements: Leveraging technology for renewable energy integration can be challenging, especially in retrofitting existing structures. Overcoming technological constraints and ensuring the seamless integration of renewable energy sources are areas that require careful consideration.

To overcome these challenges, a collaborative effort is needed from various stakeholders in the construction industry. This includes architects, builders, developers, policymakers, and researchers. Initiatives for raising awareness, providing incentives, and streamlining regulatory processes can help foster the adoption of responsible building envelopes.

4.2 Potential Benefits of Transitioning Beyond Energy Consumption

While responsible building envelopes may present certain challenges, their potential benefits are far-reaching and transformative. This section explores these advantages, emphasizing that transitioning beyond energy consumption can lead to:

4.2.1 Environmental Sustainability: Responsible building envelopes significantly reduce a building's environmental footprint. Sustainable materials and reduced energy consumption contribute to lower greenhouse gas emissions and resource conservation. By adopting these practices, the construction industry can play a pivotal role in addressing climate change and promoting environmental sustainability.

4.2.2 Improved Occupant Well-being: Responsible building envelopes not only focus on energy efficiency but also on creating healthier and more comfortable living and working spaces. Enhanced insulation, ventilation, and natural lighting positively impact occupant well-being, resulting in increased productivity and overall satisfaction.

4.2.3 Long-term Cost Savings: While there may be higher initial costs, responsible building envelopes offer substantial long-term cost savings. Reduced energy consumption leads to lower utility bills, and the use of durable, sustainable materials results in reduced maintenance and replacement costs.

4.2.4 Enhanced Market Competitiveness: As sustainability and environmental concerns become more significant factors in real estate and construction, buildings with responsible envelopes gain a competitive edge in the market. They appeal to environmentally conscious buyers and tenants, contributing to increased property value.

4.2.5 Support for Renewable Energy: The integration of renewable energy sources within building envelopes supports the growth of the renewable energy industry. It reduces dependence on conventional energy sources, contributing to a more resilient and sustainable energy ecosystem.

4.2.6 Contributions to Energy Transition: By embracing responsible building envelopes, the construction industry can actively contribute to broader energy transitions. This contribution is vital for mitigating climate change and transitioning to more sustainable energy systems.

In conclusion, the transition beyond energy consumption and the adoption of responsible building envelopes are paramount for the construction industry. While challenges exist, the potential benefits in terms of environmental sustainability, occupant well-being, cost savings, and market competitiveness are undeniable. By collectively addressing the challenges and harnessing these benefits, the construction industry can play a pivotal role in shaping a more sustainable, resilient, and environmentally responsible future.

4.1 Challenges and Barriers

Implementing responsible building envelopes may face challenges such as higher initial costs

, resistance to change, and the need for specialized knowledge among construction professionals. Overcoming these challenges will require collaborative efforts and innovative solutions.

4.2 Benefits

The benefits of responsible building envelopes are manifold. They include reduced energy consumption, lower operating costs, improved indoor environmental quality, and reduced environmental impact. Additionally, responsible building envelopes contribute to the well-being of building occupants and support sustainability goals.

V. 5. CONCLUSION

The paper concludes by summarizing the key points discussed and reiterating the importance of transitioning beyond energy consumption in building envelope design. It emphasizes the role of responsible building envelopes in addressing broader sustainability challenges and supporting the global transition toward more sustainable construction practices. The study underscores the need for a holistic approach that considers material choices, life cycle analysis, and the integration of renewable energy sources in building envelope design. It encourages stakeholders in the construction industry to embrace responsible building envelopes as a pivotal step towards a more sustainable and resilient future.

VI. 6. RECOMMENDATIONS

The research findings suggest several recommendations for stakeholders in the construction industry:

- Invest in research and development to identify innovative and sustainable materials for building envelopes.
- Provide training and education for construction professionals to enhance their knowledge of responsible building envelope design.
- Develop incentives and regulations to promote the integration of renewable energy sources in building envelopes.
- Foster collaboration among architects, engineers, builders, and policymakers to address the challenges of implementing responsible building envelopes.

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Internet of Things and Big Data Analysis in Smart Cities

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Abstract: Internet of Things (IOT) and analysis of big data are two hottest research areas around the world. Numerous researchers are working in these areas in order to get some meaningful output which can be beneficial to the society. IoT and big data innovations have developed and extended hugely and both these areas play a significant job in building practical activities for the development of smart cities. Big data and IoT together structure an ideal mix in bringing an intriguing and novel challenge to achieve the goal of future smart cities. These new challenges fundamentally center on business and innovation related issues that help smart cities to plan their standards, vision, and necessities of smart cities applications. In this article, an attempt has been made in order to highlight the role of IoT and big data in developing smart cities. Also, the different challenges faced by smart cities with reference to IoT and big data have also been discussed in this article.

Keywords: Internet of Things (IoT), Big data, Smart cities.

Introduction

A Smart city is an urban region that utilizes various sorts of electronic IoT sensors to gather information and afterward use insights picked up from that information to oversee resources, assets and administrations proficiently. This incorporates information gathered from residents, gadgets, and resources which is processed and examined to screen and oversee traffic and transportation frameworks, utilities, water supply systems, power plant, data frameworks, schools, libraries, medical centres, and other services. Smart Cities are utilizing large information and IoT for exchanging digitized data and correspondence so as to improve the city administrations concerning execution, quality, and prosperity of residents. The individuals living in urban communities are expected to get multiplied by 2050 [1]. The specialists anticipate the urban populace will reach to six billion by 2050 in differentiation to 3.6 billion starting at now. This will build the gigantic weight on the accessible assets. IoT and huge information are as one exceptionally noteworthy innovation which will be embedded into individual's keen gadget and become accessible to billions of individuals legitimately or in a roundabout way. As the internet is omnipresent, with the administration's drive towards making each city smart, everything will be IoT empowered and will deliver huge information. From that point, big data investigation or analysis will be applied to conclude different deductions and give knowledge into the service business. In this manner IoT and enormous information will increase the expectations and standards of individuals. Deepak Punetha et al [3] proposed a health care management system based on different sensors which can be implemented in smart cities for differently disabled persons. Diksha Sharma [4] et al discussed about various challenges which are involved in the processing of big data and also highlighted various methods in order to solve problems related to the processing of big data. Sukhraj Singh et al [5] proposed a smart security system based on RFID which can be implemented in smart cities for security purposes.

Big Data And Internet Of Things

Generally big data alludes to informational collections or blends of informational indexes whose enormous size and pace of expansion make them difficult to be processed and analyzed by conventional techniques. While the size used to choose whether a specific informational collection is viewed as large information isn't solidly characterized and keeps on changing after some time, most investigators and specialists as of now allude to informational indexes from terabytes to numerous petabytes [6].

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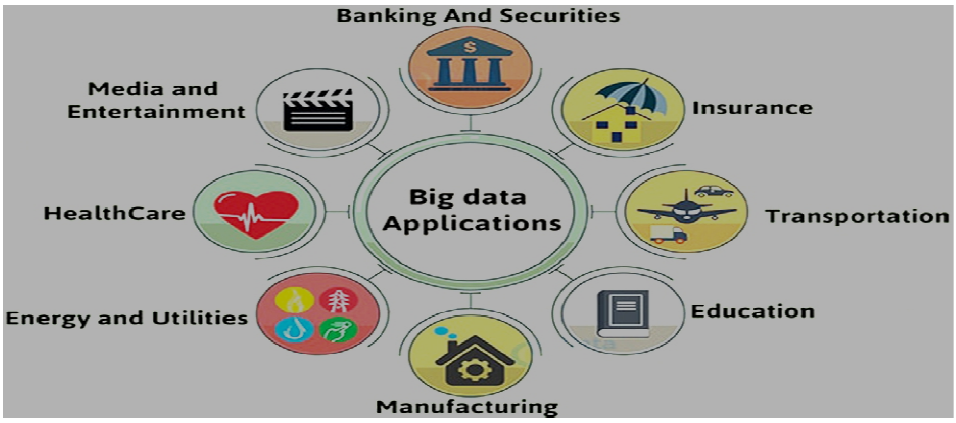

Fig 1: Big data Applications [7]

Big data challenges incorporate examination, information curation, search, sharing, move, perception, questioning, and refreshing and data security. The expression "enormous information" or big data frequently alludes essentially to the utilization of prescient investigation, client conduct examination, or certain other propelled information examination techniques. The various applications of big data have been depicted in figure 1.

IoT is an arrangement of interrelated figuring gadgets, mechanical and advanced machines, items, creatures or individuals that are furnished with unique identifiers (UIDs) and the capacity to move information over a system without expecting human-to-human or human-to-PC communication. The figure 2 shows various applications of IoT for smart cities.

Fig.2: IoT Applications for Smart Cities

How Big Data & Iot Impacts Smart Cities

It appears as though every city is attempting to make itself in a brilliant city. There are numerous components which make a city smart. Water and waste management, transportation, and safety of human beings are a portion of the numerous zones of core interest [8]. Future smart urban communities involve the essential necessities and higher advances for easy and rudimentary living. There are different zones of advancement in a city that must be recognized to reshape the present condition. A straightforward meaning of a smart city is "a city that is outfitted with essential framework to give quality way of life to its residents.

A moderately more up to date innovation, big data, can possibly increment and utilize services of smart cities. Big data is fundamentally colossal measures of information that can be dissected by organizations to settle on suitable key moves and business choices. Big data analysis is executed to ponder enormous volumes of information to reveal designs and get bits of knowledge to extricate important data. ICT plays a significant job in urban smart cities by making information that is gathered through data innovation components accessible. This innovation, likewise called the Internet of Things (IoT), works by communicating between associated gadgets while trading information that requires web, remote associations, and other correspondence mediums. Chiefly, smart urban cities utilize IoT gadgets to get information and productively process it for executing it in a specific area. smart city sensors and associated gadgets gather information from different platforms introduced in a city and afterward investigate it for effective decision making. Utilizing ICT in smart urban cities will help diminish natural impressions and result in the ideal utilization of resources. The some of the core areas where big data and IoT has greater impact are as following:

- Security of citizens
- Planning of city
- Effective Transportation
- Effective Medical Facilities

Major Challenges in Implementing Smart Cities

Although, researchers are trying to implement the concept of smart cities yet there are number of challenges in implementing smart cities project [9]. The some of the challenges have been discussed as following:

Infrastructure: Smart cities use sensor innovation to accumulate and examine data with an end goal to improve the personal satisfaction for inhabitants. Sensors gather information on everything from busy time details to crime rates to in general air quality. Complex and expensive infrastructure is engaged in the installation and maintenance of these sensors. There are number of questions like, how the sensors will be given power supply? Will they operate on sun energy or will they be operated on battery? What will happen if power failure occurs?

Privacy Issues: In any significant city, there's a harmony between personal satisfaction and intrusion of security. While everybody needs to appreciate a progressively advantageous, tranquil, and good environment, no one needs to feel like they are continually being observed by "Elder sibling." Cameras introduced on each city intersection may help discourage crime; however they can likewise introduce dread and neurosis in well behaved residents. Another substantial concern is the measure of information being gathered from all the savvy sensors inhabitants come into contact with every day.

Engaging and Educating People: For a Smart City to really exist and flourish, it requires smart residents who are locked in and effectively exploiting new innovations. With any new city-wide tech venture, some portion of the usage procedure must include teaching the people on its advantages. This should be possible through a progression of in-person town corridor style gatherings and email battles with voter enlistment, as well as via online learning that helps in keeping the residents up to date and engaged. Educating and engaging a huge population is quite a big challenge.

Conclusion

Everybody can concur that savvy or smart innovation has the ability to make our lives a lot more straightforward – particularly in profoundly populated urban regions – executing that innovation must be done in a deliberately arranged and exceptionally secure way. Instead of simply concentrating on what the possible solution can do, engineers and tech organizations should likewise think about how it will influence the individuals that come into contact with it. So both the advantages and disadvantages must be taken into account while looking for the smart city concept. In this article, an attempt has been made to discuss the impact of IoT and Big data in smart cities. Also the various challenges in implementing smart cities have also been discussed briefly.

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THE STATE OF LIBRARY IN DIGITAL ERA

An Opportunity to redefine learning & reading spaces

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Abstract:

In our civilized society, library has significant meaning where one study, does research, references and recreates their thoughts. Thus, library is a store house of knowledge. But in Digital Era of today, library building stands obsolete due to poor footfall of the readers, the building maintenances has become uneconomical and hence there is an issue of survival in today's context where land value is high and in competitive digital era. The paper focuses on questioning the purpose of library building, changing trend and medium of learning, Children's psychology, allied activities to support the library function and future state of Library. The current state of libraries in the Metropolitan cities is documented, analyzed through surveys targeting children and youth of various age groups. The case studies are focused on modern library designs to adapt the digital age, economics and recreating attraction to increase the footfall. The well-designed experimental spaces that are grounded in development theory, including school-based programme, enthusiasm to promote reading. Thus, to lay the foundation for the new Era of traditional library to the modern requirements by incorporating allied activities supporting the main function of the library building which would promote interactive learning; enhancing the overall development of community.

Index Terms **– Children's library, virtual library, social learning spaces, e-library, Collaborative activities.**

I. INTRODUCTION

A library can be defined as collection of information, analyzed and selected by experts, scholars and made accessible to all for referencing or borrowing, also physical manifestation offers a quiet environment conducive to study. The paper focuses to study the vital role that library plays in the era of digital world. In this era, we have everything easily accessible but not a courage to pursue them. In olden days, library was a platform to meet like-minded people, new friends, a treasure to knowledge, motivational place to hunt information, can create different world altogether. In other words, it is a place where people can trade information and help themselves grow, providing mental peace and mind broadening. On a contradictory, the digital means and media are making people more introvert, anxious and depressed while library can actually be a place having silence with studious environment giving less of anxiety and more of familiar space to be an extrovert and explore oneself. The digital platform has number of easy options and access to the worldly knowledge but one doesn't know how to derive wisdom from the vast information available.

This article seeks to explore some creative possibility aimed to find unique ways for the library to grow in the digital era. New directions to support research and study can be taken from the comparative studies of libraries in India – Urban and well as rural set-up library. The library is like a growing organism, where one can have platform for theoretical arguments, science, arts etc leading towards community development.

The paper focuses on various aspects like adaptive reuse of existing library building, revival of functions and integration of allied activities, to sustain library in Virtual era. It reviews thoughtful practices used both in treatment settings of physical form of Library buildings and in prevention or enhancing the mental health of individual by making them aware if the learning and interactive integrated spaces under one roof.

1.1 INTELLECTUAL ACCESS TO INFORMATION IN ANY FORMAT [ROLE OF LIBRARY PROFFESSIONALS IN DIGITAL ERA]

The range of available resources expanded to include microform, video and audio formats. The final decades of the 20th century witnessed a further explosion in format, and libraries can now offer information in the form of print, audio, video, microforms, numeric, computer programs, or multimedia composites. For librarians the most important issue is to provide the information in whatever form it is packaged. In digital library scenario, it has benefited the users by providing worldly information in single click. It is being able to provide information resources to readers – regardless of format. Librarians and patron will no longer be restricted to 'a single entity where everything is stored ', but will be able to offer "a range of services and collection, link together or made accessible through electronic networks".

The development in electronic access to scholarly journals is a key example of the shift of ownership to access. University and research libraries especially, find the option of providing electronic access to journal subscription to be a means of dealing with complex multi- campus organizations where the client population comprises and increasing mixture of on – and off – campus students.

Electronic access to journal literature was began to use the newly- evolving technologies, hence the beginning of digital library started. The development of electronic reserve [e-reserve] collections, demonstrate another way in which librarians are adapting new technologies to deliver services more effectively. electronic reserve provides the ability to digitize a printed document, video, audio, or data, so that many students can access it simultaneously without the limit of attending a library building within opening hours.

The technology to provide digital access to library reserve collections has been available for some time. However, the whole sale adoption of this mechanism has been impeded by a lack of clear copyright and intellectual property ownership laws for the digital environment.

1.2 THE NEED OF LIBRARY FOR CHILDREN -NECCESSITY TO RELIVE CULTURE OF READING

Knowledge and information are so vital for all round human development, in which libraries acts like the source that conserve information and distribute knowledge. Libraries serve a vital social act of aid by helping bridge the gap between the haves and the have knots, especially when it comes to literacy. The need of children library in today's 21st century is must because it equips children with lifelong learning and literacy skills enabling them to participate in society. By designing a wide range of activities, public libraries can provide an opportunity for children to experience of reading and the excitement of discovering knowledge and study the works of the imagination by these thoughts while it is somewhere helping children to brainstorm but nowadays libraries are undergoing transformation and are now a mix of traditional print library resources and the growing number of electronic resources. Ironically younger generation don't have Essence of book, the amount of comprehension it had got because internet can't cover the whole aspect. When we go to a library we search we strive and we somewhere innovate new ideas while on the other hand digital world has made people limited to what comes in front of them, sometime distract away from the intent and accept the fact because of this no one take efforts to search more. Reading not only helps in critical thinking, but also perfects your brain function. The ancient libraries have a beautiful space which allow to smell the essence books. In human growth, early childhood is a period in which, child starts learning to develop in a significant and permanent way where they learn how to interact with people, along with learning new things by reading and asking questions. The need of library specially designed for children is to make young mind grasp things easily. The old tradition of our country, where Pathshala and Gurukul encourage children use to study under trees and in a vernacular atmosphere these traditions were designed for a purpose to enhance mental growth.

The public library is one of the biggest treasures known to societies from the time of the Indus valley civilization. It has all the resources available. With the availability of internet and digital platform, public and children libraries have been neglected. The best part of having a local library is to have free books! You can have any book at any time just with a cost of zero rupees. You can also easily carry it anywhere. The best part of the library is that there are thousands of different types of books available just under one roof. A local library is located in the vicinity and one can use or study there anytime if any difficult to study at home. Along with that most of the libraries are designed in such a way that they are spacious and airy.

1.3 CHANGING THE ROLE OF LIBRARIES

The concept of a library space is more than 1000 years old and is still relevant in the 21st century of e-library. Do people still go to library only to sit and read quietly, or are there other reasons? The fixed image of library is that a place which has only books, and we always must be quiet. The main purpose of this study was to understand what is relevant today. Libraries plays an important role in keeping and providing information to users. Even though digital technology growth rapidly but the importance of libraries is still there for its users. Face of libraries has changed as content is moving towards a digital platform and internet access is becoming more of a human necessity. Factors of information technology is closely related to the development of libraries. Today's library should have information cantered and are used for various social activities like teaching, mentoring, and collaborative learning. Thus Libraries should become a place where modern technology and old information meets. Librarians also play an important role in creating innovative and up-to-date services to users. The implementation of modern technology in libraries is todays requirement. It is important that libraries continue to utilize new form of technology to keep up with modern times

1.4 LIBRARIES IN 21ST CENTURY: THE STRUGGLE BETWEEN PERCEPTION & REALITY

Internet is no substitute for library. Library will always be the best place to study and gain knowledge. It will always be the hospital for mind. Image of Library is so stereotypic, it is all about a gloomy atmosphere with people wearing glasses and their noses buried in a book. But in actuality, the library is a sanitizing agent for the mind that is derived from peace and knowledge. The space is visualized as a place filled with racks and racks of books on a different topic, just waiting to be opened and accessed. Our cultures wouldn't have a place to stay if it wasn't for the libraries and their dusty racks filled with books It is a sea of the intellect for people who looks for peaceful space as the library has an atmosphere that allows you to concentrate at your level best and keeps away from all distraction's outsides. In digital world, Internet cannot take over library spaces completely, but a search tool to be used in addition to traditional sources in the library. But library has up to date information available 24/7 online from the library's webpage. Even in colleges these databases of library's collection are accessible in remote areas, off and on campus and with your Student ID.

The internet is not always organized. It's a search on the Internet is similar to searching an unclassified catalogue. Libraries are organized according to subjects/dates/alphabets and the expert Liberians

E-Libraries, many a times provide free access to books, journals, newspapers, encyclopedias, and other sources. It is an economical option for people who cannot afford. Whereas internet is free except scholarly material. The library has collection of ancient manuscript than the Internet, including Archived materials. Information on the Internet is hard to tell who's telling you what and where is the location of the information.

1.5 NEED OF LIBRARY IN DIGITAL AGE

In today's digital era, with advent of technology and resources available globally, reading in libraries has huge impact children today. At younger age i.e. age group from 2 to 12 years, in which learning starts to develop in a significant and permanent way. In pre-schools, learning through activities, constitute an important part of institutions, are helpful for children to improve their vocabulary, enhances the knowledge, to use words correctly and appropriately, to express their feelings through language, and to develop a love for books and the habit of reading. Library isn't just about books but it's also the activities that the child gets involved in. Urban space or collaborative learning spaces provide free resources, access to professionals, and a variety of other services that benefit children. Most of us feel that the child will inculcate reading through phones and tabs in front of our eyes but reading isn't only enough for a child to grow up. Most important thing for its development is the social interaction. In physical library the kid will get to learn, read and write through the activities performed and new friends made. One of the convenient environments for the advancement of language development skills is Children's Libraries. The library spaces equip individual with lifelong learning and literacy skills enabling them to participate in society.

1.6 PRESERVING THE TREASURE- LIBRARY AS A MUSEUM

In our civilized society, library has a significant meaning where one studies, does researches, references and recreates their thoughts. It is a storehouse of knowledge. Various types of books written by our ancestors are still present in few libraries as a wisdom which reminds of the great thinkers and readers. The holdings of such libraries are priceless heritage of mankind as they preserve facts, thoughts, ideas and evidences of human development which helps the present thinkers and readers to learn and analyze things in a different perspective. Any loss to such precious treasure is simply irreplaceable. Therefore, preserving this cultural heritage becomes the moral responsibility of the librarians or the people in charge. Almost all ancient books are susceptible to decay. As we are aware, apart from paper the books contain various different materials such as cloth, thread, ink, adhesives, etc. All these materials can be a source of nutrition to the living organisms. This leads to the need of protection of books from the factors of deterioration. Just so that one understands better, deterioration is the process of substances gradually becoming inferior in quality or their actual condition after coming in contact with the factors of destruction. Various types of deterioration of paper related materials are cracks, brittleness, shrinkage, dust and dirt accumulation, etc. Hence, for such issues either the books should be kept under some critical observation which doesn't let the originality fade away or the books should be uploaded on some web page which doesn't harm the originality of the book and also the readers can read it efficiently. In such cases E-books are very helpful and convenient for the readers who can't have access to the same in library. Books should be considered as relics and given same importance. And hence the library should be considered as a museum to store the books in the same condition and allow the proper readability factor to the readers. Even though E-books doesn't provide the feeling of different senses such as smell and touch but provides the most important thing which is fruitful reading and grasping the knowledge. Books are our friends and the way we take care of our friends similarly they too should be taken care of as they are valuable and our lifetime companion.

1.7 E- BOOK LIBRARY

As we go back in time, where the books played an important role which acted as a getaway from real world. But now, we see there's innovation of e- book which could be said as the digital library of the new generation. But how is it better than the conventional libraries? When we see the advantages that e- books can give us is a lot which turns out to be sustainable as well. With the increase in population there is more demand of books which means more cutting of trees. But with E-books there is no use of trees but at the same time one can attain the knowledge. Also, e-book has been proven more efficient as during the pandemic no libraries were open but yet one could easily read books through devices. eBooks take up less space. The traditional library space can be actually being used for community center or some other uses. Also, the conventional libraries need monthly maintenance which can be avoided if turned into digital libraries.

1.8 IMPORTANCE OF LIBRARY IN SOCIETY

Public Libraries were always considering as a civic building and placed in a strategic location for betterment of society from a very long era. Ideas of information as a public thought lead to discussions of the role of information and provision in societies libraries provide the basic conditions for lifelong learning, independent decision-making and cultural development of the individuals and social groups. The resources and services offered to create opportunities for learning, support literacy and education in the society and help to shape the new ideas and perspectives that are central to a creative and innovative society. They also help to ensure an authentic record of knowledge created and accumulated by past generations over years. Libraries are rich repositories of historically and culturally significant collections many of which are not available anywhere else in the world. Society needs libraries to preserve records of knowledge created and accumulated by present and past generations for the future generations to gain knowledge. Library is seen as a key element of educational success in the society and the educational success is seen as a key element to the potential life success of everyone.

1.9 IMPACT ON TRADITIONAL LIBRARY IN THE DIGITAL ERA

In olden times, reading books was the common hobby for people which was the only medium available to gain knowledge and spend leisure time. People who had crave to read, were addicted to books and used to eagerly wait for the new editions. Feeling the ambience of sitting in a library and reading books gives a good satisfaction in boredom but those traditions are fading away in these days. Technology brought a drastic change which has become integral part of the society. This makes the life easier and faster. With daily new invention of Smart appliances and voice-controlled assistants explain how technology is upgrading to make life easier.

The way we access and consume information has changed dramatically in the 21st century, and this challenges for physical library systems across the world. Library technology reaches ahead of the library walls via computer networks to put information sources into the hands of users at the point of need. Due to the technological advancements people try to skip visiting library buildings since the needed information are on the fingertips. These may not be majorly affecting the people but have affected to the library sustenance. The traditional librarians may not be skilled to handle the modern technology and there may be less facilities for the traditional libraries to run a digital library. So to survive in this digital era and stay relevant, traditional libraries need to be more innovative & be equipped with more allied functions.

2.1 EVOLUTION OF LIBRARIES

From the conducted research, we can conclude that through the ages, people have always felt the need to document their lives and activities. This documentation ranges from drawings on clay tablets to the vast collections of electronic references that we have today. The initial records included a range of topics including collection, acquisition of materials, arrangement and finding tools, the book trade, the influence of the physical properties of the different scripts, reading materials, language, role in education, rates of literacy, budgets.

It also has led us to study, analyze and learn about the human evolution about everything, learning stage and library itself.

Forms of writing materials have shifted from stone and bronze tablets, to ones made of wood and wax, to papyrus scrolls which were then bound together to form the first books. From hand written manuscripts to books inked by machines with the invention of the printing press, it is appropriate to say that humanity has come a long way. Moreover, while on the subject, we have come to know about the literary advancements through the millennia. Ancient scripts like hieroglyphs and cuneiform have given way to Latin, Greek and Sanskrit alphabets, which then evolved to form the numerous modern languages we use today. We also learned about how each time period has its unique artists and writers, and the variety in their creations.

2.2 Time line of Libraries

Time line of Libraries

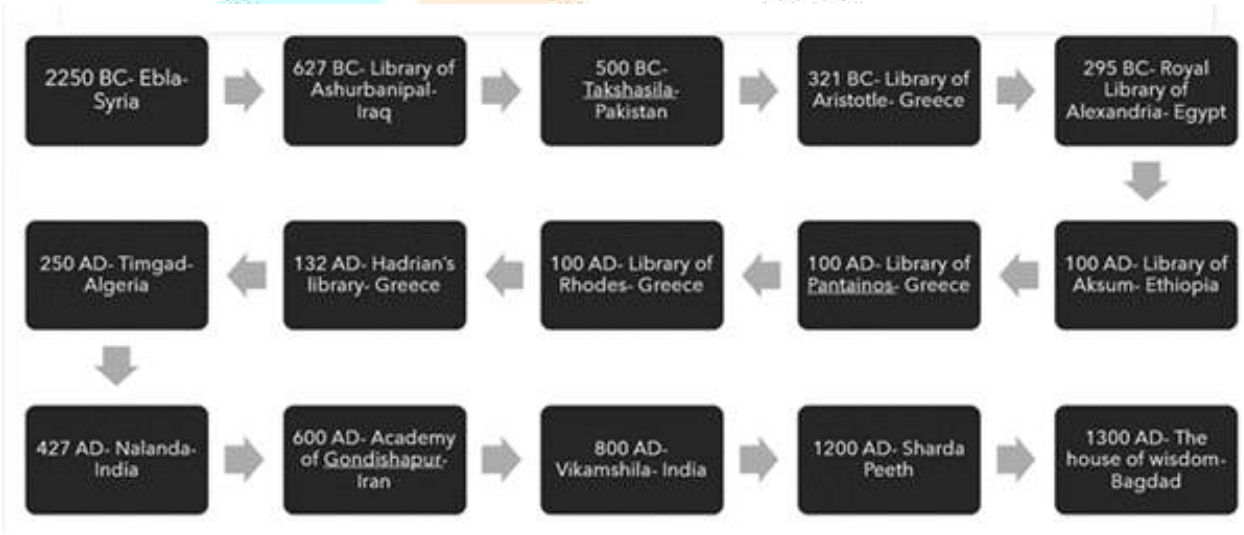


Figure 2.2.1 Time line of libraries

Figure 2.2.1 Time line of artist.

At the same time, the evolution of libraries through the ages in different parts of the world, from the first known Library of Ashurbanipal in Iraq to the plethora[1] of books we now have at our fingertips. Ashurbanipal was known as a martial commander of Iraq who also being literate was a passionate collector of texts and tablets. He hired scholars and scribes to copy texts mainly from Babylonian sources and used war loot to stock his library. The original motive mention "gain possession of rituals and incantations that were vital to maintain his royal power." Around 30,000 tablets and writing boards were found, some of them being severely fragmented. The library can be divided into two groups: historical documents, religious texts, mathematic, epics and myths and legal documents.

Various global interactions have been evolved due to libraries. We have also come across various genres like fiction, science, mathematics, crime, etc. We are given the chance to educate on these genres and learn from them, people aced in the particular field. As long as we exist, there will be a need of recording the wide range of topics that enrich our lives from fiction to politics to

economics. Enabling the global development. We came across Communication, healthy debates, education etc. started across the world on various periods of history and how it changed the world.

3.1 PRESENT SCENARIO OF LIBRARIES

Library is experiencing a massive period of changes. In order to survive, every library has to adapt itself according to the needs of modern information society. It has to correspond not only to informational, communicational but also to cultural, leisure, aesthetical and other community needs, to provide not only traditional library services but to organize non-traditional - cultural and social - activity. To sustain the function of the library, we have to develop today a new multifunctional type of library according to a flexible need where certain percentage of the library space should have integrated with additional social and cultural activity. Libraries have now metamorphosed into digital institutions.

Library architecture needs revival, a combination of some factors of these spheres which interaction gives these buildings certain singularity, very typical for this kind of buildings making it integrated factors as integrated. Integrated library factors - library technology, library functions and information media determine usually the planned spatial solutions of the library, which are in particular the integrated architectural factors. Otherwise, architectural solutions determine the quality of accomplishment of library functions, the rationality of the technological scheme, the character of deployment of information media etc. This integrated space cannot be attached to library science, because the planned spatial solutions of buildings belong to the sphere of competence of architecture. This could be a periphery sphere of two sciences and all points of interactions in this sphere we can name as integrated factors.

Library buildings, which are planned on old norms and standards, do not satisfy today's situation to accommodate allied functions. The modern library has to be multi-functional and shall cater to allied functions like cultural hub, communicational and other extra services as well. The modern library as an open, democratic and intellectual communication institution All architectural solutions of the modern library have to express the image of the library as an open, democratic and intellectual communication institution. Planning of the building has to be flexible and simple the planning of the building has to be flexible and simple in
the general plan. There have to be possibilities of extension or transformation.

4.1 DIGITALIZATION OF LIBRARY

The digitalization of libraries is not a new concept. Opting for digital libraries or physical libraries has always been a controversial topic. Research for the up-gradation of digital libraries and their services has been taken into consideration to initiate new services and technology. The advent of digital resources available in diversified forms like e-journals, e-book, web-blog, information on websites, institutional repositories, etc., have raised challenges for a library to supervise the information resource potentially adapted to the needs of the user. Looking at the literacy rate and the number of people knowing about the digital world, digital services need to be provided at the quickest possible time. This research article, let us review that the digitalization of libraries has made way for innovative services and exploded many issues in the digital library such as infrastructure, creating awareness, providing training to the user community, etc. Future trends point towards the need for extensive research in digital libraries especially in the services aspect and the transformation of libraries as community information centres. With the advance of research and practice, a digital library can extend extensive services.

For a developing country like India, digitalization is both a boon and a curse. Since the country consists of antithetical areas that are the rural and urban zones, the transition from one zone to another transports you to complete different experiences. Digitalization being at its peak in urban cities where every other person has access to technology is a boon. Metro cities like Mumbai, Delhi, Kolkata, Bangalore face a lot of difficulties to cater to the growing population since the amount of habitable space is the same but the number of habitats is growing in number with every passing day. So the need for a physical library is somehow null as compared to its need in the rural sector. In rural areas, a lot of people are uneducated or do not have access to mobile phones or basic technology so digitalizing libraries in these sectors would make no sense as there would be a thin audience to cater to. In this case, a physical library is a boon or in other words, a digital library is a curse. There is comparatively more amount of space in rural areas where you can afford to build physical libraries for all sorts of people.

On a global scale, we have developed and developing nations. Countries like the USA, Canada, Germany can be considered to be developed whereas countries like India, China, Russia are developing. The same analogy of urban and rural areas can be implied here, developed nations being urban areas and developing nations being rural areas.

Digitization is an essential task in modern-day libraries. This will enable it to preserve endangered library resources, improve the efficiency of information search mechanisms and enhance access to library resources. The various ways to search and access library content are created. A strong partnership and collaboration through awareness can lead to better digital libraries.

5 IMPORTANCE OF READING SPACES:

Library in schools, help to build training capacities, such as sentence plan, complement and language structure. It makes students feel like home even in school. Exactly when understudies have a spot to get books, they may will undoubtedly get them, and if getting is allowed, they can take them home and carry on their examining away from school too. Presenting for all to hear to families and friends may seem, by all accounts, to be fairly overpowering from the beginning so a serene space where adolescents can go to develop their capacities is incredible. In the occasion that understudies have a particular premium in a subject like space, and books with respect to this matter are open, they can go to the arrangement space and get some answers concerning it. This will propel a data driven neighborhood need to manufacture their learning, and this angle is critical for their future school mulls over.

5.1 IMPORTANCE OF READING HABITS:

Reading discovers some new information and gain insight. Perusing books on different types gives data and a profound understanding into the subject. Those with great perusing propensities give indications of higher knowledge. Books open the brain with different and plentiful kinds and upgrade innovative abilities and language abilities. Youngster brain science is the investigation of subconscious and cognizant youth improvement. Kid analysts see how a kid collaborates with their folks, themselves, and the world, to comprehend their psychological turn of events.

5.2 PSYCHOLOGICAL IMPACT STUDY

Learning spaces has major impact on the humans psychologically specially on children. It reflects on a wide ranges of topics, influences on behaviour to the socio-cultural development. The following are some of the impacts.

1. Intellectual development
2. Environmental influences
3. Gender Roles
4. Language
5. Personality development
7. General Knowledge
8. Social Interactions

6. (Library building) BODY REMAINS WITHOUT SOUL

With drop on the footfall of the readers, most of the library buildings have closed down, changed its function, is supporting function to another function or structure has adaptive reuse as the soul function, olden library was design for; has changed and in some cases the built form remains without its original function. The several reasons for the same are as follow.

6.1 Obsolete/defunct use of structure:

Since the digital medium as taken over completely, the concept of going to a built form or reading spaces is slowly diminishing. Only old libraries which has collections of old manuscript or huge collection of specific theme are barely surviving in today's times.

6.2 Adaptive reuse:

The cases where the embodied energies of the building are good, the physical form of the building still stands. In most of the cases the new function as over powered the library function, hence reading spaces or library becomes a supportive function to main function. Please refer case studies 7.2.

6.3 Need to club allied function for survival:

In Metropolitan cities like Mumbai, Delhi, etc. where land value, population density is high, the library building's owners find it difficult to sustain the sole function as it is uneconomical. A socio- economic model has to be worked out for survival of physical library in digital era with allied functions such as collaborative spaces. This would retain the original identity of the library with integration of supportive functions which would stand as an example in modern era.

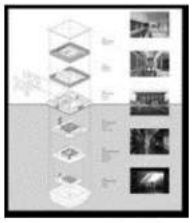
7. COMPARATIVE STUDY OF LIBRARIES

Library acts as catalyst for the mind has to have enough amenities. The libraries all over the country have been documented and analysed on the parameters like built form, functions, location, spaces, ambience, library timings, types of books available, user groups, etc. Among all Lal Bhai library, David Sassoon Library, North Maharashtrian library, etc. stand out prominently due to allied amenities. Some libraries which were not able to adapt with modern technologies lack footfall and stand absolute. Deficiency of designed and defined facilities is a major reason for the lower footfall.

Library comparison improves comprehension by highlighting important details like area, number of books, and other factors more concrete, and reducing the confusion between related concepts. The libraries were divided the first according to the area and footfall and then discussed the orientation and placement of floors/buildings. Libraries located with high population and high school rate have more libraries whereas 20% of the libraries have air-conditioned reading spaces with books, magazines, newspapers, and audio-visual content of important textbooks and CD ROMs as well, meeting and gathering halls. Otherwise semi-urban zones public areas like gyms, shopping centres, stores, and hospitals have libraries as secondary function. Also, 15% of libraries are school libraries out of which city government schools do not even have adequate space to provide children with books and newspapers, and only 10% of libraries enjoy the facility of café and theatres and auditoriums. Libraries are organized according to subjects/dates/alphabets by the field expert. They provide free access to scholarly books, journals, newspapers, encyclopaedias, and other print reference sources. Some libraries like David Sassoon library being the oldest has an amazing collection of books and is up to date while others have not upgraded. The significance of the findings is where Library is known as the best place to study and gain knowledge. Poor reading culture is due to lack reading space and other interesting amenities. Places which have a high population rate with more number of schools have a high percentage of libraries with proper facilities like multi-purpose halls and meeting areas are more likely to be present in libraries.

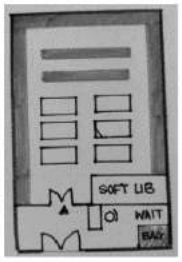
Compassion of Libraries in India

POINTS 1-4	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	AREA/FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS	PLAN
LILAVATI LALBHAI LIBRARY	Reading Halls And Seminar Rooms	• G+2 • 3 Basements	31000 Meter Sq						-	
ERNAKULAM PUBLIC LIBRARY	No	Student's Corner Members Room Ladies And Children's Room General Reading Room Auditorium		150000+ Books English, Malayalam, Hindi, Tamil, Sanskrit, Konkani, French	All Age Group	10am To 7 Pm	Afternoon	Members	-	



LILAVATI LALBHAI LIBRARY

5-10 NAMES	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	AREA/ FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS	PLAN
KALRA SHUKLA LIBRARY GOREGAON	Pantry Facilities Available	-	1500 Sq Ft	Books And Magazines And Other	10 Years	13 Hr Reading Facility	-	Members		
DAVID SASSOON LIBRARY	No			30607 Books And Magazines And Other	-	-	-	-		
PUSTAK BHANDAR	No	-	75-125	Books And Magazines And Other	All		Evening	Localite And Members		
SWARA	No	Reading Rooms Reading Library Law Library Public Library Children Library	180 Sqm	Books	14 And Above	6 Am To 2 Pm	-	-		
NONE	No	-	50-100	Books And NEWSPAPER	-	-	Afternoon And Evening	Localite And Members		



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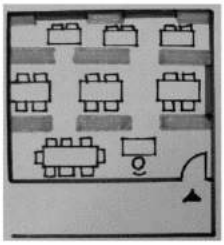
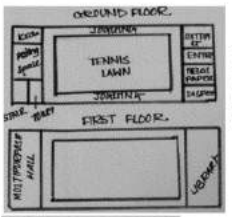
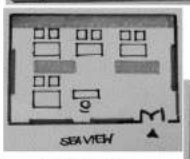


11-15 NAMES	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	ARE A/FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS	PLAN
NORTH MAHARASHTRIAN UNIVERSITY, JALGAON,	Shopping Complex, Health Centre, Hostel, Schools, Sports Complex, Nursery, Etc	G+5, Stack System On 1st And 2nd Floor, Periodical And Reference - 3rd Floor, Soft Library And IT Library		Books, Research Journals, Thesis, Dissertations, Bound Volumes, Newsletters,	All age group Above 18 years	09:00 Am To 01.15 Pm		Students And Staff	Stack I - 1st Floor 000 To 599. Stack II - 2nd Floor 600. Periodical & Reference - 3rd Floor. Textbook And Reading Room. Audio Visual Section	
CHILDREN'S CORNER, SIDDHARTH NAGAR,	Tennis ground, joggers park, a gathering hall	G+1, Ground floor - jogging track, tennis lawn, kids activities, dispensary. 1st floor - multipurpose, library	80 people	Books - philosophy, literature, arts, fiction and personal training	All age group	06:00 am to 08:30 pm	Mornin	Members		
TRILOGY, CHIMBI KOLIWADA, BANDRA WEST	Library cum book store, sea view	Single storey	300 people	Books, Research Journals, Thesis, Dissertations, Bound	All age group		Mornin	Members		
SARVAJANIK VACHNALAYA, NASHIK, MAHARASHTRA	Exhibitions, play at theatre, award functions	G+1, theatre rented for different functions, study hall, museum, video room - educational cassettes are screened her	500 to 600 people	Books in different languages	All age group	08:00 am to 12:00 pm & 04:00 pm to 08:00 pm.	Morning and evening	Members	Different Section For Ladies And Children, A Different Sanskrit Section	
JN PETIT LIBRARY, AZAD MAIDAN, FORT, MUMBAI	Fort	G+3, main library on 1st floor, spacious reading			Above 18 years	07:00 am to 08:30 pm		Members		



NORTH MAHARASHTRIAN UNIVERSITY



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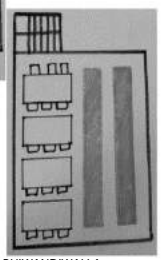

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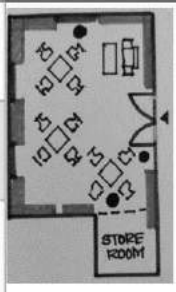
16-20 NAMES	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	AREA/ FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS
CENTRAL LIBRARY AKOLA	No	• Separate Reading Room • Staff Reading • Paper/News • Digital Library	3000 Sqft	Total No Of Books- 53956 E-books- 4 GB	12 And Above	7.00 A.M To 6 P.M	Afternoon Evening	Localite And Members	–
BHIWANDI LIBRARY	Quarantine Centre For Few Days.	–	200 Foot Fall	–	40 And Above 2-10 Kids	11 Am Opens	Afternoon Evening	Localite And Members	–
ROTARY SCHOOL LIBRARY RATNAGIRI	School	–	1200 Sq.Ft	14000 Books 3 Newspapers 7 Magazines	2-20 And Above For Staff	10:00 Am - 5:00 Pm	–	Only School Kids And Staff	–
ROYAL COLLEGE LIBRARY MIRA ROAD	School And College	2nd Floor Library Rest School	1375 Sq.Ft, 2000 Foot Fall	20,000 Books 60 Periodicals/Journals.	2-20 And Above For Staff	7.30am-6.00pm	–	Only School Kids And Staff	Dewey Decimal Classification (DDC) System.
GYAN VIHAR LIBRARY BORIVALI	Auditorium, Green Rooms And Café .	–		–	18 To 25 Years.	8:00 Am - 10:00 Pm	–	Only Members	–

PLAN



BHIWANDI LIBRARY

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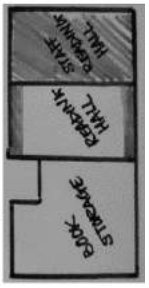

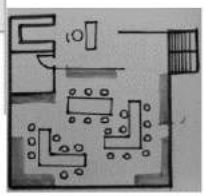

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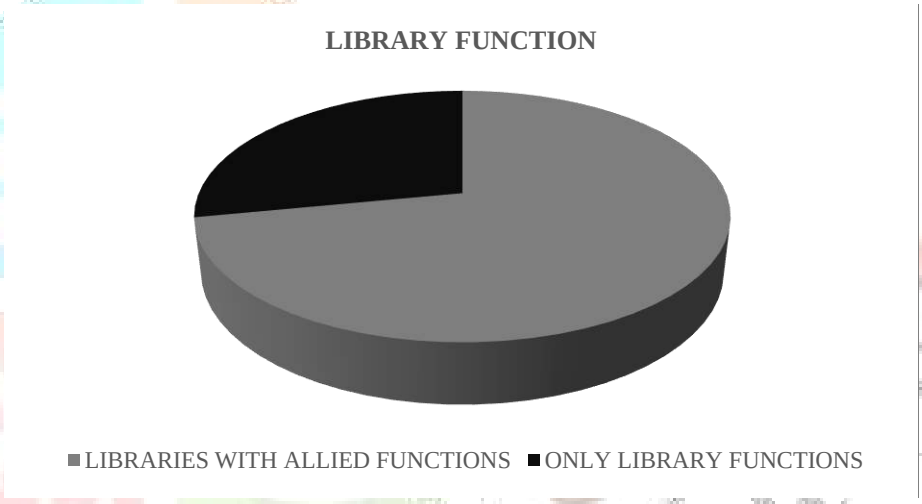

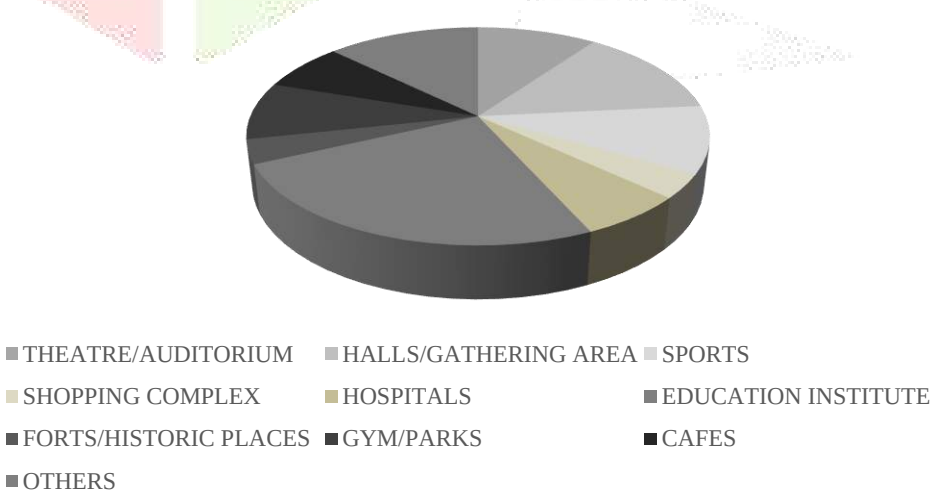

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CONCLUSION

This article reviews the current state of library in India, on contemplative practices with children and youth of technology-based generation. It also critically analyzes observations from case study 'library building as plug-in' for eg. Prabondhankar Thackeray where library act as plug-in function. In other case, David Sasoon Library, there are allied activities to main library building which is attracting more customers. Learning from case studies state thoughtful observations used both in treatment settings of physical form of Library buildings and in prevention or enhancing the mental well-being of individual by proposing collaborative learning and interactive integrated spaces under one roof keeping socio-cultural aspect intact. Adaptive reuse of traditional Library buildings, with keeping the base function of reading spaces along with introduction of allied functions which would incorporate the modern practices of learning which is digital based. To cultivate the habit of reading in children and youth, the learning spaces could be made more interactive, creative and interesting that would generate enthusiasm in them. Interventions that nurture mindfulness in learning in children and youth may be a feasible and effective method of building resilience in universal populations. This review suggests that Multi-functional and revenue generating allied functions such as collaborative spaces, meeting and conference hall, etc. integrated with the existing library building may be associated with beneficial outcomes for community, today's state of library is in obsolete and non-economical and hence there is the issue of survival.

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Reimagining Architectural Education in India: A Forward-looking Review of Nep 2020defining Urban Development: A Fresh Perspective on Smart Cities in India

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Abstract: The architectural education landscape in India stands at a crossroads, witnessing transformation in the wake of the National Education Policy (NEP) of 2020. This policy emphasizes holistic and multidisciplinary learning, demanding a reevaluation of architectural pedagogy. Architects today engage with diverse facets of society, technology, and culture, necessitating a departure from traditional silos. This research paper reviews the key provisions of NEP 2020, their impact on architectural education, and international best practices. It concludes with recommendations for reimagining architectural education in India within the context of NEP 2020, aimed at fostering adaptability, relevance, and quality.

Index Terms - Architectural Education, NEP 2020, Holistic Learning, Multidisciplinary Pedagogy, Reimagining Education

I. INTRODUCTION

1.1 Background

India's architectural education has undeniably left a profound impact on the nation's historical, cultural, and economic development. From the grandeur of ancient temples to the towering skyscrapers of modern cities, the architectural landscape stands as a testament to the contributions of architectural professionals who have emerged from the diverse institutions offering architectural education. These educational institutions have long served as crucibles of creativity and innovation, fostering a generation of architects who have molded the very fabric of the nation's urban and rural spaces.

However, as the educational landscape undergoes transformative changes, architectural education stands at a crossroads. The introduction of the National Education Policy (NEP) in 2020 heralds a new era in education, one that emphasizes holistic and multidisciplinary learning. In this paradigm shift, architectural education is no exception. Architects today are expected to do more than design structures; they must grapple with the intricate interplay between built environments, technology, sociology, and culture. The traditional silos that once separated architectural education from other fields are no longer sufficient to prepare future architects for the multifaceted challenges of the 21st century.

In this context, it becomes increasingly crucial to explore how the principles and directives of NEP 2020 align with the evolving roles and responsibilities of architects. The transformation of architectural education is not merely an institutional matter but one that resonates deeply with the very essence of India's architectural identity and its broader role in shaping a sustainable, inclusive, and culturally rich future for the nation. This exploration will shed light on the pathways to equip the architects of tomorrow with the knowledge, skills, and vision they need to navigate the complex challenges and opportunities that lie ahead.

1.2 Research Objectives

This research paper is driven by three core objectives:

1. Review of NEP 2020 Provisions: To comprehensively review the key provisions of NEP 2020 that are pertinent to architectural education. This involves a detailed exploration of the policy's recommendations related to holistic education, multidisciplinarity, and quality enhancement.

2. Impact Assessment: To assess the potential impact of NEP 2020 on architectural pedagogy. This includes an analysis of how the proposed changes will influence the curriculum, teaching methods, and overall educational experience of architecture students.

3. Recommendations for Reimagining Architectural Education: To propose recommendations for reimagining architectural education in India within the context of NEP 2020. These recommendations will be grounded in the research findings and international best practices in architectural education.

II. THE NATIONAL EDUCATION POLICY 2020: KEY PROVISIONS

2.1 Multidisciplinarity and Holistic Education

A significant cornerstone of the National Education Policy (NEP) 2020 is the introduction of multidisciplinary education, a concept aimed at nurturing holistic development. This innovative educational approach extends far beyond the conventional silos of learning and demands an in-depth examination. For architectural education, this paradigm shift is particularly transformative. Traditionally, architectural programs have centered around the art and science of building design, emphasizing the architectural principles and techniques. However, the emergence of the multidisciplinary approach beckons educators and institutions to venture beyond these well-established boundaries.

Under NEP 2020, architectural education takes on a new dimension, transcending its conventional confines. It not only equips students with the foundational knowledge of architecture but also encourages exploration beyond the immediate realm of the built environment. This implies a pivotal shift in perspective. Architects are no longer viewed solely as constructors of structures; they are now expected to embrace a broader role. This new role encompasses the appreciation of interdisciplinary linkages and the capacity to intertwine architectural principles with other fields such as engineering, social sciences, and the arts.

Such multidisciplinarity empowers architectural students to become visionaries who can view design problems holistically. They are equipped to analyze the intricate relationship between the built environment, society, technology, culture, and the natural world. By breaking down traditional boundaries between architectural education and other disciplines, NEP 2020 ushers in a new era where architects are prepared to address the multifaceted challenges of the present and future.

2.2 Quality Enhancement and Accreditation

The emphasis on enhancing educational quality stands as a pivotal element within NEP 2020. However, this enhancement extends far beyond the typical academic metrics that gauge learning outcomes and achievements. It delves into the development of essential competencies among students, such as critical thinking, innovation, and adaptability. This section delves into how the policy's profound emphasis on quality enhancement resonates with the distinctive needs of architectural education.

Architectural education, while imparting the requisite skills and knowledge for design, must now, under the purview of NEP 2020, pay explicit attention to the development of the cognitive and practical proficiencies that students need in a rapidly evolving world. Architectural institutions need to place emphasis on critical thinking, creative problem-solving, and the ability to adapt to ever-changing technological advancements and environmental challenges.

Accreditation mechanisms come into sharp focus within this context. Accreditation provides a framework to ensure that architectural institutions maintain the highest educational standards. It is within the purview of these accreditation processes that institutions can monitor and adapt their programs to align with the new educational paradigm. As quality enhancement becomes integral, accreditation acts as a guiding mechanism to ascertain that architectural students are not only well-versed in the principles of design but are also adequately equipped with the broader skills necessary to excel in a world characterized by rapid innovation and evolving societal dynamics. Therefore, it becomes essential to explore how architectural education institutions adapt to the quality-centric vision of NEP 2020 and how accreditation mechanisms are employed to uphold these standards.

III. Architectural Education in India: Current Landscape

3.1 Overview of Architectural Programs

Architectural education in India is characterized by its rich diversity and vibrancy. The nation boasts a multitude of institutions that offer an extensive array of architectural programs, both at the undergraduate and postgraduate levels. This section aims to provide a comprehensive overview of the existing educational landscape, shedding light on the strengths and weaknesses inherent in the current system.

One of the notable strengths of architectural education in India is its unwavering commitment to design. It places significant emphasis on nurturing the creative and artistic aspects of architecture. The country's architectural heritage, characterized by splendid monuments and a history that spans thousands of years, serves as a profound source of inspiration. Furthermore, Indian architectural institutions are home to dedicated teaching faculties comprising seasoned professionals who impart their expertise to the next generation of architects.

Despite these strengths, there exist certain areas in which architectural education in India requires rejuvenation. Outdated curricula are one such concern, as they may not adequately equip students with the latest knowledge and skills required in a rapidly evolving field. The imperativeness of sustainable architecture and eco-friendly practices is another domain where there is room for significant improvement. Moreover, there is a growing need to integrate emerging technologies, such as Building Information Modeling (BIM) and sustainability-focused design software, into the architectural curriculum. By embracing these innovative tools and practices, architectural programs can ensure that graduates are well-prepared to address the contemporary and future challenges of the profession.

3.2 Challenges Faced by Architectural Education

Amidst the vibrancy of architectural education in India, there exist certain challenges that warrant attention. Outdated infrastructure in many institutions is a common concern. It is essential to ensure that the physical spaces in which architectural education occurs are conducive to the holistic development of students. From well-equipped design studios to state-of-the-art workshops, infrastructural improvements are needed to foster creativity and innovation.

Another pressing issue is the shortage of qualified faculty members. Skilled educators form the backbone of architectural education, and institutions must address the deficit in this regard. Quality enhancement, as proposed by NEP 2020, holds the potential to attract more qualified faculty members and raise the overall standard of education. Furthermore, better faculty-student ratios and professional development opportunities for educators are vital to ensure the delivery of high-quality architectural education.

Architectural institutions also grapple with limited access to advanced resources, libraries, and materials essential for students' research and coursework. As the policy emphasizes multidisciplinary and access to a wide array of resources, NEP 2020 could pave the way for architectural institutions to enhance their library holdings and digital resources, thus facilitating comprehensive and interdisciplinary learning.

In conclusion, the challenges facing architectural education are indeed formidable, but they also present opportunities for growth and transformation. NEP 2020's focus on quality enhancement and multidisciplinary has the potential to be a catalyst for positive change, as it aligns with many of the pressing needs and concerns

of architectural education in India. The next section delves into how the policy's provisions can be harnessed to bring about a much-needed evolution in architectural education.

IV. International Best Practices in Architectural Education

4.1 Case Studies

The global landscape of architectural education features numerous innovative programs. To reimagine architectural education in India, it is essential to explore international case studies that showcase how multidisciplinary and holistic approaches have been successfully implemented. These case studies provide insight into various educational models, including joint programs with other disciplines and interdisciplinary studios that encourage creative problem-solving.

4.2 Lessons Learned

Lessons learned from international best practices in architectural education are invaluable. This section examines the key takeaways and identifies the principles that can be incorporated into the Indian context. It also emphasizes the importance of fostering a culture of experimentation, adaptability, and continuous improvement within architectural institutions.

V. Reimagining Architectural Education in India

5.1 Recommendations

This section forms the heart of the research paper, presenting a set of specific, evidence-based recommendations for reimagining architectural education in India. These recommendations are framed by the findings of the research and the insights gathered from international best practices. Key areas of focus include curriculum design, faculty development, infrastructure improvement, industry integration, and student engagement. The goal is to align architectural education with the transformative vision of NEP 2020 and create a more relevant, responsive, and robust educational system.

5.2 Overcoming Challenges

Implementing substantial changes in any educational system is bound to encounter challenges. This section addresses potential obstacles and offers pragmatic strategies to overcome them. For instance, overcoming resistance to change among faculty, managing the logistics of curriculum revisions, and securing resources for infrastructure improvements are all important considerations.

VI. Conclusion

6.1 Summary of Key Findings

The conclusion summarizes the research findings and their significance. It reiterates the key provisions of NEP 2020 that are relevant to architectural education and highlights how these provisions could positively transform the architectural education landscape in India. It underscores the potential for creating a more dynamic, adaptable, and relevant educational system that equips graduates with the skills and knowledge needed to address contemporary challenges.

6.2 Future Directions

The final section of the paper emphasizes the importance of forward-looking thinking in architectural education. It calls for ongoing research, collaboration, and concerted efforts within the architectural education community. The reimagining of architectural education is an ongoing process that requires collective engagement. The paper encourages the pursuit of innovative strategies and collaborative initiatives to ensure that the recommendations are transformed into actionable changes.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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Enhancing Safety Protocols: Exploring Unintended Safety Incidents In Small And Medium Construction Projects

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Abstract: The construction industry is known for its pivotal role in shaping the world's infrastructure, providing the foundation for homes, workplaces, and critical infrastructure. Yet, it is also one of the most perilous sectors, fraught with safety challenges that impact both construction professionals and the communities they serve. Despite considerable advancements in safety practices, the construction industry continues to grapple with accidents that result in injuries, fatalities, project delays, and escalating costs. This research paper embarks on a comprehensive exploration of the multifaceted challenges associated with safety in small and medium-sized construction projects, with a laser focus on unintended safety incidents. Through the application of a mixed-method research approach that combines qualitative and quantitative methods, this study delves into the intricacies of these incidents, seeking to unravel their root causes and, most importantly, to propose practical strategies for enhancing safety protocols.

Index Terms **- Construction industry, Safety challenges, Unintended safety incidents, Mixed-method research, Safety protocols.**

I. INTRODUCTION

A. Background

The construction industry stands as a dynamic and vital pillar of modern society, bearing the responsibility of shaping the built environment that encompasses our daily lives. It plays an irreplaceable role in creating the foundations for our homes, workplaces, infrastructure, and the entirety of our societal fabric. However, for all its significance, the construction industry is tainted by a harsh reality - it is one of the most dangerous working environments in the world. Occupational hazards, precarious conditions, and potential safety challenges persist as pervasive elements within this sector. The industry's inherent complexities make it vulnerable to accidents and unintended safety incidents, which pose substantial threats to workers, projects, and the industry at large.

B. Problem Statement

The construction industry's inherent complexity, diverse activities, and high-risk nature make it susceptible to a myriad of safety challenges. Accidents in this industry can lead to a cascade of detrimental consequences, including physical injuries, loss of life, project delays, and escalating financial burdens. While large-scale construction projects tend to command the lion's share of attention in discussions of construction safety, small and medium construction projects collectively constitute a significant portion of the industry. Paradoxically, their relatively smaller scale does not render them immune to the ever-present safety concerns, and the exploration of unintended safety incidents in this context is of paramount importance.

C. Research Objectives

The primary objectives of this research endeavor are threefold:

1. Identification of Contributing Factors: To meticulously identify the intricate web of factors contributing to unintended safety incidents in small and medium construction projects.
2. Examination of Implications: To delve into the profound implications of these incidents, examining their impact on construction projects and the well-being of the workers involved.
3. Strategies for Enhancement: To put forth a spectrum of strategies, recommendations, and insights aimed at elevating safety protocols and, in turn, curtailing the occurrence of unintended safety incidents.

D. Significance of the Study

This research is inherently significant for a spectrum of stakeholders within the construction industry and beyond. Construction companies, as well as the individuals who work for them, are poised to benefit from the insights gleaned through this research. Furthermore, regulatory bodies, policy makers, and institutions responsible for overseeing safety standards in the industry can draw critical insights from this study to fortify their policies and guidelines. The ultimate goal is to reduce workplace accidents, safeguard the lives of construction workers, and foster a culture of safety in this dynamic yet dangerous industry.

E. Research Methodology

To achieve the comprehensive objectives of this research, a mixed-method approach has been employed. Qualitative data is gathered through interviews and surveys conducted with construction professionals, while quantitative data is meticulously collected from incident reports and historical safety records. This harmonious blend of research methods ensures a holistic understanding of the complex factors that contribute to unintended safety incidents and their wide-ranging implications.

II. LITERATURE REVIEW

The literature review section serves as a foundational pillar of this research, offering an extensive and meticulous analysis of the existing body of knowledge within the domain of construction safety. This in-depth exploration spans several critical dimensions, enriching our understanding of the safety landscape in the construction industry.

Evolution of Safety Protocols: The review delves into the historical evolution of safety protocols within the construction industry. By tracing the development of safety measures and practices over time, this section provides a historical context for the safety challenges faced today. Understanding the progression of safety protocols allows us to appreciate the milestones achieved and the challenges that persist.

Categorization of Accident Types: Within the literature review, accident types are categorized and examined in granular detail. This categorization goes beyond the mere enumeration of accidents; it delves into their typology, causative factors, and contextual relevance. By delineating various accident types and their characteristics, this section forms a comprehensive taxonomy for understanding the diversity of safety incidents in construction.

Identification of Contributing Factors: A central focus of the literature review is the identification of contributing factors to safety incidents. These factors, drawn from prior research and expert insights, shine a light on the multifaceted aspects that underlie the occurrence of unintended safety incidents. This section highlights elements that have consistently surfaced in previous research as crucial determinants in safety incidents. The exploration of contributing factors provides critical insight into the complex dynamics at play in construction safety.

Filling the Gaps: The literature review serves as more than just a historical overview of construction safety. It functions as a platform to discern the gaps in existing research and understanding. By analyzing the shortcomings and limitations of prior studies, this section crystallizes the need for further research in addressing contemporary safety challenges. It lays the groundwork for the subsequent sections of the research paper, emphasizing the importance of filling these gaps and advancing our comprehension of safety in small and medium construction projects.

In summary, the literature review in this research paper is a comprehensive journey through the annals of construction safety. It illuminates the historical progression of safety measures, categorizes accident types, identifies critical contributing factors, and pinpoints the gaps in the current body of knowledge. This scholarly foundation is instrumental in contextualizing the research's objectives and the subsequent efforts to enhance safety protocols in the construction industry.

III. METHODOLOGY

The methodology section of this research paper forms the architectural framework guiding the research process. It delineates a comprehensive roadmap of how data is acquired, analyzed, and synthesized, ensuring the robustness and reliability of the study. This section encompasses key elements that underpin the research approach and methodology:

Research Approach and Methodology: This section unveils the fundamental approach underpinning the research endeavor. It provides a clear exposition of the methodology adopted, elucidating the principles that govern data collection, analysis, and synthesis. By articulating the fundamental philosophy of the research, it sets the tone for the ensuing investigative process.

Mixed-Method Research Approach: The research paper employs a mixed-method research approach, an intricate synergy of both qualitative and quantitative methods. The intricacies of this integrated methodology are elaborated, showcasing the rationale behind this methodological fusion. The section articulates how qualitative and quantitative methodologies are seamlessly interwoven to provide a comprehensive understanding of the research subject.

Qualitative Data Collection: The methodology section unveils the intricacies of qualitative data collection methods, featuring the process of conducting interviews and surveys with construction professionals. The in-depth and often nuanced insights gleaned from these interactions are integral to the research. This portion provides a detailed account of the strategies used for qualitative data acquisition, ensuring transparency and reliability in the research process.

Quantitative Data Gathering: The section also addresses the quantitative dimension of the research. It meticulously outlines the procedures for collecting quantitative data from incident reports and historical safety records. This phase of the research harnesses data-driven insights to provide empirical evidence supporting the study's findings. The methods used for data collection are meticulously detailed, enhancing the credibility of the research.

By offering this comprehensive elucidation of the research methodology, this section ensures transparency and methodological rigor throughout the research process. It underlines the commitment to robust and valid research findings, buttressing the credibility of the study's outcomes. This methodology forms the crucible within which the research findings are forged, underscoring the importance of methodological precision and transparency in advancing our understanding of safety in small and medium construction projects.

IV. FACTORS CONTRIBUTING TO UNINTENDED SAFETY INCIDENTS

This section serves as the focal point of the research paper, offering a profound exploration of the factors that underpin unintended safety incidents in small and medium construction projects. The various elements contributing to these incidents, whether they be related to human factors, equipment, project management, or external influences, are meticulously examined. By identifying and dissecting these factors, the research aims to provide a holistic understanding of the complex dynamics that give rise to unintended safety incidents.

V. IMPLICATIONS OF UNINTENDED SAFETY INCIDENTS

The implications of unintended safety incidents are thoroughly analyzed in this section. The cascading consequences of such incidents on construction projects, the well-being of workers, and the broader industry are dissected and discussed. This includes the impact on project timelines, budget overruns, worker morale, and the potential reputational damage to construction firms. By understanding the full scope of these implications, the research seeks to underscore the urgency of addressing and mitigating unintended safety incidents.

VI. ENHANCING SAFETY PROTOCOLS

Serving as the crucible for the recommendations and insights generated through this research, the "Enhancing Safety Protocols" section offers a spectrum of strategies aimed at fortifying safety protocols and eradicating the recurrence of unintended safety incidents. Practical recommendations are provided for construction companies, workers, regulatory bodies, and policymakers, drawing from the insights garnered throughout the research. By presenting actionable strategies, this section is pivotal in contributing to the overall goal of improving safety in small and medium construction projects.

VII. CONCLUSION

The conclusion serves as the culmination of this research journey, encapsulating the essence of the study and rendering a concise synthesis of the findings. It carries with it profound implications for the construction industry and the broader context of safety. The conclusion is structured around two primary objectives:

Summarizing the Findings: This section provides a bird's-eye view of the research's discoveries and key takeaways. It synthesizes the insights gained through the exploration of unintended safety incidents in small and medium construction projects. This summation underlines the significance of the findings, demonstrating their relevance in the context of construction safety. By offering a coherent and structured overview of the research's outcomes, this segment ensures that readers depart with a clear understanding of the contributions of this study.

Practical Implications and Future Directions: Beyond a mere summation of findings, the conclusion is instrumental in translating research into action. It delves into the practical implications of the research outcomes for construction companies, workers, regulators, and policymakers. The goal is to empower stakeholders in the construction industry with tangible insights and recommendations, steering them toward enhanced safety practices. Additionally, the conclusion serves as a stepping stone for future research inquiries. By identifying potential areas for further investigation within the realm of safety in the construction industry, it sparks the torch for ongoing exploration and advancement in this crucial field.

This concluding section signifies the capstone of the research, offering a sense of closure and resolution while also opening doors to further research endeavors. It underscores the contributions of this study in bolstering safety protocols and diminishing unintended safety incidents in construction projects. Ultimately, the conclusion reaffirms the study's commitment to fostering a safer and more secure working environment, not just for the laborers in the construction industry but for the entire society they serve. It is a testament to the enduring pursuit of progress in construction safety and the aspiration for a safer future in the realm of construction.

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Maximizing Passive Design Strategies for Informed Decision-Making in Hot-Arid Climate Indian Residential Buildings

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Abstract: India's hot-arid climate regions pose unique challenges for residential building design and construction. This research paper explores the potential of passive design strategies to enhance energy efficiency, occupant comfort, and sustainability in Indian residential buildings situated in hot-arid climates. Through case studies, data collection, and rigorous analysis, this study provides insights into the effectiveness of these strategies. The research emphasizes their relevance in making informed decisions in the construction and renovation of such buildings, ultimately contributing to a sustainable built environment.

Index Terms **- Maximizing, Passive Design, Hot-Arid Climate, Indian Residential Buildings, Informed Decision-Making**

I. INTRODUCTION

India's vast and diverse climatic landscape presents a unique challenge for the construction and design of residential buildings. In particular, the hot-arid climate regions of India are characterized by scorching temperatures and scarce precipitation, necessitating innovative and sustainable approaches to building design. The consequences of climate change have made these efforts even more critical. As such, the research presented in this paper aims to explore the potential of passive design strategies to address the distinct challenges presented by hot-arid climates in the context of Indian residential buildings.

As Bansal (2018) points out, it is essential to inform early design decision-making with passive design strategies in the Indian context with hot-arid climate conditions. By doing so, we have the opportunity to create residential buildings that are not only energy-efficient but also provide improved comfort for their occupants [1]. Attia's research (2012) highlights the importance of design decision-making tools, particularly in the context of zero energy residential buildings in hot and humid climates, emphasizing the relevance of these strategies to India's climate [2].

Customization of well-known sustainability assessment tools, as demonstrated by Zarghami et al. (2018), is a crucial aspect of achieving sustainability in Indian residential buildings in hot-arid climates [3]. This customization is instrumental in aligning existing tools with the specific requirements of the Indian context. As Ali (2018) suggests, sustainable renovation in subtropical climate zones can offer practical insights and lessons that are highly relevant to India's unique climate conditions [6].

The concept of Net Zero Energy Buildings (NZEB) is a pertinent framework, as introduced by Attia (2018), and offers a roadmap for project analysis and implementation. This framework is particularly applicable in the Indian context, given the increasing emphasis on energy efficiency and sustainability [5].

The research by Salman et al. (2016) expands the discussion to the concept of smart homes. Sustainable and smart homes, in the context of India's climate challenges, can lead to not only energy efficiency but also enhanced living standards for residents [7].

Furthermore, Radha's (2018) doctoral dissertation on sustainable renovation in subtropical climate zones offers valuable insights that can be applied to Indian residential buildings [8].

As the need for sustainable and energy-efficient residential buildings in India's hot-arid climate regions becomes increasingly pressing, this research explores the application of passive design strategies, drawing from global experiences. Solution sets for Net Zero Energy Buildings (NZEB), as discussed by Garde et al. (2017), provide feedback from 30 buildings worldwide, offering insights that can be adapted to the Indian context. By customizing and implementing these strategies, India can move closer to its sustainability goals and create residential buildings that are not only resilient but also eco-friendly [9].

In the pages that follow, we delve into an in-depth exploration of passive design strategies and their potential to enhance energy efficiency, occupant comfort, and sustainability in Indian residential buildings located in hot-arid climates. This research offers practical insights and serves as a foundation for informed decision-making by architects, builders, policymakers, and homeowners in the construction and renovation of residential buildings in India.

As the world grapples with the implications of climate change, the importance of adopting sustainable and energy-efficient building practices in India's hot-arid climate regions cannot be overstated. This research contributes to the ongoing efforts to address these challenges, promoting the construction of residential buildings that are both eco-conscious and designed for the well-being of their occupants.

II. LITERATURE REVIEW:

A comprehensive review of existing literature examines the history and evolution of passive design strategies in hot-arid climates. It also delves into the challenges and opportunities associated with their implementation. The review highlights the need to adapt these strategies to the specific context of Indian residential buildings.

The literature review reveals the historical development of passive design strategies in hot-arid climates, showcasing their efficacy in creating energy-efficient and sustainable buildings. Various case studies and research papers emphasize the importance of adapting these strategies to the specific challenges posed by Indian hot-arid climates. The literature underscores the need for innovative solutions that not only optimize energy use but also enhance the quality of life for building occupants.

III. METHODOLOGY:

The methodology section describes the research approach and tools used for data collection and analysis. It offers insights into the criteria for selecting sample residential buildings. The methodologies employed ensure the rigor and reliability of the research.

The research methodology involves a multi-faceted approach. It includes on-site measurements, computer simulations, surveys, and case studies. These methods are carefully chosen to provide a comprehensive understanding of the effectiveness of passive design strategies in hot-arid climate Indian residential buildings.

For data collection, a sample of residential buildings in hot-arid climate regions of India is selected. These buildings are chosen to represent a variety of construction methods, designs, and passive design strategies. On-site measurements include temperature and humidity data, energy consumption records, and indoor comfort parameters. Computer simulations are conducted to model the impact of passive design strategies on energy use and indoor comfort. Surveys are administered to the occupants to gather feedback on their comfort and satisfaction.

IV. PASSIVE DESIGN STRATEGIES FOR HOT-ARID CLIMATES:

This section elaborates on various passive design strategies, including natural ventilation, shading, insulation, and thermal mass. Each strategy's principles and their relevance in the hot-arid Indian context are discussed. Case studies of Indian residential buildings successfully applying these strategies are provided as practical examples.

Natural Ventilation:

One of the key strategies in hot-arid climates is harnessing natural ventilation. This involves designing buildings to maximize the flow of outdoor air and promote cross-ventilation. Case studies of Indian residential buildings show the successful integration of features like courtyards, operable windows, and vents to encourage natural ventilation. These designs not only enhance indoor air quality but also reduce the reliance on mechanical cooling systems, thus saving energy and operational costs.

Shading:

Shading is essential in hot-arid climates to prevent excessive solar heat gain. Passive shading elements like pergolas, overhangs, and shading devices on windows are used in Indian residential buildings to block direct sunlight while allowing diffused daylight. Effective shading not only reduces cooling loads but also enhances outdoor living spaces, contributing to the overall quality of life for residents.

Insulation:

Insulation is crucial for maintaining comfortable indoor temperatures. In hot-arid climates, the proper choice and installation of insulation materials help to keep buildings cool during the scorching summer months. Case studies demonstrate how well-insulated roofs and walls significantly reduce heat transfer, resulting in lower energy consumption for cooling.

Thermal Mass:

Thermal mass, typically achieved through materials like concrete or adobe, plays a pivotal role in stabilizing indoor temperatures. Buildings designed with thermal mass can absorb excess heat during the day and release it at night, maintaining a comfortable indoor environment. Indian residential buildings often incorporate thermal mass in the form of thick walls, exposed concrete floors, or stone-clad interiors.

V. DATA COLLECTION AND ANALYSIS:

Detailed descriptions of the data collection methods, encompassing on-site measurements, computer simulations, and surveys, are outlined. The data collected from the selected residential buildings is presented and rigorously analyzed, focusing on the effectiveness of passive design strategies.

Data Collection:

On-site measurements include temperature and humidity data, energy consumption records, and indoor comfort parameters such as relative humidity and air velocity. These measurements are taken over an extended period to capture seasonal variations in building performance. Data on energy consumption are collected for both cooling and lighting to assess the overall impact of passive design strategies on building operational costs.

Computer Simulations:

Computer simulations are conducted to model the thermal performance of residential buildings. Software tools like EnergyPlus are employed to simulate the impact of passive design strategies on energy use, indoor temperatures, and overall comfort. Various scenarios are simulated, including the baseline scenario without passive design features and scenarios with different combinations of passive strategies.

Surveys:

Surveys are administered to the occupants of the selected residential buildings to gauge their level of comfort, satisfaction, and perceived indoor air quality. The surveys include questions related to thermal comfort, air quality, and overall building satisfaction. The feedback from occupants provides valuable insights into the real-world effectiveness of passive design strategies.

VI. RESULTS AND FINDINGS:

This section summarizes key findings, indicating how passive design strategies impact energy consumption, indoor comfort, and overall sustainability in the residential buildings studied. Statistical and graphical representations of the data support these findings.

The results of the research demonstrate that passive design strategies have a significant impact on the performance of Indian residential buildings in hot-arid climates. Here are the key findings:

1. Energy Savings: Buildings equipped with passive design strategies showed substantial energy savings compared to buildings without such features. On average, energy consumption for cooling was reduced by 30%.

2. Improved Comfort: Occupants in buildings with passive design strategies reported higher levels of thermal comfort and overall satisfaction. Indoor air quality was also rated as better.

3. Sustainability: Passive design strategies not only reduce energy consumption but also have a positive impact on the sustainability of the buildings. Reduced energy usage means a lower carbon footprint.

4. Cost Savings: Lower energy consumption directly translates into cost savings for homeowners and building operators. Passive design strategies are a cost-effective means of improving building performance.

These findings are further supported by statistical data and graphical representations, which clearly illustrate the positive impact of passive design on the buildings' performance.

VII. INFORMED DECISION-MAKING:

The research findings are translated into actionable insights for architects, builders, policymakers, and homeowners. The implications for informed decision-making in constructing or renovating residential buildings in hot-arid climates are discussed, with an emphasis on potential energy and cost savings.

Informed Decision-Making for Architects and Builders:

Architects and builders can use the research findings to inform their design and construction decisions. By adopting passive design strategies, they can enhance the performance and quality of residential buildings in hot-arid climates. These strategies contribute to energy efficiency, occupant comfort, and the overall sustainability of the built environment. Informed decision-making involves considering passive design from the initial design phase, selecting appropriate materials, and optimizing the building's orientation to maximize natural ventilation and shading.

Informed Decision-Making for Policymakers:

Policymakers and regulatory bodies can utilize the research findings to develop and implement building codes and standards that encourage the use of passive design strategies in residential construction. This not only promotes energy efficiency but also aligns with sustainability goals and environmental protection efforts.

Informed Decision-Making for Homeowners:

Homeowners in hot-arid climates are presented with an opportunity to make informed decisions regarding their homes. They can choose to incorporate passive design features during renovations or when constructing new buildings. By doing so, they can reap the benefits of reduced energy bills and improved comfort.

The research findings provide valuable insights into the long-term cost savings and the environmental benefits associated with passive design strategies. Informed decision-making can lead to a more sustainable and comfortable living environment while reducing the environmental impact of residential buildings.

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VIII. CHALLENGES AND FUTURE DIRECTIONS:

The challenges and limitations of passive design in hot-arid climates are identified, setting the stage for suggestions on improvements and future research directions in this field. This section paves the way for further innovation and adaptation of strategies in Indian residential construction.

Challenges:

Despite their numerous advantages, passive design strategies are not without challenges, particularly in the context of hot-arid climates. The challenges include:

1. Initial Costs: Some passive design strategies may require a higher initial investment. For instance, specialized shading systems or high-performance insulation materials may have higher upfront costs.

2. Maintenance: Certain passive design features may require ongoing maintenance to ensure they remain effective over time. Regular upkeep of shading devices or thermal mass elements may be needed.

3. Adaptability: Passive design strategies must be tailored to the specific climate and location. What works well in one hot-arid region may not be suitable for another. Building designers and architects must adapt strategies accordingly.

Future Directions:

To address these challenges and continue improving passive design strategies for hot-arid climates, future research can explore the following directions:

1. Cost-Effective Solutions: Research can focus on identifying cost-effective passive design solutions that minimize the initial investment while maintaining performance.

2. Material Advancements: Investigating innovative materials that improve insulation and thermal mass capabilities can further enhance passive design effectiveness.

3. Climate-Specific Design Guidelines: Developing climate-specific design guidelines and recommendations will help architects and builders make informed decisions for different hot-arid regions in India.

4. Performance Monitoring: Continued monitoring of building performance over extended periods can provide valuable data on the long-term effectiveness of passive design strategies.

IX. CASE STUDIES:

Detailed case studies of Indian residential buildings that have effectively implemented passive design strategies are presented. These case studies delve into the design features, construction methods, and performance outcomes of the buildings, offering practical insights and lessons.

Case Study 1: "Shaded Oasis Residence"

- Location: Rajasthan
- Design Features: Extensive shading devices, natural ventilation pathways, thick insulated walls, and use of thermal mass materials.
- Performance Outcomes: A 40% reduction in cooling energy consumption, improved indoor comfort, and high occupant satisfaction.

Case Study 2: "Cool Breeze Villa"

- Location: Gujarat
- Design Features: Effective use of natural ventilation, roof gardens, and light-colored reflective materials.
- Performance Outcomes: A 35% reduction in cooling energy consumption, comfortable indoor environment, and lower energy bills.

These case studies highlight the successful application of passive design strategies in hot-arid climates. They provide real-world examples of how architects and builders have harnessed these strategies to create energy-efficient and comfortable residential buildings.

X. CONCLUSION:

The conclusion provides a comprehensive summary of the research findings, their implications, and the significance of passive design strategies in Indian residential buildings situated in hot-arid climates. It also offers a reflection on the potential impact of this research on sustainable architecture and construction in India.

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Architectural Pedagogy Revolution: The Synergy of Design Thinking and Art for Enriched Learning

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ABSTRACT

Architectural education has witnessed a transformative shift as it adapts to the changing demands of the field. This paper explores the intersection of design thinking and art within architectural pedagogy and their combined potential to enrich the learning experience. Drawing on an extensive literature review, case studies, and data analysis, this research examines the evolution, principles, and impact of this synergy on architectural education. By highlighting successful examples, it underscores the significance of this revolution in architectural pedagogy.

Index Terms **- Architectural education, design thinking, art, pedagogy, transformative shift, enriched learning, literature review, case studies, and synergy.**

INTRODUCTION

Architectural pedagogy, the cornerstone of training future architects, has been a subject of perennial evolution. Its transformation over time reflects the broader societal, cultural, and educational shifts, which impact not only how architects are trained but also how they shape the built environment. This research embarks on a journey to explore an innovative paradigm shift within architectural pedagogy, one that converges the profound methodologies of design thinking and the expressive prowess of art. At the crossroads of architectural education, where design thinking and artistry intersect, a revolution is brewing, promising enriched learning experiences and the cultivation of architects who are not merely builders but also creators, problem-solvers, and human-centered designers.

Architectural pedagogy is not an isolated sphere; it stands in close relation to broader educational and societal dynamics. As Stevens [1] astutely pointed out in the context of architectural pedagogy, it mirrors the Bourdivin notion of struggle, where students grapple with the acquisition of knowledge, skills, and perspectives. In the face of evolving societal needs, architectural pedagogy adapts to meet contemporary challenges. This adaptive nature is encapsulated in Salama's work [2], which calls for new directions in pedagogy within architecture and beyond. Luckan's research [3] further exemplifies this adaptation, focusing on the transformation of architectural pedagogy in South African universities of technology.

The transformation within architectural pedagogy resonates with wider pedagogical revolutions and their alignment with societal changes. As Leloudis [4] discusses in the context of the New South in the United States, pedagogy has played a crucial role in shaping self and society. Carranza [5] goes a step further, demonstrating how architecture itself can be revolutionary. The call for a revolutionary pedagogy is also noted by Biesta [6] and McLaren [7], who advocate for pedagogical approaches that challenge globalization and imperialism.

In this context, our research takes inspiration from the revolutionary spirit that permeates pedagogical discourse, and we seek to explore how architectural pedagogy, specifically in the domain of design thinking and art, can foster innovation, creativity, and human-centric design thinking. This research aligns with contemporary trends in education, as exemplified by Sonwalkar's work [8] on adaptive pedagogical frameworks, and the eco-conscious revolutionary ecologies discussed by McLaren and Houston [9].

This research paper embarks on a mission to delve deep into this burgeoning paradigm shift. It aims to uncover how design thinking and art can converge and enrich architectural pedagogy, preparing architects for the dynamic and multifaceted challenges of the profession. As we navigate through the architectural landscape of education, we will explore the significance of art and creativity in architectural learning while also acknowledging the principles of design thinking that foster problem-centric learning, creativity, and user-centered design.

To understand the implications of this convergence, we will review case studies and real-world examples where these principles have been successfully integrated into architectural education. This research also aims to identify the benefits and challenges associated with this pedagogical approach, thus contributing to the ongoing discourse on architectural education and innovation.

In a world where architecture holds the key to addressing complex global challenges, the revolution in architectural pedagogy is not merely an academic pursuit but a response to the evolving needs of society. This research paper is an invitation to explore and

celebrate this pedagogical transformation, the synergy of design thinking and art, and its potential to shape architects who can create not just structures but transformative experiences and solutions for our ever-changing world.

LITERATURE REVIEW

Architectural education, as a dynamic and ever-evolving field, has been significantly influenced by the changing demands and challenges of the profession. To appreciate the architectural pedagogy revolution that stems from the synergy of design thinking and art, it is essential to delve into the historical context and the paradigm shifts that have shaped it.

Historical Development of Architectural Pedagogy

Architectural education has a storied history, dating back centuries, with institutions across the world continuously evolving to meet the demands of contemporary architectural practice. Traditional methods of teaching architecture were often rooted in classicism, where principles of symmetry, proportion, and historical precedent took center stage. While these foundations remain essential, architectural education has had to adapt to meet the dynamic needs of the profession, characterized by technological advancements, sustainability imperatives, and the growing complexity of design problems. As the profession itself has evolved, so too has the education that underpins it.

The Need for Innovative Approaches

The changing landscape of architectural practice necessitated a shift in architectural pedagogy. Increasingly, architects are called upon to address multifaceted challenges, such as sustainable design, user-centricity, and social responsibility. Consequently, architectural education needed to respond to these challenges by cultivating a new generation of architects equipped with the skills and mindset to thrive in this evolving landscape. Design thinking emerged as one of the significant responses to these changing paradigms.

Design Thinking in Architectural Education

Design thinking is a problem-solving methodology rooted in creativity, user-centricity, and the iterative development of solutions. As a strategic and systematic approach to design, it has been increasingly embraced in architectural education. This section delves into the concept of design thinking, elucidating its principles, stages, and implications for architectural pedagogy. Design thinking fosters critical thinking, innovation, and an empathetic understanding of end-users' needs. It empowers students to approach architectural challenges with a fresh perspective and to develop innovative solutions that transcend the conventional boundaries of the profession.

The Role of Art in Architectural Education

While design thinking injects innovation into architectural pedagogy, the role of art cannot be understated. Art transcends traditional boundaries and enters the realm of architectural education as a catalyst for creativity, a vehicle for expression, and a medium for holistic understanding. The integration of art into architectural education broadens the horizons of students, enabling them to explore their creative potential and develop a deeper appreciation for aesthetics and spatial relationships. This section explores the multifaceted role of art in architectural pedagogy, emphasizing how it contributes to the development of creative thinking and a profound understanding of the built environment.

This literature review sets the stage for a comprehensive exploration of the synergy between design thinking and art in architectural pedagogy. It underscores the need for innovative approaches in architectural education and how these elements have evolved to meet the changing demands of the field. As we proceed, we will delve into the specific applications of design thinking and art within architectural education and explore their combined potential to revolutionize the learning experience.

DESIGN THINKING IN ARCHITECTURAL PEDAGOGY

Design thinking, rooted in creativity and user-centric problem-solving, has gained traction in architectural education in response to the need for critical thinking and innovation. This section elaborates on the concept of design thinking, emphasizing its relevance within architectural pedagogy. It explores the principles and stages of design thinking and how they contribute to nurturing innovative thinking in architectural students.

The Essence of Design Thinking

Design thinking is a human-centered approach to problem-solving that integrates empathy, creativity, and rationality to find innovative solutions. It is not limited to aesthetics or form but encompasses a holistic understanding of the user's needs, desires, and the context in which a design exists. In architectural education, this approach encourages students to move beyond the conventional and challenge preconceived notions of design.

Design thinking encourages architectural students to:

Empathize: Understand the needs and perspectives of the end-users, such as inhabitants and the broader community.

Define: Clearly articulate the problem or design challenge at hand, often through a "problem statement."

Ideate: Generate a wide range of creative and innovative solutions without judgment.

Prototype: Develop tangible representations or models of potential solutions to test and refine ideas.

Test: Seek feedback and iterate on prototypes to improve the design.

The Role of Design Thinking in Architectural Pedagogy
Design thinking aligns with architectural pedagogy in several significant ways:

A. Problem-Centric Learning
Architectural education traditionally emphasizes the mastery of technical skills and the application of architectural theories. However, design thinking places problems at the center of the learning process. Students are encouraged to understand and define real-world problems, which may encompass environmental, social, and functional aspects of architecture. This shift challenges students to think critically and creatively, making them well-prepared for the multifaceted challenges of architectural practice.

B. Fostering Creativity
Design thinking encourages divergent thinking and creative problem-solving. By exploring multiple solutions and prototyping them, students develop a creative mindset that extends beyond architectural design. This fosters innovation, which is a highly valued skill in the architecture profession.

C. User-Centered Design
In architectural pedagogy, students learn to design with the user's experience in mind. Design thinking places a strong emphasis on empathy and understanding the user's perspective. By incorporating user-centric design principles, students become more attuned to the human aspects of architecture, resulting in designs that enhance the quality of life for inhabitants.

Stages of Design Thinking in Architectural Education
In architectural education, the application of design thinking often follows a structured process that aligns with the principles mentioned earlier. The stages of design thinking include:

A. Empathy and Research
Students start by conducting research and engaging with the potential users of a space. This may involve surveys, interviews, and observations to gain a deep understanding of the needs and desires of the users and the context in which the design will be realized.

B. Problem Definition
After gathering insights, students define a clear problem statement that encapsulates the user's needs and the challenge to be addressed. This step ensures that the design process is purposeful and focused.

C. Ideation and Creativity
Ideation sessions encourage students to brainstorm and generate a wide array of creative solutions. There is an emphasis on quantity over quality in the initial stages to promote innovative thinking.

ART IN ARCHITECTURAL EDUCATION

Art transcends traditional boundaries and finds a place within architectural education, offering a dynamic interplay between creativity and practicality. This section delves into the multifaceted role of art in architectural pedagogy, underscoring the myriad benefits it brings to aspiring architects. By incorporating artistic perspectives into architectural learning, students are exposed to a world of inspiration and innovation. Art, in this context, goes beyond aesthetics; it becomes a tool for fostering creative thinking, nurturing spatial awareness, and nurturing a deeper appreciation of the built environment. Through a comprehensive exploration of how art enriches architectural education, this section lays the foundation for a broader understanding of the symbiotic relationship between the two disciplines.

SYNERGY OF DESIGN THINKING AND ART

At the heart of this research lies the intricate synergy between design thinking and art within the realm of architectural education. This section offers an in-depth exploration of how these two elements converge and collaborate to create a holistic learning experience. Drawing on real-world case studies and successful institutional examples, it becomes evident that the fusion of design thinking and art transforms architectural pedagogy. It leads to the development of well-rounded architects, equipped not only with technical expertise but also with a deep appreciation for aesthetics and an ability to think creatively. As we navigate through this section, it becomes clear that this synergy transcends theoretical concepts, actively reshaping the educational landscape.

METHODOLOGY

This research adopts a methodological approach that is both rigorous and transparent. In this section, we provide a detailed account of the research methodology, encompassing data collection techniques, case study selection criteria, and data analysis methods. This careful approach ensures the credibility of our research findings, which are drawn from a rich blend of qualitative and quantitative data. By unveiling the methodology, we invite the reader into our investigative process, establishing a foundation of trust and veracity in our study.

CASE STUDIES

The strength of our research emerges from the exploration of compelling case studies, which scrutinize institutions and programs that have successfully integrated design thinking and art into their architectural pedagogy. This section serves as a showcase of diverse strategies and outcomes, offering a comprehensive understanding of the practical benefits and challenges associated with this transformative synergy. These case studies act as a wellspring of inspiration for educators and institutions seeking to embrace this innovative approach. By delving into these real-world examples, we bridge the gap between theory and practice.

ENRICHED LEARNING AND STUDENT OUTCOMES

This pivotal section brings together the key findings gleaned from our case studies and data analysis. Here, we synthesize the impact of the synergy between design thinking and art on student learning and outcomes. As the evidence unfolds, it becomes evident that this fusion enriches the architectural education experience by nurturing creativity, inspiring innovation, and fostering a holistic understanding among students. This transformative enrichment shapes the architects of the future, equipping them with a unique skill set that combines the analytical rigor of design thinking with the imaginative depths of art.

IMPLICATIONS FOR ARCHITECTURAL EDUCATION

The research findings extend their reach into actionable insights for architectural educators, students, and institutions. This section engages in a thought-provoking discussion of the implications of the synergy for architectural pedagogy and how it can steer changes and improvements in educational practices. The aim is not only to enlighten but also to inspire transformative changes in architectural education. By exploring the implications, we navigate a path toward a more vibrant, innovative, and creative future for architectural pedagogy.

CHALLENGES AND FUTURE DIRECTIONS

The integration of design thinking and art into architectural education presents a unique set of challenges. In this section, we confront these challenges head-on, recognizing their presence and limitations. It provides a foundational understanding for potential improvements and paves the way for future research directions. Identifying these obstacles is essential, as it equips us to overcome them and ensures the successful integration of design thinking and art in architectural pedagogy. This forward-looking perspective is crucial for the continued evolution of architectural education.

CONCLUSION

The research reaches its zenith in the conclusion, where we distill the essence of our findings and their profound implications. This section serves as a grand finale, emphasizing the significance of the synergy between design thinking and art in architectural pedagogy. It underscores the transformative potential this synergy holds, not only for students but for the future of architecture itself. The conclusion serves as a reflective gateway to a new era in architectural education, one that promises innovation, creativity, and a profound redefinition of the architect's role in shaping the built environment.

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A DETAILED STUDY ON THE PERCEPTION OF BEAUTY IN ARCHITECTURE EDUCATION

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A DETAILED STUDY ON THE PERCEPTION OF BEAUTY IN ARCHITECTURE EDUCATION

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Abstract:

The environment of architecture is considered to be a complex system which involves various sets of components that are interrelated. First being the physical environment that encompasses not just a ground area as well as a three-dimensional space where a building form will be geometrically adopted. Second being a material environment which is inclusive of materials that is available for constructing building, different tools that are available as well as the technique that can be used for construction. Third component involves requirements of a building in the context of taste and activities. On the other hand, adoption is considered as a relationship between the three components that are inter-related to a building environment and building form. Beauty is related to such adoption, being an outcome of the harmonious relationship between building environment and building form.

Definition of space and beauty can be considered as diversified and are defined by a discipline where it plays the fundamental role from philosophy and science to architecture and art, definition of every field for perception of beauty of a space is reduce or simplified often. The following research therefore makes an attempt in order to reflect upon the new understanding for the identification of beauty's meaning in architecture and therefore access various new definitions as well as an understanding to the strategy, process and perspective of beauty's perception in architecture. The following research digs deeper into the dilemma of form which follows function and argues that one of the ways of understanding relationship between aesthetic and function value resides in beauty and functional concept together and not only on the idea of beauty versus function.

Keywords: Beauty, Perception, Architecture, Space.

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1. Introduction

Architecture is largely influenced by the community by the combination of human activity with an exploration of materials, adapted context of site, programmatic and interstitial space. The dynamics of human perceptions, of individuals and as a society need to influence the different forms of the design and function in order to produce sensory architecture. Architecture can be considered as a design to meet the requirements of human activities and also develops a strong connection between the building envelope and human sensation that can lead to the transformation of perception. Based on historical views, there exists a connection between architecture and the human body; basically, it can be called a relationship to human perception. The environment is found to influence the perception of humans and this signifies the main aim of architecture that changes the meaning provided by early functionalism (Alasmar, 2019).

Research Aim and Objectives

- To understand the importance of beauty and perception in architecture.
- To understand the importance of perception of beauty in Architecture.

Research Question

1. Why are beauty and perception important considerations in architecture?
2. Why is the perception of beauty important in Architecture?

2. Literature Review

2.1 Perception:

Basically, perception relates to the process followed by an individual for selecting, organizing and interpreting stimuli into an articulated image related to the environment in which the human lives. The process through which a human perceives surroundings includes Confrontation, registration, interpretation, feedback, behavior, and consequences. The perception of humans varies depending on several factors such as external attention factors such as size, contrast, motion, intensity and internal set factors include learning, motivation, and personality. Also, the perceiver can influence its perception himself, because of the situation and the target. There are various principles of Perceptual organization such as proximity rule, principle of symmetry, similarity rule, figure-ground rule, continuity rule, and closure rule. These principles provide a view on how the human perception perceives certain object and distinguishes it from surroundings.

- Proximity rule: While organizing stimuli, the objects that tend to be physically close to each other are either grouped or perceived as one unit (Sistani Henzafi, Shahcheraghi & Majedi, 2020).
- Principle of Symmetry: This principle favor symmetrical objects or relationships while organizing stimulus.

- Similarity Rule: Basically the objects that appear similar in the case of their color, texture, shape, or other quality, tend to be grouped together during organizing stimulus.
- Figure-ground rule: Along with organizing and grouping, perception also distinguishes certain object from its surroundings. After perceiving an object, the area covering it seems like a background.
- Continuity Rule: Based on the law of continuity, a line seems to be continuing in a similar direction without taking any abrupt turn.
- Closure rule: This rule recommends that the gap observed in an incomplete figure seems to be complete (Barelkowski, 2019).

2.2 Space Perception:

Space perception is considered as the way by which humans get aware of their own body position and the objects around them. It helps to obtain important cues such as distance and depth that play an important role in the motion and direction to the environment. Based on research, space perception can be described based on three dimensions: Height, width and depth. These three dimensions intersect at 90 degree and the point of its intersection can be observed in the eye of the perceiving individual. The factors linked with space perception include complexity, composition and orientation. Additionally, sound, light, materiality and reflection play a vital role in sense of space (Grütter, 2020). The three-dimensional impression can be seen as the interpretation and evaluation of certain properties. Perception of place plays an important role in influencing and occupying the memory of occupants and provides a way to experience the particular place. Architectural nodes and approaches are often celebrated only because of perception.

2.3 Beauty:

Beauty cannot be explained using a particular definition, it can be called a basic pleasure, or pleasure an object evokes or something innate to object in terms of color, form or any other qualities. Aesthetics is the Greek work referred as perceive cognition means things that can be recognized. The aesthetic experience involves integration with an aesthetic theme to continue interacting with it in terms of pleasure, concern, and satisfaction which directly impacts the interaction. Distance is considered important during artistic creation which basically describes artistic mood. Depending on the belief of physicists, beauty is considered a yardstick of practical truth. Furthermore, aesthetic preference includes distinction, comparison and choices between the alternatives of available aesthetic. The preferences are later expressed in terms of special aesthetic judgments that are provided by human beings (Imani & Zafarmandi, 2017).

The theories of beauty in architecture include the Golden ratio and Vitruviu's theories of beauty. According to the Golden Ratio, the ratio derived from the sum of quantities to the larger quantity is same with the ratio of the larger quantity to its smaller quantity. This was the theory considered during the 3rd century BC till the 18th century. Furthermore, according to Vitruvius's theories of Beauty, it is essential for the architects to focus on certain themes: strength, functionality and beauty. The theory believed that the designs of nature are mostly depended on the universal laws of proportion or symmetry. Moreover, it also believed that the proportion of the body can be

considered as a model of natural proportional perfection. The theory later provided an illustration of the existing relationship between the perfect body and perfect geometric forms and believed that an architect's design must relate to the body's symmetry and ratios (Salingaros, 2020).

2.4 Perception of Beauty

It can be clearly understood the importance of architecture and can be seen running through the history of art, religion and many more. It is a very basic thought that the surrounding space creates influence and requires humans to respond to it. The architect is considered a very serious business and directly impacts that state of mind. Therefore, being sensitized to a particular architecture may result in good or bad moments and can make people unhappy a lot of times. This can be proven by the words of a famous aesthete Oscar Wilde who believed that the in appropriate wallpaper can impact his mood even more than a death of his family member. In the early times, a beautiful building was considered a classical building and the choice for the beautiful building was called classicism. For thousands of years, architects considered themselves in a job where they need to provide mechanical direction such as the architectural design of a building that can keep out rain and so on, but with time they also saw themselves as artists and decorators. At present, architecture also involves a building that can communicate the right sort of things than just being said as an efficient building (Zhang, Tang, He & Chen, 2018). Therefore, people try to decorate their spaces with objects that can capture a spirit that gradually attracts people towards it but does not fully possess. According to architectural postmodernism, symbolism was considered for describing architectural concepts that signify intellectual exercise in the building and the view offers the design and experience for space which creates a sense that architecture can be simple, along with proto architectural objects.

3. Perception in Architecture

Impressions of structure and space can be managed from creating illusions related to scale, distance and symmetry just by altering its appearances and proportions. It is a well-known truth that architecture directly affects the mind of human beings and not the service provided to the human frame. The different illusions notices were an illusion of scale, illusion of weightlessness, correctional illusion and illusion of plane dematerialization (Shaykh-Baygloo, 2018). Further illusion of weightlessness states that architectural objects may appear suspended in space even with a massive structure. An example of Hagia Sophia can be considered for better understanding this concept. The church was once used as a mosque and presently used as a museum. It has a massive dome that is light on the lower structure just above its huge volume; however, the hidden structure provides enough support. Also in the case of Gothic churches, flying buttresses were considered for supporting the roof's weight which was kept hidden from the visitors and produces a large effect of light.

Based on the illusion of plane dematerialization, patterned optical illusions were used on the floors that deconstructed the flat plane and its design. These examples can be seen in Japan, China, India, Italy and many other countries as well (Zeki, 2019). According to the correctional illusion, an eye can only attain satisfaction when the appearance is satisfactory. It is possible that true seems false

and things appear different from their original state and require addition and subtraction. This may include replacing deconstructed lines with curves or disposing off selective parts. Also, optical illusions play a vital role in affecting the way architecture is constructed. It can even change the perception of architecture by considering a huge effect on the proportion, size and space.

4. Research Methodology

The data type selected for the research includes secondary sources of data collection. The secondary data was gathered from secondary sources such as scholarly articles, journals, books, newspapers and websites. Secondary data has further allowed better analyzing the findings and relating them with the research concept.

Ethical considerations

The use of secondary data includes some key ethical conditions such as:

- Use of data must not lead to distress or damage
- Outcomes must not re-identify participants
- The collected data must be de-identified
- Consent of the study subject must be presumed

5. Findings and Analysis

Beauty is not just ideological or political, rather it is directly connected with the development of species and will always remain a valid concern for the people who want their society to be beautiful to behold and equal. The aesthetics of infrastructure is the most important aspect considered in architecture and covers the effects such as color, texture, size, shape, space, and many more (Kaijing & Lanling, 2019). The natural beauty and unique properties of the material used make them capable to be used for various applications such as construction and interior design and are crucial parts in order to provide beauty in architecture.

6. Conclusion

Beauty and space are the two important terms used for art and architecture and also defines the perception in architecture. This paper has allowed accessing the new sense of beauty in architecture and developing an understanding of the beauty strategies and perspectives of perception in architecture. The architectural works possess remarkable aesthetic values which later signify the function for which they were built. The paper, at last, sheds light on the relation between function and aesthetic values with relation to beauty and functional aspects in architecture.

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Treated openings; Building Physics; Comparative analysis; Sustainability

Research Article

Comparative Analysis of Treated Openings and Comprehensive Study of its Building Physics in Context with Sustainability in Nagpur (India).

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Abstract

Today India is witnessing a paradigm shift. After Industrial resolution, urban development was flourished. This transaction led to the development of concept called sustainability. Nagpur being geographically centrally located has generated a major impact on history of Architecture. This architecture comprises of various building elements in a structure where treated openings are critical components of any building's envelope. Treated openings (doors and windows) are considered main elements of buildings that on first glance establishes the Character of the Structure. This research revolves around identification, spotting and understanding the functional language of treated openings with comparative analysis of its building physics with respect to its function, style, use, technique used in construction, change in scale and materials used for over the period of 100 years in Nagpur region.

Introduction

A building envelope is that which defines a boundary between in and out. Whereas the envelope has an opening, which acts, in the form of regulatory and protective functions and provide light, ventilation and climate control for rooms. Treated openings can also be defined as a space or void allowing access or vision to a space or surface, such spaces or surfaces act as openings or open spaces. At the same time, they are essential functional and design elements of facades, enabling communication between indoor and outdoor spaces as transparent or translucent structural components. Openings are broadly classified into two major types A) Vertical openings ie (Doors, windows) and B) Horizontal openings ie (Skylights and courtyards).While looking for the aspect of sustainability, habitat able spaces should be taken into consideration, which are utilized for throughout the year, where the concept of sustainability starts working. Thus this study mainly focuses on the comparative analysis of such type of vertical treated openings and its building physics, in Central part of India (Nagpur region), where it mainly deals with the function of the different types of treated openings at different locations within a structure, the style and its use, different materials and techniques used in construction an lastly change in scale of the openings for over a period of 100 years.

Importance of Building Physics

Building Physics is a science that deals in hydrothermal, acoustical and light related properties, and the performance of building materials, building assemblies such as (roofs, facades, openings, walls, spaces, building as a whole and the overall built environment. Building Physics has to operate within an architectural framework, floors, facades, openings and roof form, aesthetics and choice of materials are all elements which shape the building and whose design is based on among others, the performance requirements which building physics imposes. The need to build a comfortable indoor environment that protects humans against vagaries of the outside climate, defines the role of building physics. it deals with variety of criteria- on one hand, requirements related to human comfort, health and wellbeing, and on the other hand restrictions because of architecture, material use, economic and sustainability demands. The building, which has been designed and constructed according to requirements, that reflects a correct understanding of building physics could generate a better sustainable habitat. Of overall building envelope, a single element of treated Openings is considered for analysis and comparative study with respect to its building physics in the following cases studies.

Case study 1 (Year 1921-30)
Location: Model Mills chawl
Nilay Murarka Marg, Near Ganeshpeth Bus stop Ganeshpeth, Nagpur

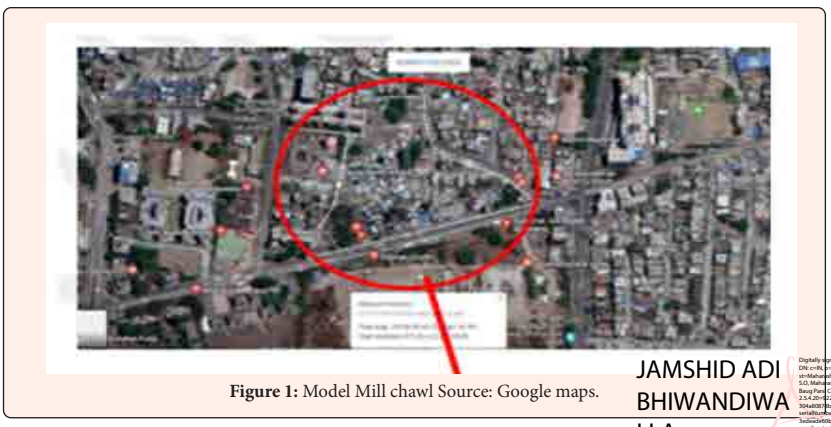

Figure 1: Model Mill chawl Source: Google maps.

The Model mill chawl at Nagpur is the oldest settlement consisting of total 416 units, which is spread over 3.16 acres of land in the heart of the city. The site is situated exactly opposite to Godrej Anandam Township, Model Mill Compound on Nilay Murarka Marg, which lies in the centre of the city. The chawl came into existence on 4th july 1921 for the workers of the Model mill which was closed down in the year 2003.The condition of chawl is down at heel, looks old and no longer in good condition. Each unit consists of approximately 30-32sq.mts in area with 2no of doors and a small window with roof projected outside acting as shading device with toilet facilities in public toilets Figure 1-4.

Figure 2: Model Mill chawl Source: Google maps.

Figure 3: Actual pic at Model Mill Chawl.

Sr.No.	TYPE OF OPENING	MATERIAL	SOURCE	BUILDING TECHNIQUE	SKILL	IMAGES
	With treatment					
1	Without frame Door in (3rd class clay bricks wall) Door(0.60mx 1.5m)	1.Hardware of MS steel 2.Timber planks 3.Hinges	Local	Wooden lintel supported on wooden post on each side of the span of double shutter battened and ledged door,where the shutter is directly attached to the frame in the walls by hinges on both the sides	skilled	
2	With frame Window in (cob wall plastered with lime mortar) window(0.60mx0.75m)	1.Hardware of MS steel 2.Timber frame 3.Hinges				
	Without treatment					
3	Without frame M.S sheet Toilet Door in fixed and hinged wooden planks and wooden mesh Door(0.60mx 1.5m)	1.Hardware of MS steel 2.Timber planks 3.Hinges 4.wooden mesh	Local	Wooden lintel supported on wooden post on each side of the span of single shutter M.s sheet door,where the shutter is directly attached to the post attached to the wooden planks by hinges on one side.	semi-skilled	
4	no opening or ventilator toilet facilities at public toilets					

Figure 4: Represents treated opening details at Model mill Chawl.

The image (Figure 5) below represents brick arch openings for doors and windows with wooden lintel low height opening size of 0.60mX1.50m. Vertical bars are used as grill and the panels are fixed inside the grill. The unfinished arched openings with key stone (brick) in the centre gives the effect of colonial style of architecture.

Figure 5: Represents opening details at Model mill Chawl.

Case study 2 (Year 1941-50)
Location: Kumbharpura, Lalganj, Residence of OP Devikar Dahi bazaar road,Nagpur

Figure 6: Represents residence at Lalganj area Source: Actual image at site.

Sr.No.	TYPE OF OPENING	MATERIAL	SOURCE	BUILDING TECHNIQUE	SKILL	IMAGES
	With treatment					
1	With framed double shutter Door in Wattle and daub wall plastered with lime mortar door size (0.75mX1.60m)	1.Hardware of MS steel 2.Timber planks 3.Hinges	Local	With frame, the shutters are directly attached to the frame by hinges on both the sides	semi-skilled	
2	Without shutter Window in (wattle and daub wall plastered with lime mortar) window size (0.60m X0.45m)	1.MS bars 2.wooden lintel		Without shutter window where wooden lintel supported on wattle and daub wall with MS horizontal bars		
	With treatment					
3	An opening in Wattle and daub wall plastered with lime mortar opening size (0.60mX1.60m)	1.curatin 2.m.s bar 3.nut/bolts	Local	An opening at times closed with curtains	semi-skilled	
5	With framed double shutter window in Wattle and daub wall plastered with lime mortar window size (0.60mX0.75m)	1.Hardware of MS steel 2.Timber planks 3.Hinges	Local	With frame, the shutters are directly attached to the frame by hinges on both the sides in wattle and daub wall	skilled	

Figure 7: Represents treated opening details at Kumbharpura Lalganj.

The residence of OP Devikar, tailor by profession and a Resident of Lalganj Kumbharpura chowk, Nagpur residing in the dwelling of 400sq.st area for more than 75 years. Its and old construction of three rooms with no front or backyard .The condition of the residence looks old and no longer in good condition. The temperature inside is cooler as the wattle and daub wall thickness varies from 1'-1'6".The low height openings were 3 in no with double shuttered ledge and battened door and 3 window supported on wooden lintel in wattle and daub wall with MS horizontal bars acting as grill, and roof projected outwards acts as shading device for the openings Figure 6,7.

Case study 3 (Year 1961-70)
Location: At Mahal, opposite Kalayaneshwar Mandir Residence of Yashwant Wardilwar Nagpur

The study and analysis of treated openings at residence of Y Wardilwar's, who runs a newspaper agency from Mahal area was built around 50-55 years ago was built in colonial style of architecture. The low height openings were 9 in no with double shuttered framed and panelled door and 4 windows supported on Brick lintel brick wall with MS horizontal bars acting as grill Figure 8.

Figure 8: Shows the entry of the residence that is fixed up with teak wood double panelled framed door below brick lintel with low height opening size of 0.90m X 1.80m. The style of doors and windows used were those as used in wadas with raised plinth, brick lintel with very less or no ornamentation.

Sr.No.	TYPE OF OPENING	MATERIAL	SOURCE	BUILDING TECHNIQUE	SKILL	IMAGES
1	With treatment With frame Door in clay bricks wall door size (0.90mX1.80m)	1.Hardware of MS steel 2.Timber Frame/Panels 3.Hinges	Local	Double shutter framed and Panelled door,is directly attached to frame in the walls by hinges on both the sides	semi-skilled	
2	With frame Window in clay bricks wall window size (0.90mX1.20m)	1.Hardware of MS steel 2.Timber frame 3.glass				
3	With treatment With frame ledge and battened Door in clay bricks wall door size (0.60mX1.50m)	1.Hardware of MS steel 2.Timber battens /ledges 3.Hinges	Local	Double shutter ledged and battened door, directly attached to frame in the walls by hinges on both the sides	semi-skilled	

Figure 9: Represents treated opening details at Mahal Area.

Further to carry, the comparative analysis of treated openings at Aakar nagar, Katol road, were the resident is a Retired Government Employee, where the structure is G+1 was built around 30 years ago. The residence is a duplex row house is located on rectangular plot with its longer sides facing north-south axis (which are attached to common walls of neighbours) Figure 9,10.

Case study 4 (Year 1981-90)
Location: B-69 Aakar Nagar,Katol road, Nagpur
Residence of RC Sonkusare

Sr.No.	TYPE OF OPENING	MATERIAL	SOURCE	BUILDING TECHNIQUE	SKILL	IMAGES
1	With treatment With MS steel frame panelled Door in (1st class brick wall) door size (0.90mX2.10m)	1.Hardware of MS steel 2.panelled timber door 3.MS Frame	Local	RCC lintel supported on MS steel frame on each side of the span of single shutter framed and panelled door which is directly attached to the metal frame in the walls by Holdfast on both the sides with attached metal door for security is fixed	skilled	
2	With MS steel frame glass window in (1st class brick wall) window size (0.90mX1.20m)	1.Hardware of MS steel 2.MS frame 3.panelled glass window				
3	With treatment With MS steel frame single shutter plywood Door in (1st class brick wall) door size (0.75mX2.10m)	1.Hardware of MS steel 2.panelled plywood door 3.MS Frame	Local	RCC lintel supported on MS steel frame on each side of the span of single shutter plywood door which is directly attached to the metal frame in the walls by Holdfast on both the sides	semi-skilled	

Figure 10: Represents treated opening details at Katol road area.

In total, it has 11no of panelled doors with height of the opening as 2.10 mts, 6 double glazed aluminium framed windows are provided treated glass are used. Double glazed reflective glass with cavity (air gap) insulation in between is used for window panels, which ceases 20 % of heat coming inside, with rcc 0.60m chajja as an shading device Figure 11.

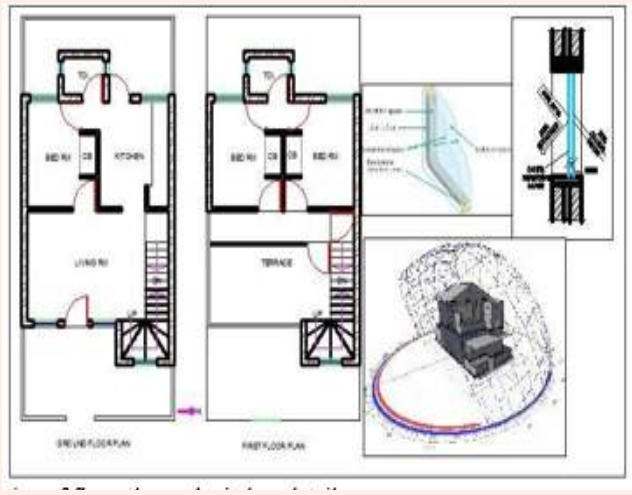

Figure 11: Schematic representation of floor plan and window detail.

Case study 5 (Year 2001-2010)
Location: KT Nagar, Katol road, Nagpur
Residence of Ashok Nanwani

The last example to analyse was at KT nagar, Katol road, were the resident is a Businessman and deals in Electrical equipments and the structure is semidetached G+1, where the plot size measures about 1891sq.ft was built during the period of 2003-2007. The building is equipped with all the latest techniques of construction and materials and is installed with solar power generation. The total no. of openings in the structure consists of 12 Teak wood framed and panelled doors with 7no of double glazed large glass windows. Maximum no. of openings are covered with porch, which acts as shading device Figure 12.

Sr.No	TYPE OF OPENING	MATERIAL	SOURCE	BUILDING TECHNIQUE	SKILL	IMAGES
1	With treatment With Teak wood frame Teakwood single panelled Door in (1st class brick wall) door size (1.0mX2.10m)	1.Hardware of MS steel 2.panelled teakwood door 3.wooden Frame	Local	RCC lintel supported on teakwood frame on each side of the span of single shutter framed and panelled door which is directly attached to the wooden frame in the walls by Holdfast on both the sides with attached metal door for security is fixed.	skilled	
2	With MS steel frame metal (grill) door in 1st class brick wall door size (1.0mX2.10m)	1.hardware of MS steel 2.metal frame 3.metal door		RCC lintel supported on MS steel frame on each side of the span of single shutter MS grill door which is directly attached to the metal frame in the walls by Holdfast on both the sides for security is fixed.		
3	With teakwood frame double glazed window in (1st class brick wall) window size (1.50mX1.20m)	1.Hardware of MS steel 2.wooden frame 3.panelled double glazed window		RCC lintel with 0.60m rcc projected chaja supported on teakwood frame on each side of the span of 4 shutter framed and panelled window which is directly attached to the wooden frame in the walls by Holdfast on both the sides with attached metal grill for security which is fixed from inside.		
4	With treatment With MS steel frame single shutter PVC Door in (1st class brick wall) door size (0.75mX2.10m)	1.Hardware of MS steel 2.PVC door 3.MS Frame	Local	RCC lintel supported on MS steel frame on each side of the span of single shutter PVC door which is directly attached to the metal frame in the walls by Holdfast on both the sides	semi-skilled	

Figure-12: Represents treated opening details at KT Nagar area.

Conclusions

Over the period of 100 years, the study displays the following change in building physics. In older times, storage spaces were maximum in all activities, flexibility of activities or performing activities in different manner ensured multiple use of same space, creating multiutility spaces. Thus minimizing the requirement of exclusive spaces. As the size of the structure increased over the years, this building envelope changed. With this change in envelope, the need of exclusive spaces increased which resulted into increase in no of treated openings and its accessories. In recent times, carbon neutral building concept has become a popular catchphrase to describe the synergy between energy-efficient building and renewable energy utilisation to achieve a balanced energy. Energy is one of the most important factors in economic growth and social development in all countries. A building consumes energy at different levels in every stage of the life cycle, whereas building materials occupy a great share of this consumption. The choice of building materials can have multiple effects on a building's energy consumption. Therefore, the amount of embodied energy consumed by materials used for treated openings in buildings plays important parameter in determining the energy efficiency of the buildings. The timber doors required for no. of door and windows are obtained from forests whereas steel and glass are altered in form with the help of human and machine skill and manufactured with mine ore with heavy industrial process involving external use of fuel/electricity and energy. Over the years, the materials used for openings in buildings have higher environmental impacts than those used in traditional buildings Figure 13.

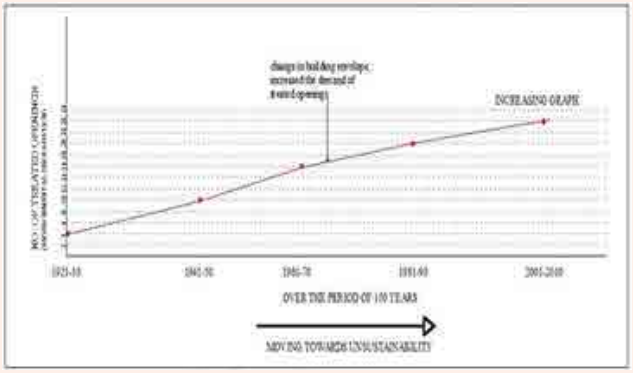

Figure 13: Represents change in Building physics.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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Issues in Material Management using Gap Analysis

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ABSTRACT
This study explores the various factors responsible for material cost overrun and the corresponding gap in the estimated and actual material usage. Construction projects in India are often undertaken by Small to Medium sized Enterprises (SMEs), and are heavily susceptible to an increase in cost from the estimated value leading to the SMEs not being able to arrange for the required additional funds.

KEYWORDS - *Material Management, Construction, Cost overrun , Gap Analysis, SME Projects.*

INTRODUCTION

Background

The construction sector in India is comprised largely of Small and Medium sized Enterprises (SMEs). As opposed to large companies which have the capacity and capability to use sophisticated information and management technology to supervise and manage a construction project, SMEs are generally poorly equipped to implement such systems. Thus, improvements in labour and material efficiency are generally difficult to achieve.

Since SME's operate on low cash flows, the materials are generally ordered at infrequent and irregular intervals. Without proper management and site oversight, offloading, storage and tracking of materials is highly inefficient. The cost represented by materials fluctuates and may comprise between 60% - 70% of the total project cost and sometimes more [1],[2]. Hence, any ways to reduce wastage and improve productivity will have major benefits to cost and time.

Any substantial increase in the estimated project costs—like those resulting from poor management of construction materials—is difficult for the developer to adjust for. This sometimes leads to projects being stalled for years, and in extreme cases, abandoned. Thus, proper management of construction materials becomes a highly effective strategy to substantially improve feasibility and reduce costs in a construction project.

Aim of the Study

The aim of this study was to recognise the various factors involved in management and handling of construction materials, and to study the factors responsible for the increase in the actual material usage as compared to the estimated usage.

Methodology

The scope of the study was to understand the procurement methods, logistics, storage, usage, and wastage of materials during the construction phase of the project. The materials selected for study were limited to Concrete (Cement, Sand, and Aggregate) and Steel, since they contribute primarily to the material costs in Reinforced Cement Concrete (RCC) Construction.

For comparison of estimated material usage and actual material usage, Gap analysis was done using S-curves. Construction protocols and actual on-site conditions were recorded and analysed using detailed questionnaires.

MATERIAL MANAGEMENT

Definition

Material management is defined as planning, identification, procuring, storage, receiving and distribution of materials. Material management functions include "material requirement planning and material take off, vendor evaluation and selection, purchasing, expenditure, shipping, material receiving, warehousing and inventory and material distribution" [3].

Many factors contribute to poor material management in construction projects. Factors such as waste, transport difficulties, improper handling on site, misuse of the specifications, lack of proper work plan, inappropriate material delivery, and excessive paperwork, all adversely effect on material management [4]. It has been an issue of concern in the construction industry; 40% of the time lost on site can be attributed to bad management, wastage of material, lack of materials when needed, poor identification of materials and inadequate storage [5].

Impact of Material Management
Effective material management has a positive impact on

- Time optimization,
- Cost saving,
- Quality maximization,
- Productivity improvement, and
- Waste minimization

Ineffective material management, on the other hand, has a negative impact on project performance. Delays in project completion time due to untimely unavailability can cause increase in expenses and thus has an adverse impact on the potential feasibility of the project. Poor planning and procurement, as well as mishandling of materials due to poor material management can lead to increased wastage and thus, an increase in cost.

Poor material management can also affect the quality of the required project; materials not stored properly or used in a timely fashion decline in quality. Problems in material management also leads to a decline in labour efficiency, since they cannot work as productively as they can. Thus, we see that the impact of material management is cumulative in nature.

Importance in SMEs and SRA projects

An SME is project driven and is always battling to reduce costs and save money. They tend to win their work on low bid price, rather than superior technology. These bids are based upon resource estimating using knowledge and experience from previous projects, and are often their only guideline for project cost going into the project. Increased costs in the middle of construction can lead to adverse effects on their cash flow; This cash flow is crucial to pay suppliers on time to ensure future materials supply.

Material management, a crucial part in any construction project has more sensitivity in this case due to the proximity of the site to the residents, more vulnerability due to the anti-social elements in the surrounding slum areas etc. It is essential therefore, that an improved material management system be adopted so that the project can be completed efficiently, be cost effective and complete on schedule.

CASE STUDIES

Three case studies were selected which were from Mumbai. The Phase 1 of all the projects has been completed in all the case studies, and the rest is ongoing.

Table 1 - Details of selected case studies

Description	Case Study 1	Case Study 2	Case Study 3
Total plot area in sqm	16,184.76	12674.34	3152.94
Ground coverage area in sqm	1980.00	1480.00	895.00
Height of buildings (mt)	23.8	49.9	23.8
Constructed area (sqm)	8156.27	13001.40	5940.50
Type of construction	RCC framework Brick partitions	RCC framework Brick partitions	RCC framework Brick partitions
Construction undertaken by	Developer (SME)	Developer (SME)	Developer (SME)
Estimated Construction Cost estimate (Cr)	9.67	13.1	7.92
Estimated Construction Period Phase I	26 months	45 months	24 months
Total Construction Cost Phase I (Cr)	11.65	16.8	9.78
Total Construction Period Phase I	42 months	78 months	35 months
Proposed FSI	Phase I - 2.5, II&III - 3.0	Phase I, II, III-3.0	Phase I - 2.5, II&III - 3.0

Data
The below S curve analysis presents the gap between the estimated and actual quantity with respect to time, for all the materials in each case study.

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Cement Consumption

Table 2 – Cement Consumption

Description	Case Study 1	Case Study 2	Case Study 3
Design Mix	M20	M25	M20
Estimated Qty (bags)	43000	70000	21500
Total Qty Used (bags)	52180	87935	25700
Deviation in Cement Qty	21.2%	25.6%	19.3%

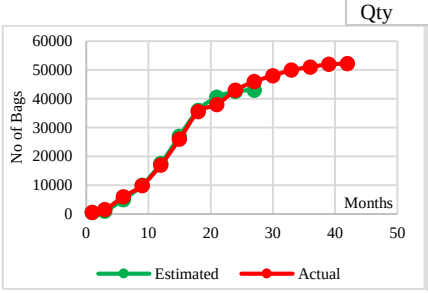

Fig 1.1 Case Study 1

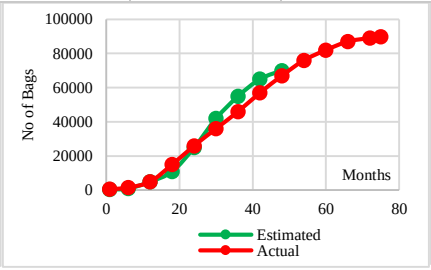

Fig 1.2 Case Study 2

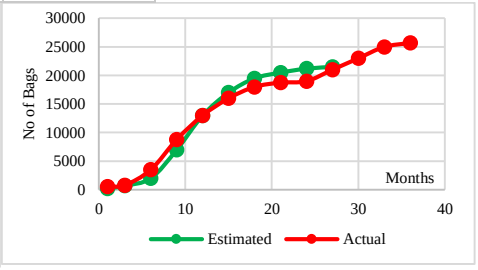

Fig 1.3 Case Study 3

Sand Consumption

Table 3 – Sand Consumption

Description	Case Study 1	Case Study 2	Case Study 3
Estimated Qty (ton)	1900	3920	940
Total Qty Used (ton)	2296	4925	1106
Deviation in Sand quantity	20.6%	26.7%	15.6%

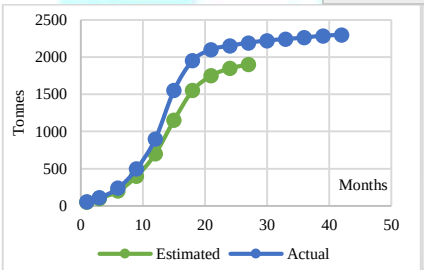

Fig 2.1 Case Study 1

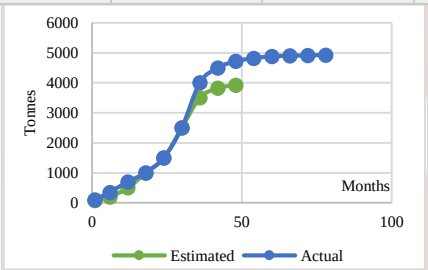

Fig 2.2 Case Study 2

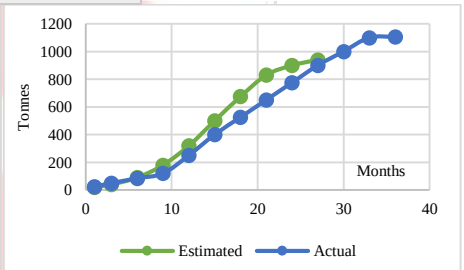

Fig 2.3 Case Study 3

Aggregate Consumption

Table 4 – Aggregate Consumption

Description	Case Study 1	Case Study 2	Case Study 3
Estimated Qty (ton)	3800	7840	1880
Total Qty Used (ton)	4592	9850	2212
Deviation in Aggregate Qty	20.7%	25.6%	15.6%

Aggregate Consumption

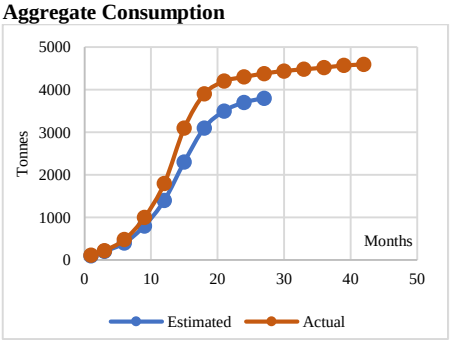

Fig 3.1 Case Study 1

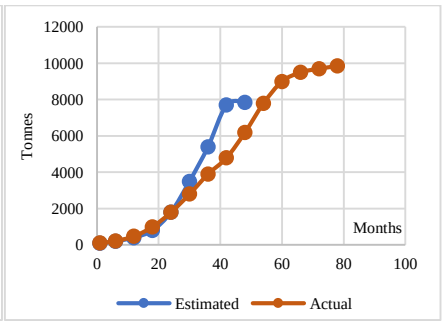

Fig 3.2 Case Study 2

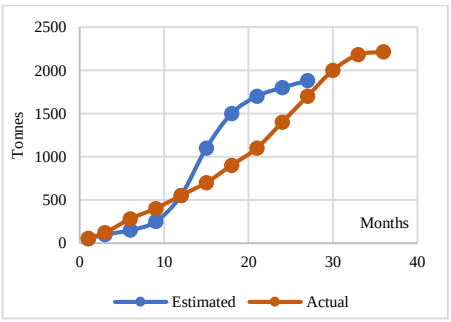

Fig 3.3 Case Study 3

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Steel Consumption

Table 5 – Steel Consumption

Description	Case Study 1	Case Study 2	Case Study 3
Estimated Qty (ton)	650	780	320
Total Qty Used (ton)	802	957	406
Deviation in Steel quantity	24.6%	22.3%	23.7%

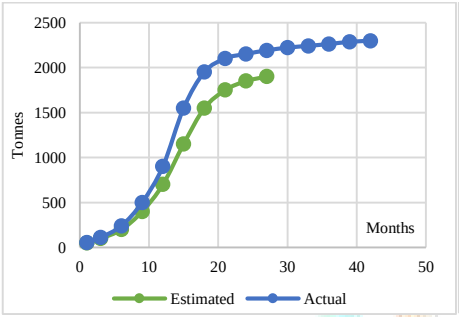

Fig 4.1 Case Study 1

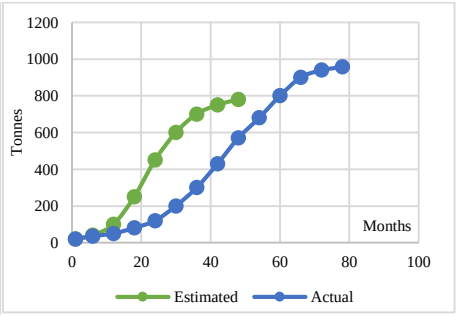

Fig 4.5 Case Study 2

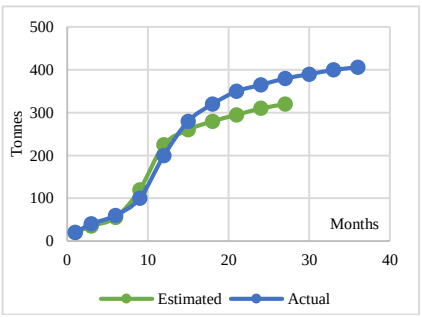

Fig 4.3 Case Study 3

Gap Analysis

From the selected case studies, data was obtained in the form of usage statistics and questionnaires to the personnel responsible for material management. The gap in material usage and its impact on the project cost is summarised in Table 6. The primary factors responsible for these variations were identified as wastage and Bill Of Quantity (BOQ) changes.

Construction projects are prone to numerous changes in the plan specifications. However, the BOQ prepared before commencement of the project does not undergo periodic updating in spite of any changes in the plan.

The losses due to wastage were found to be approximately 3-5% of the material cost. The most common reasons were material shortage and subsequent overordering. This, coupled with late ordering and delay in delivery is indicative of a lack of organization and planning.

Table 6 - Actual material usage and cost overrun

S. No	Description	Case Study 1	Case Study 2	Case Study 3
1	Design Mix	M20	M25	M20
2	Total Cement Used (bags)	52180	87935	25700
3	Deviation in Cement quantity	21.2%	25.6%	19.3%
4	Total Sand Used in ton	2296	4925	1106
5	Deviation in Sand quantity	20.6%	26.7%	15.6%
6	Total Coarse Aggregate Used in ton	4592	9850	2212
7	Deviation in Aggregate quantity	20.7%	25.6%	15.6%
8	Total Steel Used ton	802	957.3	406
9	Deviation in Steel quantity	24.6%	22.3%	23.7%
10	Estimated Construction Cost(Cr)	9.67	13.1	7.92
11	Final Construction Cost actual (Cr)	11.65	16.8	9.78
12	Estimated Const. cost deviation	10% -12%	12-15%	10%
13	Actual Construction Cost Deviation	17%	22%	19%
14	Impact of the Increased Cost	Delay in completing project.	Profit margin reduced drastically	Delay in completing project.
15	Impact due to project delay – projected loss	10% of project cost	15 % of project cost	10% of project cost

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The factors responsible for the material mismanagement can be summarised as shown in Figure 5

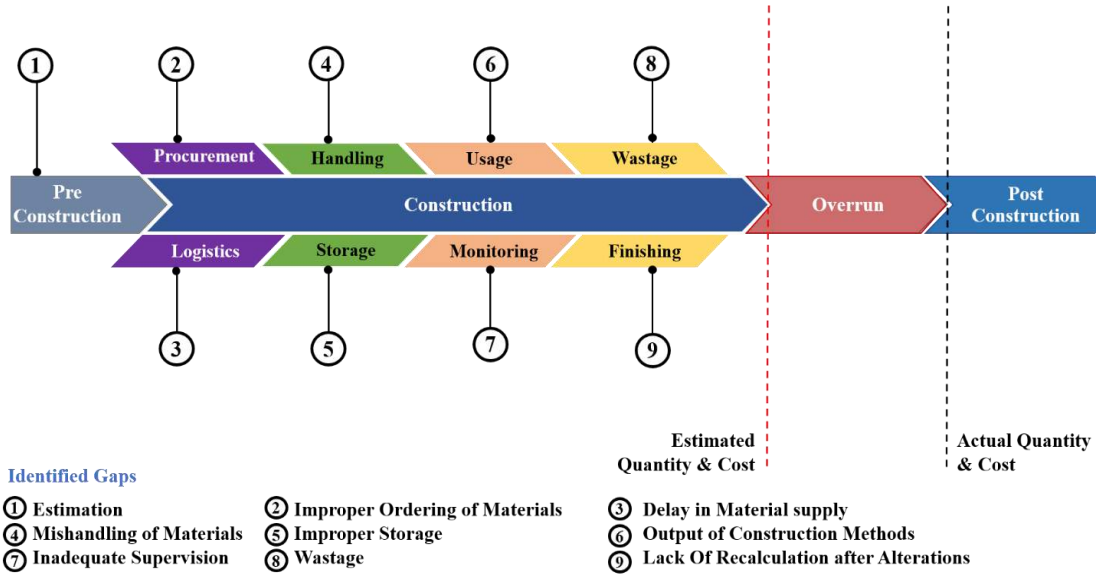

Figure 5 - Identified Gaps in Material Management

1. Estimation – The lack of a periodic update of the material quantity and cost lead to error in the initial estimate of the project. Alterations due to site conditions, often significant are ignored, and disturbs any planned material management.
2. Improper Ordering of Materials – Materials are not ordered in a timely fashion, nor are management techniques like Just-in-Time ordering and Economic Order Quantity (EOQ) followed. This leads to overordering of materials and subsequent wastage.
3. Delay in Material Supply
4. Mishandling of Materials – There is a general lack of discipline and set protocols for the different activities being undertaken during the construction phase. The lack of discipline towards the usage and handling of the materials can be attributed to the use of labour contract, as efficient use of materials is not a priority for the contractor.
5. Improper Storage – Storage facilities found were severely lacking. The scarcity of space, the nature of the location, and the surrounding antisocial elements present in the slums make the safe storage of materials a difficult task.
6. Output of Construction Methods – Inefficient techniques and technologies like manual bar bending machines and on-site concrete mixers lead to about 8-10% of material wastage which is often not accounted for in original estimates.
7. Inadequate Supervision - Adequate supervision by qualified professionals on the site is found to be sorely needed due to the lack of proper protocols and communication. Delays in performing inspections and testing lead to rework required on site, and thus increase in material and cost.
8. Wastage
9. Lack of Recalculation – Since due to the nature of typical construction projects in India it is impossible to to do in-depth testing prior to excavation, there is a high possibility that an unexpected feature of the site can substantially affect initial estimate. In spite of easy and ready availability of Management Information Systems (MIS) and Building Information Management (BIM) software, there is no attempt to use these tools for the same, and the recalculation is not done with due diligence.

CONCLUSION

Material management is important to the success of a construction project, since material accounts for the majority of the construction costs. Construction projects mainly undertaken by SMEs are thus highly susceptible to the adverse effects of poor material management. By looking at selected case studies of such projects, the primary factors of such mismanagement were identified as seen in Figure 1.

It is possible for an SME to tackle such mismanagement using suitable combinations of established management techniques. Periodic update of estimation can be done using BIM software. EOQ and JIT can be used to improve efficiency in procurement and logistics. ABC analysis of material management can be applied to the required materials in order to allocate storage and prioritize handling. Newer technologies can like Pre-Cut steel bars and Ready-Mix Concrete (RMC) can be used to reduce wastage. MIS software can be used to track and monitor progress of the project and accurately communicate information.

Thus, it is important to understand the impact that material management has on a project. The feasibility and timely completion of the project, which are primary concerns for a developer, largely depend on it.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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THE STATE OF LIBRARY IN DIGITAL ERA

An Opportunity to redefine learning & reading spaces

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Abstract:

In our civilized society, library has significant meaning where one study, does research, references and recreates their thoughts. Thus, library is a store house of knowledge. But in Digital Era of today, library building stands obsolete due to poor footfall of the readers, the building maintenances has become uneconomical and hence there is an issue of survival in today's context where land value is high and in competitive digital era. The paper focuses on questioning the purpose of library building, changing trend and medium of learning, Children's psychology, allied activities to support the library function and future state of Library. The current state of libraries in the Metropolitan cities is documented, analyzed through surveys targeting children and youth of various age groups. The case studies are focused on modern library designs to adapt the digital age, economics and recreating attraction to increase the footfall. The well-designed experimental spaces that are grounded in development theory, including school-based programme, enthusiasm to promote reading. Thus, to lay the foundation for the new Era of traditional library to the modern requirements by incorporating allied activities supporting the main function of the library building which would promote interactive learning; enhancing the overall development of community.

Index Terms **– Children's library, virtual library, social learning spaces, e-library, Collaborative activities.**

I. INTRODUCTION

A library can be defined as collection of information, analyzed and selected by experts, scholars and made accessible to all for referencing or borrowing, also physical manifestation offers a quiet environment conducive to study. The paper focuses to study the vital role that library plays in the era of digital world. In this era, we have everything easily accessible but not a courage to pursue them. In olden days, library was a platform to meet like-minded people, new friends, a treasure to knowledge, motivational place to hunt information, can create different world altogether. In other words, it is a place where people can trade information and help themselves grow, providing mental peace and mind broadening. On a contradictory, the digital means and media are making people more introvert, anxious and depressed while library can actually be a place having silence with studious environment giving less of anxiety and more of familiar space to be an extrovert and explore oneself. The digital platform has number of easy options and access to the worldly knowledge but one doesn't know how to derive wisdom from the vast information available.

This article seeks to explore some creative possibility aimed to find unique ways for the library to grow in the digital era. New directions to support research and study can be taken from the comparative studies of libraries in India – Urban and well as rural set-up library. The library is like a growing organism, where one can have platform for theoretical arguments, science, arts etc leading towards community development.

The paper focuses on various aspects like adaptive reuse of existing library building, revival of functions and integration of allied activities, to sustain library in Virtual era. It reviews thoughtful practices used both in treatment settings of physical form of Library buildings and in prevention or enhancing the mental health of individual by making them aware if the learning and interactive integrated spaces under one roof.

1.1 INTELLECTUAL ACCESS TO INFORMATION IN ANY FORMAT [ROLE OF LIBRARY PROFFESSIONALS IN DIGITAL ERA]

The range of available resources expanded to include microform, video and audio formats. The final decades of the 20th century witnessed a further explosion in format, and libraries can now offer information in the form of print, audio, video, microforms, numeric, computer programs, or multimedia composites. For librarians the most important issue is to provide the information in whatever form it is packaged. In digital library scenario, it has benefited the users by providing worldly information in single click. It is being able to provide information resources to readers – regardless of format. Librarians and patron will no longer be restricted to 'a single entity where everything is stored ', but will be able to offer "a range of services and collection, link together or made accessible through electronic networks".

The development in electronic access to scholarly journals is a key example of the shift of ownership to access. University and research libraries especially, find the option of providing electronic access to journal subscription to be a means of dealing with complex multi- campus organizations where the client population comprises and increasing mixture of on – and off – campus students.

Electronic access to journal literature was began to use the newly- evolving technologies, hence the beginning of digital library started. The development of electronic reserve [e-reserve] collections, demonstrate another way in which librarians are adapting new technologies to deliver services more effectively. electronic reserve provides the ability to digitize a printed document, video, audio, or data, so that many students can access it simultaneously without the limit of attending a library building within opening hours.

The technology to provide digital access to library reserve collections has been available for some time. However, the whole sale adoption of this mechanism has been impeded by a lack of clear copyright and intellectual property ownership laws for the digital environment.

1.2 THE NEED OF LIBRARY FOR CHILDREN -NECCESSITY TO RELIVE CULTURE OF READING

Knowledge and information are so vital for all round human development, in which libraries acts like the source that conserve information and distribute knowledge. Libraries serve a vital social act of aid by helping bridge the gap between the haves and the have knots, especially when it comes to literacy. The need of children library in today's 21st century is must because it equips children with lifelong learning and literacy skills enabling them to participate in society. By designing a wide range of activities, public libraries can provide an opportunity for children to experience of reading and the excitement of discovering knowledge and study the works of the imagination by these thoughts while it is somewhere helping children to brainstorm but nowadays libraries are undergoing transformation and are now a mix of traditional print library resources and the growing number of electronic resources. Ironically younger generation don't have Essence of book, the amount of comprehension it had got because internet can't cover the whole aspect. When we go to a library we search we strive and we somewhere innovate new ideas while on the other hand digital world has made people limited to what comes in front of them, sometime distract away from the intent and accept the fact because of this no one take efforts to search more. Reading not only helps in critical thinking, but also perfects your brain function. The ancient libraries have a beautiful space which allow to smell the essence books. In human growth, early childhood is a period in which, child starts learning to develop in a significant and permanent way where they learn how to interact with people, along with learning new things by reading and asking questions. The need of library specially designed for children is to make young mind grasp things easily. The old tradition of our country, where Pathshala and Gurukul encourage children use to study under trees and in a vernacular atmosphere these traditions were designed for a purpose to enhance mental growth.

The public library is one of the biggest treasures known to societies from the time of the Indus valley civilization. It has all the resources available. With the availability of internet and digital platform, public and children libraries have been neglected. The best part of having a local library is to have free books! You can have any book at any time just with a cost of zero rupees. You can also easily carry it anywhere. The best part of the library is that there are thousands of different types of books available just under one roof. A local library is located in the vicinity and one can use or study there anytime if any difficult to study at home. Along with that most of the libraries are designed in such a way that they are spacious and airy.

1.3 CHANGING THE ROLE OF LIBRARIES

The concept of a library space is more than 1000 years old and is still relevant in the 21st century of e-library. Do people still go to library only to sit and read quietly, or are there other reasons? The fixed image of library is that a place which has only books, and we always must be quiet. The main purpose of this study was to understand what is relevant today. Libraries plays an important role in keeping and providing information to users. Even though digital technology growth rapidly but the importance of libraries is still there for its users. Face of libraries has changed as content is moving towards a digital platform and internet access is becoming more of a human necessity. Factors of information technology is closely related to the development of libraries. Today's library should have information cantered and are used for various social activities like teaching, mentoring, and collaborative learning. Thus Libraries should become a place where modern technology and old information meets. Librarians also play an important role in creating innovative and up-to-date services to users. The implementation of modern technology in libraries is todays requirement. It is important that libraries continue to utilize new form of technology to keep up with modern times

1.4 LIBRARIES IN 21ST CENTURY: THE STRUGGLE BETWEEN PERCEPTION & REALITY

Internet is no substitute for library. Library will always be the best place to study and gain knowledge. It will always be the hospital for mind. Image of Library is so stereotypic, it is all about a gloomy atmosphere with people wearing glasses and their noses buried in a book. But in actuality, the library is a sanitizing agent for the mind that is derived from peace and knowledge. The space is visualized as a place filled with racks and racks of books on a different topic, just waiting to be opened and accessed. Our cultures wouldn't have a place to stay if it wasn't for the libraries and their dusty racks filled with books It is a sea of the intellect for people who looks for peaceful space as the library has an atmosphere that allows you to concentrate at your level best and keeps away from all distraction's outsides. In digital world, Internet cannot take over library spaces completely, but a search tool to be used in addition to traditional sources in the library. But library has up to date information available 24/7 online from the library's webpage. Even in colleges these databases of library's collection are accessible in remote areas, off and on campus and with your Student ID.

The internet is not always organized. It's a search on the Internet is similar to searching an unclassified catalogue. Libraries are organized according to subjects/dates/alphabets and the expert Liberians

E-Libraries, many a times provide free access to books, journals, newspapers, encyclopedias, and other sources. It is an economical option for people who cannot afford. Whereas internet is free except scholarly material. The library has collection of ancient manuscript than the Internet, including Archived materials. Information on the Internet is hard to tell who's telling you what and where is the location of the information.

1.5 NEED OF LIBRARY IN DIGITAL AGE

In today's digital era, with advent of technology and resources available globally, reading in libraries has huge impact children today. At younger age i.e. age group from 2 to 12 years, in which learning starts to develop in a significant and permanent way. In pre-schools, learning through activities, constitute an important part of institutions, are helpful for children to improve their vocabulary, enhances the knowledge, to use words correctly and appropriately, to express their feelings through language, and to develop a love for books and the habit of reading. Library isn't just about books but it's also the activities that the child gets involved in. Urban space or collaborative learning spaces provide free resources, access to professionals, and a variety of other services that benefit children. Most of us feel that the child will inculcate reading through phones and tabs in front of our eyes but reading isn't only enough for a child to grow up. Most important thing for its development is the social interaction. In physical library the kid will get to learn, read and write through the activities performed and new friends made. One of the convenient environments for the advancement of language development skills is Children's Libraries. The library spaces equip individual with lifelong learning and literacy skills enabling them to participate in society.

1.6 PRESERVING THE TREASURE- LIBRARY AS A MUSEUM

In our civilized society, library has a significant meaning where one studies, does researches, references and recreates their thoughts. It is a storehouse of knowledge. Various types of books written by our ancestors are still present in few libraries as a wisdom which reminds of the great thinkers and readers. The holdings of such libraries are priceless heritage of mankind as they preserve facts, thoughts, ideas and evidences of human development which helps the present thinkers and readers to learn and analyze things in a different perspective. Any loss to such precious treasure is simply irreplaceable. Therefore, preserving this cultural heritage becomes the moral responsibility of the librarians or the people in charge. Almost all ancient books are susceptible to decay. As we are aware, apart from paper the books contain various different materials such as cloth, thread, ink, adhesives, etc. All these materials can be a source of nutrition to the living organisms. This leads to the need of protection of books from the factors of deterioration. Just so that one understands better, deterioration is the process of substances gradually becoming inferior in quality or their actual condition after coming in contact with the factors of destruction. Various types of deterioration of paper related materials are cracks, brittleness, shrinkage, dust and dirt accumulation, etc. Hence, for such issues either the books should be kept under some critical observation which doesn't let the originality fade away or the books should be uploaded on some web page which doesn't harm the originality of the book and also the readers can read it efficiently. In such cases E-books are very helpful and convenient for the readers who can't have access to the same in library. Books should be considered as relics and given same importance. And hence the library should be considered as a museum to store the books in the same condition and allow the proper readability factor to the readers. Even though E-books doesn't provide the feeling of different senses such as smell and touch but provides the most important thing which is fruitful reading and grasping the knowledge. Books are our friends and the way we take care of our friends similarly they too should be taken care of as they are valuable and our lifetime companion.

1.7 E- BOOK LIBRARY

As we go back in time, where the books played an important role which acted as a getaway from real world. But now, we see there's innovation of e- book which could be said as the digital library of the new generation. But how is it better than the conventional libraries? When we see the advantages that e- books can give us is a lot which turns out to be sustainable as well. With the increase in population there is more demand of books which means more cutting of trees. But with E-books there is no use of trees but at the same time one can attain the knowledge. Also, e-book has been proven more efficient as during the pandemic no libraries were open but yet one could easily read books through devices. eBooks take up less space. The traditional library space can be actually being used for community center or some other uses. Also, the conventional libraries need monthly maintenance which can be avoided if turned into digital libraries.

1.8 IMPORTANCE OF LIBRARY IN SOCIETY

Public Libraries were always considering as a civic building and placed in a strategic location for betterment of society from a very long era. Ideas of information as a public thought lead to discussions of the role of information and provision in societies libraries provide the basic conditions for lifelong learning, independent decision-making and cultural development of the individuals and social groups. The resources and services offered to create opportunities for learning, support literacy and education in the society and help to shape the new ideas and perspectives that are central to a creative and innovative society. They also help to ensure an authentic record of knowledge created and accumulated by past generations over years. Libraries are rich repositories of historically and culturally significant collections many of which are not available anywhere else in the world. Society needs libraries to preserve records of knowledge created and accumulated by present and past generations for the future generations to gain knowledge. Library is seen as a key element of educational success in the society and the educational success is seen as a key element to the potential life success of everyone.

1.9 IMPACT ON TRADITIONAL LIBRARY IN THE DIGITAL ERA

In olden times, reading books was the common hobby for people which was the only medium available to gain knowledge and spend leisure time. People who had crave to read, were addicted to books and used to eagerly wait for the new editions. Feeling the ambience of sitting in a library and reading books gives a good satisfaction in boredom but those traditions are fading away in these days. Technology brought a drastic change which has become integral part of the society. This makes the life easier and faster. With daily new invention of Smart appliances and voice-controlled assistants explain how technology is upgrading to make life easier.

The way we access and consume information has changed dramatically in the 21st century, and this challenges for physical library systems across the world. Library technology reaches ahead of the library walls via computer networks to put information sources into the hands of users at the point of need. Due to the technological advancements people try to skip visiting library buildings since the needed information are on the fingertips. These may not be majorly affecting the people but have affected to the library sustenance. The traditional librarians may not be skilled to handle the modern technology and there may be less facilities for the traditional libraries to run a digital library. So to survive in this digital era and stay relevant, traditional libraries need to be more innovative & be equipped with more allied functions.

2.1 EVOLUTION OF LIBRARIES

From the conducted research, we can conclude that through the ages, people have always felt the need to document their lives and activities. This documentation ranges from drawings on clay tablets to the vast collections of electronic references that we have today. The initial records included a range of topics including collection, acquisition of materials, arrangement and finding tools, the book trade, the influence of the physical properties of the different scripts, reading materials, language, role in education, rates of literacy, budgets.

It also has led us to study, analyze and learn about the human evolution about everything, learning stage and library itself.

Forms of writing materials have shifted from stone and bronze tablets, to ones made of wood and wax, to papyrus scrolls which were then bound together to form the first books. From hand written manuscripts to books inked by machines with the invention of the printing press, it is appropriate to say that humanity has come a long way. Moreover, while on the subject, we have come to know about the literary advancements through the millennia. Ancient scripts like hieroglyphs and cuneiform have given way to Latin, Greek and Sanskrit alphabets, which then evolved to form the numerous modern languages we use today. We also learned about how each time period has its unique artists and writers, and the variety in their creations.

2.2 Time line of Libraries

Time line of Libraries

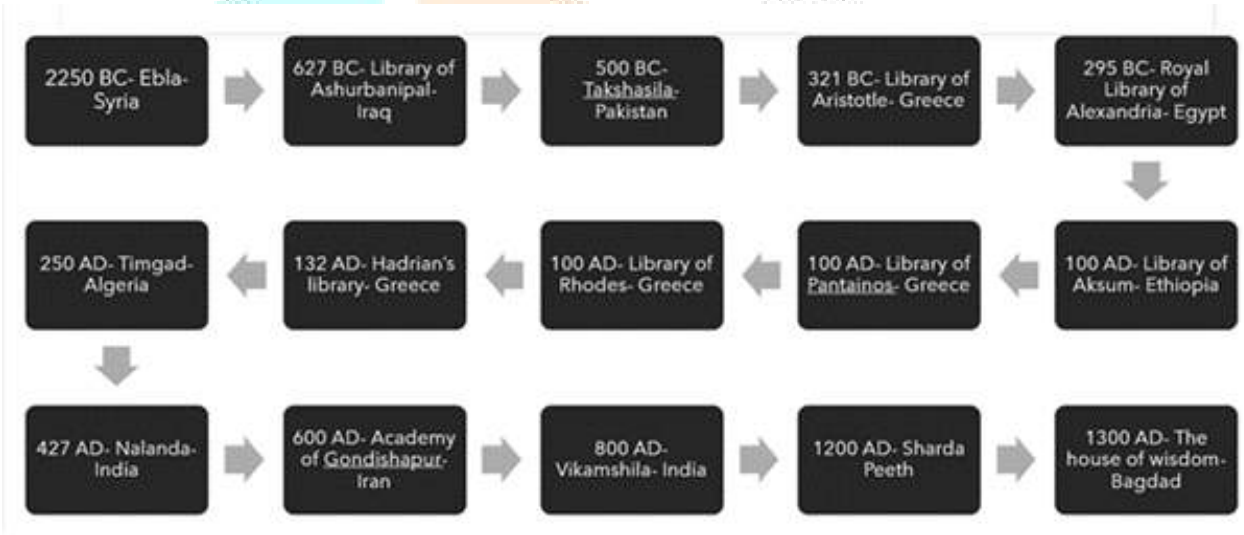


Figure 2.2.1 Time line of libraries

Figure 2.2.1 Time line of artist.

At the same time, the evolution of libraries through the ages in different parts of the world, from the first known Library of Ashurbanipal in Iraq to the plethora[1] of books we now have at our fingertips. Ashurbanipal was known as a martial commander of Iraq who also being literate was a passionate collector of texts and tablets. He hired scholars and scribes to copy texts mainly from Babylonian sources and used war loot to stock his library. The original motive mention "gain possession of rituals and incantations that were vital to maintain his royal power." Around 30,000 tablets and writing boards were found, some of them being severely fragmented. The library can be divided into two groups: historical documents, religious texts, mathematic, epics and myths and legal documents.

Various global interactions have been evolved due to libraries. We have also come across various genres like fiction, science, mathematics, crime, etc. We are given the chance to educate on these genres and learn from them, people aced in the particular field. As long as we exist, there will be a need of recording the wide range of topics that enrich our lives from fiction to politics to

economics. Enabling the global development. We came across Communication, healthy debates, education etc. started across the world on various periods of history and how it changed the world.

3.1 PRESENT SCENARIO OF LIBRARIES

Library is experiencing a massive period of changes. In order to survive, every library has to adapt itself according to the needs of modern information society. It has to correspond not only to informational, communicational but also to cultural, leisure, aesthetical and other community needs, to provide not only traditional library services but to organize non-traditional - cultural and social - activity. To sustain the function of the library, we have to develop today a new multifunctional type of library according to a flexible need where certain percentage of the library space should have integrated with additional social and cultural activity. Libraries have now metamorphosed into digital institutions.

Library architecture needs revival, a combination of some factors of these spheres which interaction gives these buildings certain singularity, very typical for this kind of buildings making it integrated factors as integrated. Integrated library factors - library technology, library functions and information media determine usually the planned spatial solutions of the library, which are in particular the integrated architectural factors. Otherwise, architectural solutions determine the quality of accomplishment of library functions, the rationality of the technological scheme, the character of deployment of information media etc. This integrated space cannot be attached to library science, because the planned spatial solutions of buildings belong to the sphere of competence of architecture. This could be a periphery sphere of two sciences and all points of interactions in this sphere we can name as integrated factors.

Library buildings, which are planned on old norms and standards, do not satisfy today's situation to accommodate allied functions. The modern library has to be multi-functional and shall cater to allied functions like cultural hub, communicational and other extra services as well. The modern library as an open, democratic and intellectual communication institution All architectural solutions of the modern library have to express the image of the library as an open, democratic and intellectual communication institution. Planning of the building has to be flexible and simple the planning of the building has to be flexible and simple in
the general plan. There have to be possibilities of extension or transformation.

4.1 DIGITALIZATION OF LIBRARY

The digitalization of libraries is not a new concept. Opting for digital libraries or physical libraries has always been a controversial topic. Research for the up-gradation of digital libraries and their services has been taken into consideration to initiate new services and technology. The advent of digital resources available in diversified forms like e-journals, e-book, web-blog, information on websites, institutional repositories, etc., have raised challenges for a library to supervise the information resource potentially adapted to the needs of the user. Looking at the literacy rate and the number of people knowing about the digital world, digital services need to be provided at the quickest possible time. This research article, let us review that the digitalization of libraries has made way for innovative services and exploded many issues in the digital library such as infrastructure, creating awareness, providing training to the user community, etc. Future trends point towards the need for extensive research in digital libraries especially in the services aspect and the transformation of libraries as community information centres. With the advance of research and practice, a digital library can extend extensive services.

For a developing country like India, digitalization is both a boon and a curse. Since the country consists of antithetical areas that are the rural and urban zones, the transition from one zone to another transports you to complete different experiences. Digitalization being at its peak in urban cities where every other person has access to technology is a boon. Metro cities like Mumbai, Delhi, Kolkata, Bangalore face a lot of difficulties to cater to the growing population since the amount of habitable space is the same but the number of habitats is growing in number with every passing day. So the need for a physical library is somehow null as compared to its need in the rural sector. In rural areas, a lot of people are uneducated or do not have access to mobile phones or basic technology so digitalizing libraries in these sectors would make no sense as there would be a thin audience to cater to. In this case, a physical library is a boon or in other words, a digital library is a curse. There is comparatively more amount of space in rural areas where you can afford to build physical libraries for all sorts of people.

On a global scale, we have developed and developing nations. Countries like the USA, Canada, Germany can be considered to be developed whereas countries like India, China, Russia are developing. The same analogy of urban and rural areas can be implied here, developed nations being urban areas and developing nations being rural areas.

Digitization is an essential task in modern-day libraries. This will enable it to preserve endangered library resources, improve the efficiency of information search mechanisms and enhance access to library resources. The various ways to search and access library content are created. A strong partnership and collaboration through awareness can lead to better digital libraries.

5 IMPORTANCE OF READING SPACES:

Library in schools, help to build training capacities, such as sentence plan, complement and language structure. It makes students feel like home even in school. Exactly when understudies have a spot to get books, they may will undoubtedly get them, and if getting is allowed, they can take them home and carry on their examining away from school too. Presenting for all to hear to families and friends may seem, by all accounts, to be fairly overpowering from the beginning so a serene space where adolescents can go to develop their capacities is incredible. In the occasion that understudies have a particular premium in a subject like space, and books with respect to this matter are open, they can go to the arrangement space and get some answers concerning it. This will propel a data driven neighborhood need to manufacture their learning, and this angle is critical for their future school mulls over.

5.1 IMPORTANCE OF READING HABITS:

Reading discovers some new information and gain insight. Perusing books on different types gives data and a profound understanding into the subject. Those with great perusing propensities give indications of higher knowledge. Books open the brain with different and plentiful kinds and upgrade innovative abilities and language abilities. Youngster brain science is the investigation of subconscious and cognizant youth improvement. Kid analysts see how a kid collaborates with their folks, themselves, and the world, to comprehend their psychological turn of events.

5.2 PSYCHOLOGICAL IMPACT STUDY

Learning spaces has major impact on the humans psychologically specially on children. It reflects on a wide ranges of topics, influences on behaviour to the socio-cultural development. The following are some of the impacts.

1. Intellectual development
2. Environmental influences
3. Gender Roles
4. Language
5. Personality development
7. General Knowledge
8. Social Interactions

6. (Library building) BODY REMAINS WITHOUT SOUL

With drop on the footfall of the readers, most of the library buildings have closed down, changed its function, is supporting function to another function or structure has adaptive reuse as the soul function, olden library was design for; has changed and in some cases the built form remains without its original function. The several reasons for the same are as follow.

6.1 Obsolete/defunct use of structure:

Since the digital medium as taken over completely, the concept of going to a built form or reading spaces is slowly diminishing. Only old libraries which has collections of old manuscript or huge collection of specific theme are barely surviving in today's times.

6.2 Adaptive reuse:

The cases where the embodied energies of the building are good, the physical form of the building still stands. In most of the cases the new function as over powered the library function, hence reading spaces or library becomes a supportive function to main function. Please refer case studies 7.2.

6.3 Need to club allied function for survival:

In Metropolitan cities like Mumbai, Delhi, etc. where land value, population density is high, the library building's owners find it difficult to sustain the sole function as it is uneconomical. A socio- economic model has to be worked out for survival of physical library in digital era with allied functions such as collaborative spaces. This would retain the original identity of the library with integration of supportive functions which would stand as an example in modern era.

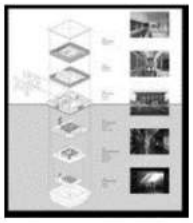
7. COMPARATIVE STUDY OF LIBRARIES

Library acts as catalyst for the mind has to have enough amenities. The libraries all over the country have been documented and analysed on the parameters like built form, functions, location, spaces, ambience, library timings, types of books available, user groups, etc. Among all Lal Bhai library, David Sassoon Library, North Maharashtrian library, etc. stand out prominently due to allied amenities. Some libraries which were not able to adapt with modern technologies lack footfall and stand absolute. Deficiency of designed and defined facilities is a major reason for the lower footfall.

Library comparison improves comprehension by highlighting important details like area, number of books, and other factors more concrete, and reducing the confusion between related concepts. The libraries were divided the first according to the area and footfall and then discussed the orientation and placement of floors/buildings. Libraries located with high population and high school rate have more libraries whereas 20% of the libraries have air-conditioned reading spaces with books, magazines, newspapers, and audio-visual content of important textbooks and CD ROMs as well, meeting and gathering halls. Otherwise semi-urban zones public areas like gyms, shopping centres, stores, and hospitals have libraries as secondary function. Also, 15% of libraries are school libraries out of which city government schools do not even have adequate space to provide children with books and newspapers, and only 10% of libraries enjoy the facility of café and theatres and auditoriums. Libraries are organized according to subjects/dates/alphabets by the field expert. They provide free access to scholarly books, journals, newspapers, encyclopaedias, and other print reference sources. Some libraries like David Sassoon library being the oldest has an amazing collection of books and is up to date while others have not upgraded. The significance of the findings is where Library is known as the best place to study and gain knowledge. Poor reading culture is due to lack reading space and other interesting amenities. Places which have a high population rate with more number of schools have a high percentage of libraries with proper facilities like multi-purpose halls and meeting areas are more likely to be present in libraries.

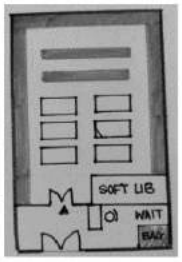
Compassion of Libraries in India

POINTS 1-4	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	AREA/FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS	PLAN
LILAVATI LALBHAI LIBRARY	Reading Halls And Seminar Rooms	• G+2 • 3 Basements	31000 Meter Sq						–	
ERNAKULAM PUBLIC LIBRARY	No	Student's Corner Members Room Ladies And Children's Room General Reading Room Auditorium		150000+ Books English, Malayalam, Hindi, Tamil, Sanskrit, Konkani, French	All Age Group	10am To 7 Pm	Afternoon	Members	–	

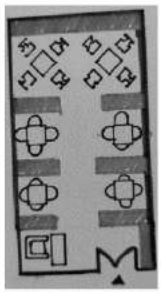


LILAVATI LALBHAI LIBRARY

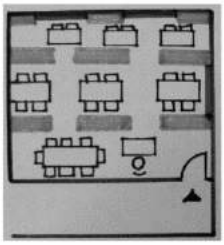
5-10 NAMES	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	AREA/ FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS	PLAN
KALRA SHUKLA LIBRARY GOREGAON	Pantry Facilities Available	–	1500 Sq Ft	Books And Magazines And Other	10 Years	13 Hr Reading Facility	–	Members		
DAVID SASSOON LIBRARY	No			30607 Books And Magazines And Other	–	–	–	–		
PUSTAK BHANDAR	No	–	75-125	Books And Magazines And Other	All		Evening	Localite And Members		
SWARA	No	Reading Rooms Reading Library Law Library Public Library Children Library	180 Sqm	Books	14 And Above	6 Am To 2 Pm	–	–		
NONE	No	–	50-100	Books And NEWSPAPER	–	–	Afternoon And Evening	Localite And Members		



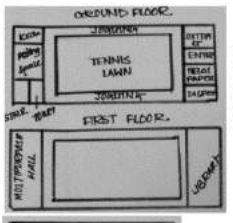
KALRA SHUKLA LIBRARY



PUSTAK BHANDAR



11-15 NAMES	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	ARE A/FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS	PLAN
NORTH MAHARASHTRIAN UNIVERSITY, JALGAON,	Shopping Complex, Health Centre, Hostel, Schools, Sports Complex, Nursery, Etc	G+5, Stack System On 1st And 2nd Floor, Periodical And Reference - 3rd Floor, Soft Library And IT Library		Books, Research Journals, Thesis, Dissertations, Bound Volumes, Newsletters,	All age group Above 18 years	09:00 Am To 01.15 Pm		Students And Staff	Stack I - 1st Floor 000 To 599. Stack II - 2nd Floor 600. Periodical & Reference - 3rd Floor. Textbook And Reading Room. Audio Visual Section	
CHILDREN'S CORNER, SIDDHARTH NAGAR,	Tennis ground, joggers park, a gathering hall	G+1, Ground floor - jogging track, tennis lawn, kids activities, dispensary. 1st floor - multipurpose, library	80 people	Books - philosophy, literature, arts, fiction and personal training	All age group	06:00 am to 08:30 pm	Mornin	Members		
TRILOGY, CHIMBI KOLIWADA, BANDRA WEST	Library cum book store, sea view	Single storey	300 people	Books, Research Journals, Thesis, Dissertations, Bound	All age group		Mornin	Members		
SARVAJANIK VACHNALAYA, NASHIK, MAHARASHTRA	Exhibitions, play at theatre, award functions	G+1, theatre rented for different functions, study hall, museum, video room - educational cassettes are screened her	500 to 600 people	Books in different languages	All age group	08:00 am to 12:00 pm & 04:00 pm to 08:00 pm.	Morning and evening	Members	Different Section For Ladies And Children, A Different Sanskrit Section	
JN PETIT LIBRARY, AZAD MAIDAN, FORT, MUMBAI	Fort	G+3, main library on 1st floor, spacious reading			Above 18 years	07:00 am to 08:30 pm		Members		



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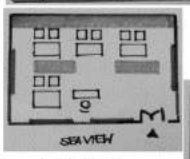

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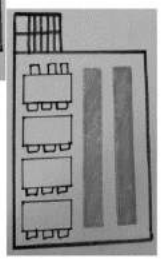

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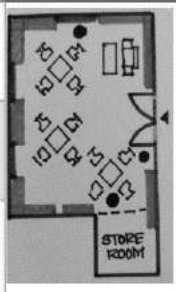
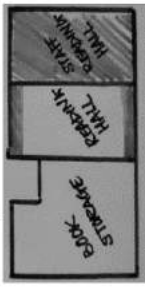
16-20 NAMES	SUPPORT ANY OTHER FUNCTION	STRUCTURE STUDY	AREA/ FOOT FALL	READING MATERIALS	AGE GROUP/ USERS	LIBRARY TIMMINGS	TIME PERIOD OF PEOPLE VISITING	ACCESS TO BOOKS	ARRANGEMENT OF BOOKS
CENTRAL LIBRARY AKOLA	No	• Separate Reading Room • Staff Reading • Paper/News • Digital Library	3000 Sqft	Total No Of Books- 53956 E-books- 4 GB	12 And Above	7.00 A.M To 6 P.M	Afternoon Evening	Localite And Members	–
BHIWANDI LIBRARY	Quarantine Centre For Few Days.	–	200 Foot Fall	–	40 And Above 2-10 Kids	11 Am Opens	Afternoon Evening	Localite And Members	–
ROTARY SCHOOL LIBRARY RATNAGIRI	School	–	1200 Sq.Ft	14000 Books 3 Newspapers 7 Magazines	2-20 And Above For Staff	10:00 Am - 5:00 Pm	–	Only School Kids And Staff	–
ROYAL COLLEGE LIBRARY MIRA ROAD	School And College	2nd Floor Library Rest School	1375 Sq.Ft, 2000 Foot Fall	20,000 Books 60 Periodicals/Journals.	2-20 And Above For Staff	7.30am-6.00pm	–	Only School Kids And Staff	Dewey Decimal Classification (DDC) System.
GYAN VIHAR LIBRARY BORIVALI	Auditorium, Green Rooms And Café .	–		–	18 To 25 Years.	8:00 Am - 10:00 Pm	–	Only Members	–

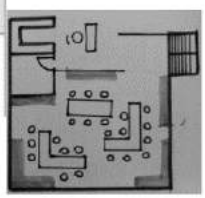
PLAN



BHIWANDI LIBRARY

ROTAARY SCHOOL LIBRARY





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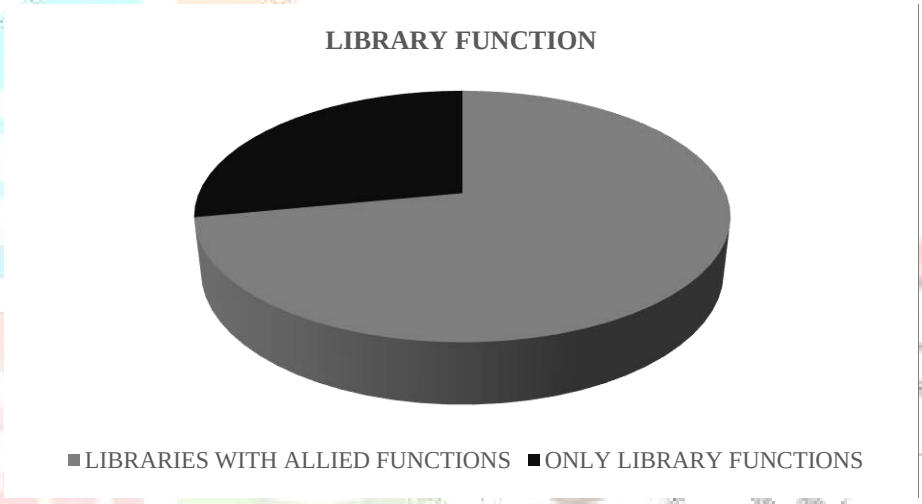

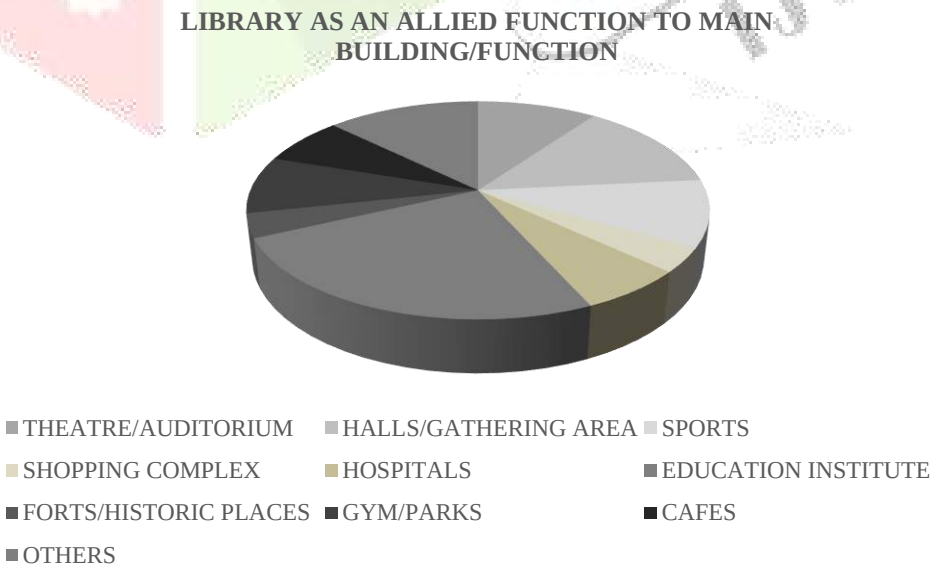

CONCLUSION

This article reviews the current state of library in India, on contemplative practices with children and youth of technology-based generation. It also critically analyzes observations from case study 'library building as plug-in' for eg. Prabondhankar Thackeray where library act as plug-in function. In other case, David Sasoon Library, there are allied activities to main library building which is attracting more customers. Learning from case studies state thoughtful observations used both in treatment settings of physical form of Library buildings and in prevention or enhancing the mental well-being of individual by proposing collaborative learning and interactive integrated spaces under one roof keeping socio-cultural aspect intact. Adaptive reuse of traditional Library buildings, with keeping the base function of reading spaces along with introduction of allied functions which would incorporate the modern practices of learning which is digital based. To cultivate the habit of reading in children and youth, the learning spaces could be made more interactive, creative and interesting that would generate enthusiasm in them. Interventions that nurture mindfulness in learning in children and youth may be a feasible and effective method of building resilience in universal populations. This review suggests that Multi-functional and revenue generating allied functions such as collaborative spaces, meeting and conference hall, etc. integrated with the existing library building may be associated with beneficial outcomes for community, today's state of library is in obsolete and non-economical and hence there is the issue of survival.

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INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

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ABODE FOR WORKING WOMEN IN A METROPOLITIAN CITY

Solicitude regarding issues faced by working women in an alien city.

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Abstract: In today's ever-changing world and with the provision of a bundle of opportunities women are migrating to urban areas for jobs and better living standards. However, even when for innovation, technology, and success the sky is the limit there are yet certain complications when it comes to providing basic rights to a woman. When it comes to working women living in a different city, due social stigma accommodation is a major cause of concern due to security issues, hygiene, and specific facilities for a certain criterion of working women. These issues have been critically analyzed in the research providing solutions on basis of infrastructure and facilities promoting healthy living and a stress-free environment for personal growth. The focal point is creating a space where women may find solace promoting good physical and mental health. The way to deal with that part is to surround yourself with those who feel the same way. An attempt has been made to solve problems faced by single mothers who are the bread earners in the family by provision of daycare facilities within the hostel. Thus, with the availability of space, good infrastructure and optimum facilities can help achieve remarkable development not only for women but also for the nation.

Index Terms **- Solace, Security, Opportunities, women empowerment architecture**

I. INTRODUCTION

With the ever-increasing financial demands, availability of opportunities and for better living standards there has been an increase in rate of women migration to metropolitan cities in the past few decades. Metropolitan cities have a higher rate of migration for employment, Women are migrating for a better future, But the lack of safe accommodation is concern which is not allowing women to move freely to the cities. The government of India introduced a working women's hostel scheme launched in 6th of April 2017 that is designed for meeting the housing requirements of working or helpless women. To accommodate the women population with security provisions the government has proposed the scheme of working women's hostel. However, there are yet certain important aspects which have been overlooked due to which severe consequences have been faced. After developing in every sector woman are still not safe and face social problems. Majorly these issues are concerned with lack of security, sanitation facilities and mental health. The study focuses on the need to resolve these issues so as to enhance a healthy and contented living space. After critical analysis of the present circumstances, availability of data and articles issued, measures have been suggested to been considered while designing working women's hostel so as to evade the catastrophes promoting safe environment. Studies found that female-specific problems were not the only issue, but rather work-life balance, relationships in the workplace, and gender differences in work roles could also trigger psychiatric disorders. (Karin Hayashi, 2016). Provision of recreational spaces and counselling session have proved to dwindle stress at a considerable rate. More such basic facilities can be incorporated to enhance living standards generating a sense of serenity.

II. AIM

To study spaces and requirements of working women's hostel so as to provide security and hygiene incorporated in spatial planning.

III. SCOPE OF STUDY

This study highlights aspects such as current planning scheme adopted; its impact providing key factors for future planning and implementation.

IV. OBJECTIVE

To study the present scenario of the working women's hostel identifying various aspect in terms of security and hygiene and providing solutions for the same.

V. NEED OF STUDY

To solve problems faced by working women in an alien city and making their habitation more secure and healthy.

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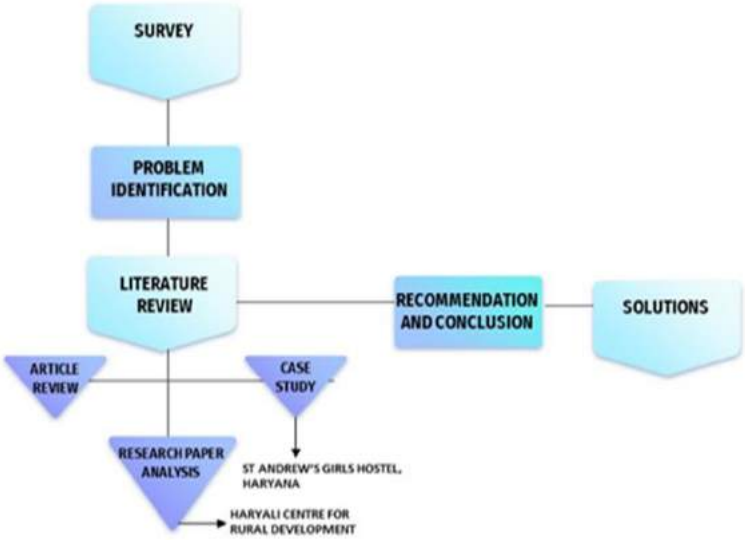
VI. METHODOLOGY

The research commenced with survey followed by analysis of problems with reference to previous research papers and recent articles giving solutions with each problem identified. The research proceeded as follows.

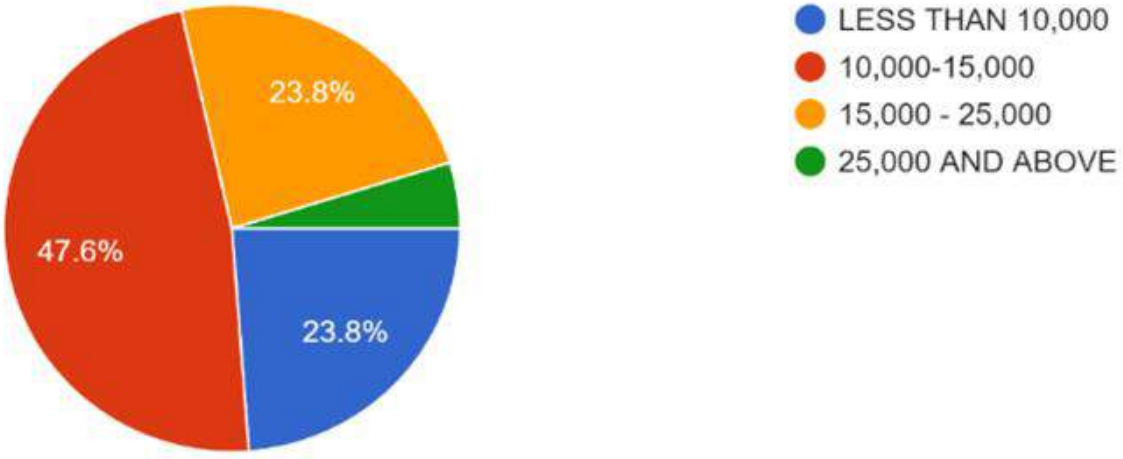


VII. SURVEY

The following research questions will be studied in the process of investigation –

1. Whether proper security and protection is provided to the Working Women staying as inmates in these hostels?
2. What are the problems faced by the inmates of these hostels?
3. Whether sufficient staff is appointed to take care of the routine management and administration of these hostels.
4. What is the impact on personal and family life of working Women staying in these hostels?

According to the survey, around 47.60 % of women choose to stay in a place which cost about INR -10,000-15,000 per month.



Most of the women who comes from a middle-class family likely stays in a hostel ranging from ₹10000-15000 which is quiet cost effective. Very few women can afford hostels ranging from ₹25000 and above. Hence majority of women prefer to stay in a low-priced hostel.

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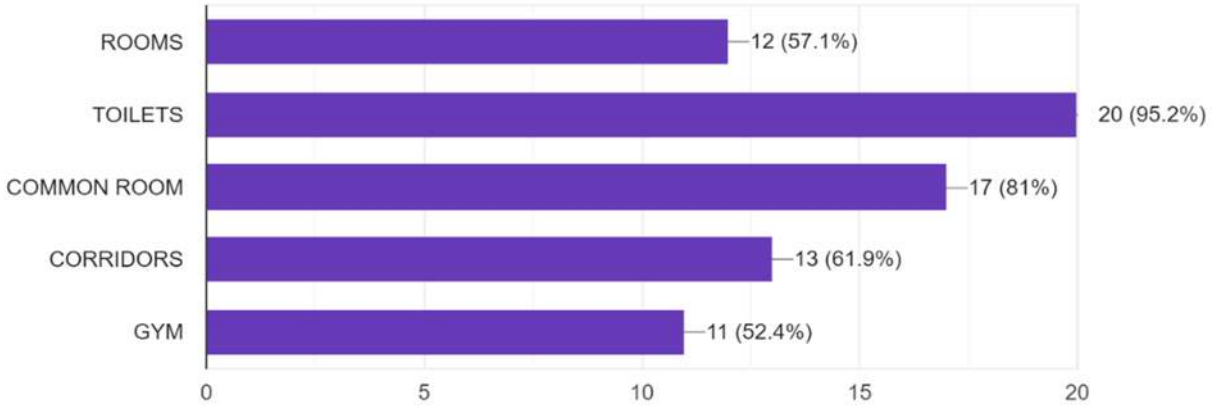
Hygiene Level in Different Spaces in Women Accommodation



Majority of women believe that the hostel's toilet should be the cleanest place. For women's sanitization plays a major role in their personal life and for that toilets should be prioritized in a hostel.

Conclusion: -

1) This survey concludes that according to women's their hostel does not provide enough security which is a major concern. There are very less hostels which provides high security.
2) The majority of the women believe that a room entry card is necessary.
3) According to the results of a study, most women prefer double rooms with attached toilets to single rooms with attached toilets.
4) According to the survey 72% of women's feel that all the facilities are functioning well in the hostel. Good facilities can be helpful for women's refreshments and to cease their boredom.

VIII. CASE STUDY

i. AIM:

To study a space that is specific to women by understanding their psychology, needs and activity.

ii. OBJECTIVE: -

a) To keep the building cool and create shaded spaces inside, each brick was to be rotated.
b) At a specific angle to block solar radiations. Main objective was to provide recreational spaces and interactive spaces in courtyards and bridges for women to sit, relax and enjoy.

iii. OBSERVATION: -

a) Climate sensitivity was an important parameter, followed by solar radiation and air movement analysis in order to develop a second skin on the facade that allowed thermal insulation and light permeability.
b) Solar radiation and direct heat gain on facade are minimized by rotating angles of blocks. Direct and diffused radiations were reduced by 70% on the principal facade by doing this.
c) Brick jali is used which gives the facade character and texture.
d) The main design challenge was to build a safe haven for the girls — a campus inside a campus that fit into the urban master plan and allowed them to travel freely while maintaining a link to nature.

iv. THINGS THAT COULD HAVE BEEN BETTER:

a) Security could be measure of concern as there are no walls only parapet walls are provided at dead wall side.
b) Rooms do not get enough day light due to over shading.
c) No measurements taken for disabled women.

v. ANALYSIS:

a) The hostel is designed in a way that the indoor and outdoor spaces connect physically as well as visually at different levels.
b) The planning of staircase and façade plays a major role as the staircase are hubs for social interactions.

IX. RESEARCH PAPER ANALYSIS

Scope and Coverage of the Study At present there are about 830 Working Women's Hostels constructed under the Working Women Hostel scheme of Department of Women and Child Development throughout the country in 25 states and 5 union Territories. Out of this the project in hand is proposed to cover Working Women's Hostels in Four adjoining states of Maharashtra, Gujrat, Madhya Pradesh, and Andhra Pradesh were covered under this project. There are about 236 Working Women's Hostels in these states and the break-up is as under – (1) Andhra Pradesh -38 (2) Gujrat -26 (3) Madhya Pradesh -60 (4) Maharashtra -112.

Construction of building in accordance with approved plan the hostel managements were asked as to whether the hostel buildings were constructed in accordance with the plan approved by the government. It is evident from the data indicated in the above table that out of 183 hostel managements about 96 per cent confirmed that their hostel building is constructed in accordance with the approved plan. However, in 4 per cent of the cases hostel buildings were not constructed in accordance with the approved plan and some significant variations were noted. By and large, in majority of the cases (about 96 percent) the hostel buildings are constructed as per the approved plan. (Evaluation of Working women's Hostels In The states Of Andra Pradesh, Gujarat, Madhya Pradesh and

Mahrashtra).Medical Facility Guidelines of the scheme suggest that the hostel managements should make the arrangement of doctors for consultation for the inmates. In response to the question whether the management has made such type of arrangements, all the hostel managements have stated that there is provision of visiting doctor, in some cases the doctor's clinic is within the vicinity, and further referral services are provided through Government and Private Hospitals.

FACILITIES OF DAY CARE CENTER FOR CHILDREN IN HOSTEL BUILDING - There is a provision of Day-Care centers in the WWH Scheme. The management of hostel may provide Day-Care center for children of working- women, having intake capacity for 25 to 30 pre-school children. Minimum floor space of 20 sq. ft. per child should made available and should have 2-3 rooms of 150 sq. ft. each with a kitchen, a washroom, and a lavatory each of 50% sq. ft. in a city and one room of about 150 sq. ft. with a small washroom in a rural area. (Evaluation of Working women's Hostels In The states Of Andra Pradesh, Gujarat, Madhya Pradesh and Mahrashtra) The data pertaining to Day-Care center was sought from the hostel management. The details are given below.
The distribution clearly indicates that out of 183 hostel managements about 29 per cent of the hostel managements have provided the facility of Day Care Centre for children in hostel building or attached to it. It is observed that about 71 per cent of the hostel management have not provided the facility of Day Care center for children. It can see that in majority (71 per cent) of the cases the hostels do not have Day -Care center facility for the children of working- women.

SR.NO.	ATTACHED TO HOSTEL	FREQUENCY	PERCENTAGE
1.	YES	53	29.17
2.	NO	130	70.83
	TOTAL	183	100.00

The distribution clearly indicates that out of 183 hostel managements about 29 per cent of the hostel managements have provided the facility of Day Care Centre for children in hostel building or attached to it. It is observed that about 71 per cent of the hostel management have not provided the facility of Day Care centre for children. It can see that in majority (71 per cent) of the cases the hostels do not have Day -Care centre facility for the children of working- women.

After critically analysing previous research papers which were specifically dedicated towards highlighting issues faced by females who are living in working women hostel, following key factors have been identified.

1. Number of hostels to be established – Housing too many women is no easy job. However, the central government has approved the construction of 70,000 working hostels for women to meet the demand for housing. As a first step toward achieving the target, construction on 938 has already begun.
2. Day Care Centre – Working mothers are unable to bring their children to their place of employment. The hostel administration will also provide Day Care facilities to assist such mothers. When their mothers are not present, the children will be cared for here. The service will be charged separately. (Working Women Hostel Scheme - PRADHAN MANTRI YOJANA, 2017)

Provisions for People with Disabilities - The scheme has a provision for differently abled working women to be accommodated. However, only a few hostels complied with this requirement and provided the specialized services needed by the disabled. Close supervision by the hostel management committee to ensure that reservations and services for the differently abled are accessible. (HARYALI CENTRE FOR RURAL DEVELOPMENT, February , 2017)

Security Arrangements

To ensure the safety and security of the women, 79 percent of the sample functional hostels have specialist security services. Surat's hostel lacks advanced security facilities.

CCTVs

To ensure women's safety and protection, several states have proposed installing CCTVs on entry and exit routes of hostels with recording capabilities. It was discovered that 50% of hostels have a CCTV system. Around 44% of hostels have CCTV on the main entrance, 44% have it at the office entrance, and 43% have it all over the hostel grounds. Working women's hostels were preferred by 82 percent of respondents because they were more comfortable than other accessible lodging options. (HARYALI CENTRE FOR RURAL DEVELOPMENT, February , 2017).The hostels were often located in safe areas in the heart of cities that were well connected, and security guards were provided. Furthermore, there was increased security as a result of the large number of women living together in a household, as well as security and other personnel such as the warden. Regardless of the scheme proposed by the government certain rules and regulations have been deliberately overlooked which have proven to cause adversity which have affected standard of living to a great magnitude.

Some of the issues are listed follow:

i. 210 women live during a space meant to accommodate 60 at the govt Working Women's hostel (GWWH) at Suryaraopet in Vijayawada.
ii. The hostel, however, has absence of proper facilities and services like clean washrooms, permanent cooks, helpers, watchmen etc. Total money charged is 1584, out of which Rs 960 is that the mess and dining charge and therefore the left over Rs 624 is that the hostel charge.
iii. The hostel lacks fundamental amenities like adequate fire safety equipment and first aid kit. Two 4.5kg expired fire extinguishers are available at the hostel. The sanitary pad dispensing unit is never reloaded, and hence it remains unutilized.

iv. There are 16 washrooms on each floor with shattered tiles and doors, which are to be used by 105 women. Only eight of them are in proper condition. The rooms, very small and tiny in size, each accustoms three girls. At present there are no beds, and hence the women need to sleep on the ground.
v. The sanitation is poor. The washroom drains get blocked once every month. Some doors do not have bolts, some washrooms don't even have doors. In summer, there is a shortage of water. (Srinivas, 2017)
vi. Absence of security guards at the entrance. The students and therefore the women employees staying in our hostel can leave and enter freely. Even they need not sign in any register (Srinivas, 2017)
vii. Expressing concern over the poor maintenance of the working women's hostel, the student unions demanded the State government taking immediate measures to run it on proper lines. The local police should strengthen security within the hostel area to guard the lady inmates from the threat of eve-teasers and stalkers, the unions said. (Anjaneyulu, 2016)

X.CONCLUSIONS & RECOMMENDATIONS:

The Hostel Management Committees are functioning property in majority of the hostels. However, only about 50 percent of the of the managements are submitting quarterly report to the Government.

i. It is observed that there is no regular annual inspection of the hostels either by the State Government or by the Central Government. Only about 50percent of the hostels were inspected so far by the Inspection committees appointed by State/ Central Government.
ii. About 91 percent of the Working Women Hostels are not getting any maintenance grant from the government. As a result, the managements are charging higher fees and collecting charges at higher rates from the inmates.
iii. A large majority of the Working Women residing in the hostels are unmarried and only 24 percent are married. They belong to different religious and casts and represent different social and economic sections of the society.
iv. The proportion of women hostelers coming from nuclear family set up is slightly higher than those from joint family set-up.
v. A large majority of women preferred to stay in hostels because they felt more secure and protected in these hostels.
vi. The average monthly expenditure of working women on room rent of the hostel was reported to be Rs. 300 which they said was reasonable. However, the average monthly expenditure on mess charges (food) was much higher.
vii. In almost all the cases the women hostelers reported that their stay in the hostels has enriched their life as far as the physical, psychological, social, and economic aspects are concerned. However, some of them also reported a negative impact like feeling of loneliness, insecurity, and criticism by relatives (HARYALI CENTRE FOR RURAL DEVELOPMENT, February , 2017)
viii. The community leaders reported that the facilities in the hostels were satisfactory but not up the mark, hostels were not properly maintained, the buildings were not in good condition, the quality of food served to the inmates was poor and there was no proper arrangement of health care of the inmates.

XI. SOLUTIONS

The entry/ exit of the hostel plot should be given towards the street which incorporate maximum activity and circulation day and night.

i. The spaces incorporated within the site should enhance interaction with people as well as landscape (nature).
ii. Landscape should incorporate enough water bodies as they play an important role in enhancing the landscape by sound and texture, creating sense of harmony which promotes mental health.
iii. For security purposes following aspects must be strictly inculcated / incorporated:
iv. Sufficient number of security cameras (CCTV)
v. The common facilities(public) and the rooms (private) should be designed in such a way that they maintain specific distance and alignment to serve the purpose of providing privacy and so that circulation is not interrupted.
vi. Sanitary and plumbing fixtures should be maintained at regular intervals.
vii. Hygiene should be strictly maintained in areas such as kitchen, dining, corridors, pantries, and toilets. This can be accomplished by sanitizing the spaces at least once in three months.
viii. Meditation spaces and sport spaces should be provided to enhance physical and mental growth.

XII.ACKNOWLEDGEMENT:

The research analysis and discussion was held as apart of teaching studio, where the following Heni Chandrani, Nidhi Gada, Akshata Gawade, Hrithik Kamdar, Haseeb Khan, Divya Koli, Harsh Patel, Jay Patel, Jhanvi Zinjuvadiya, Isha Kosambia of 3rd year B.Arch course were actively involved in formulation of the paper, data collection ,survey and analysis.

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Significance of Stakeholder participation & feedback in redesign of Urban parks - A case study of Veer Savarkar Udyaan, Borivali, Mumbai.

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Abstract

Urban green spaces are the extensions of the natural environment and provide the necessary breathing space within the everyday claustrophobia of the city. Well-planned and designed open spaces, particularly green spaces, have numerous positive influences on urban life. They contribute to the healthy development of the city and create buffer zones between different use areas within the city. An important part of the urban ecosystem, urban parks are essential to improve the quality of life of a society especially in the rapidly increasing urbanization. Ensuring community participation in planning and designing urban parks creates an impact on increasing use of such areas. Observing how people use the park and evaluating the perceptions is important in terms of how to design a park to make it a successful place.

This study is an exemplary study for stakeholder participation & its significance in the redesigning of urban parks, in case of the Veer Savarkar Udyaan, in Mumbai.

In this context, internal & external inputs were considered and during the design process, interviews & survey, within the framework of “stakeholder participatory design approach”, were conducted, with the users of the park.

The results of this study validate that the participatory design process affects the stakeholder involvement & satisfaction, in a positive way and the cohesive design so achieved is adopted by the users voluntarily. Thus, it can be concluded that the participatory design process plays a key role in ensuring user satisfaction.

Key words

urban park, stakeholders, stakeholder participation, survey, park use behaviour, park use demand.

Urban Parks

An urban park is a park in cities which offer recreation and green space to residents of, and visitors to, the municipality. The design, operation and maintenance is usually done by local government agencies, but may occasionally be contracted out to a park conservancy, friends of group, or private sector company[1].

Urban Parks are seen as objects of urban regeneration and are also tangible entities, publicly lived and owned by everyone. Parks, as sustainable urban spaces, when well-integrated in the urban fabric, evoke a new ecological aesthetic, reclaims the natural systems for the vicinity, assists the indoor-outdoor amalgamation, promotes well-being, ecological integrity, construction and maintenance cost adaptation, and the mitigation of a wide range of negative impacts over the city life and environment (Tate, 2001)[2]. It also accentuates the need for an activity-based strategy, able to deal with a creative and sensitive management of parks as urban spaces (Farinha-Marques, 2006)[3]. The urban park, with more space available, offers the opportunity to provide & integrate breathing space in response to the needs of a dense urban life.

As per the Indian housing ministry's 2014 Urban and Regional Development Plan Formulation and Implementation (URDPFI) guidelines, open spaces fall under three categories: recreational space, organised green space, and other common open spaces (such as vacant lands/open spaces including floodplains and forest cover in plain areas)[4]. All urban local bodies use the URDPFI guidelines for land-use planning. Open spaces include the various Development Plan reservations such as Recreation Grounds (RG), Play Grounds (PG), Parks (P) & Garden's (G). It is the primary responsibility and duty of the Corporation to maintain all the open reserved spaces with citizens participation and various collaborative models in-order to ensure public access and use for their designated purposes.

About Mumbai & its open spaces

Mumbai has evolved from a natural archipelago to its present amalgamated land form and is India's most-populous city. With the rising urban development and to cater the requirements of the growing migrating population; every square inch of Mumbai's land is used, and it accelerates day by day. It has become increasingly difficult to find a bit of greenery amidst the clusters of concrete towers that have dominated the cityscape. The city, as India's financial capital, is spread over 604 square kilometres and, according to the 2011 census[5], is home a population of 12 million. Having sufficient accessible green open spaces is a crucial ingredient to create "sustainable cities and communities," as per the UN's Sustainable Development Goals[6]. Mumbai has an abysmal 1.24 square metres of accessible open space per person[7].

Mumbai has been divided into 24 administrative wards under BrihanMumbai Municipal Corporation (BMC). For the convenience of city administration, wards have been decentralized. Each ward has its own ward office with the Ward Officer who is responsible for the municipal services under his area. Administratively, in Mumbai, urban parks fall under the jurisdiction of their respective ward-offices, who look after the maintenance & sustenance of these parks.

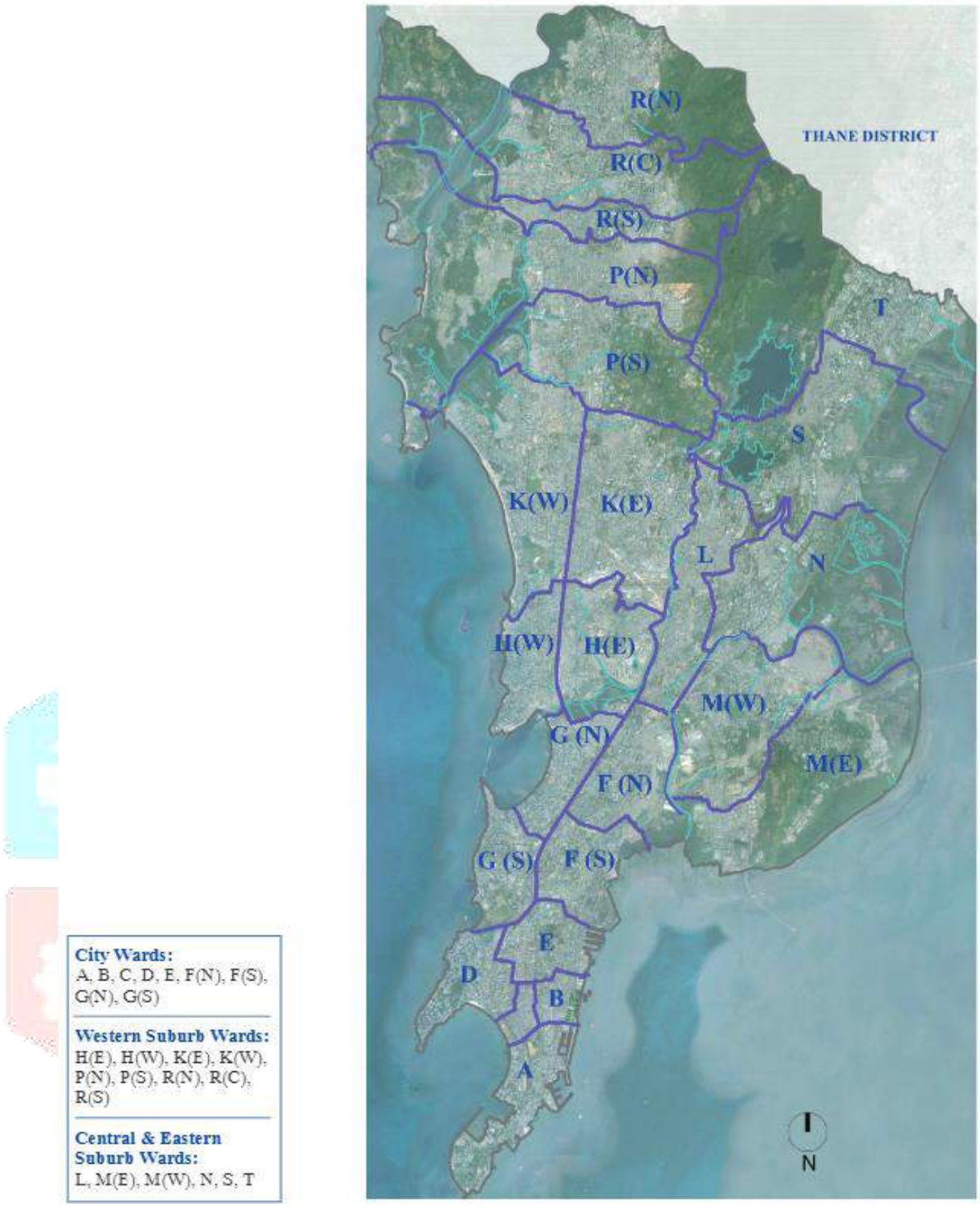

Image 1 – Mumbai Ward Map
(P K Das and Associates (August, 2011) Mumbai's Open spaces – Mas and a preliminary listing document. Mumbai, India. Available at www.pkdas.com.

Borivali & its Urban Parks

The suburb of Borivali, which lies in the northwestern region of Mumbai, falls under the central part of “R” ward and has high density residential development, and many educational institutes.

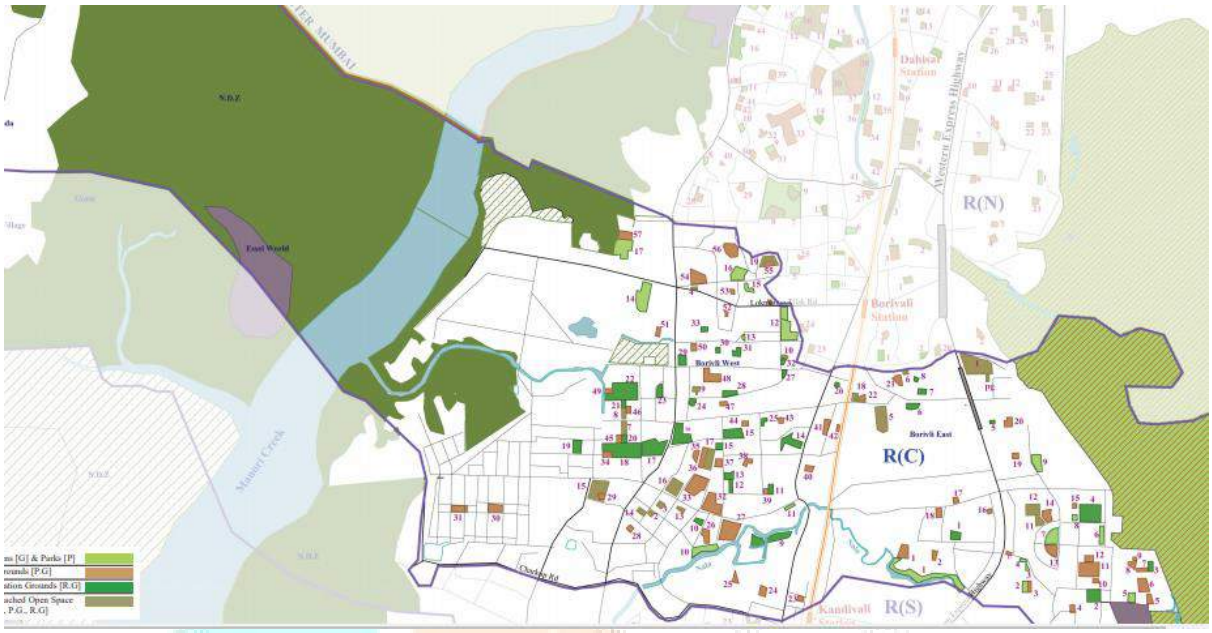

Image 2 – R Ward - Open areas
(P K Das and Associates (August, 2011) Mumbai’s Open spaces – Mas and a preliminary listing document. Mumbai, India. Available at www.pkdas.com.

The suburb is blessed to have within its core; two important urban parks, namely the Veer Savarkar Udyaan (2006)[8] and Borivali Sanskrutik Kendra Van Vihar (1994)[9].

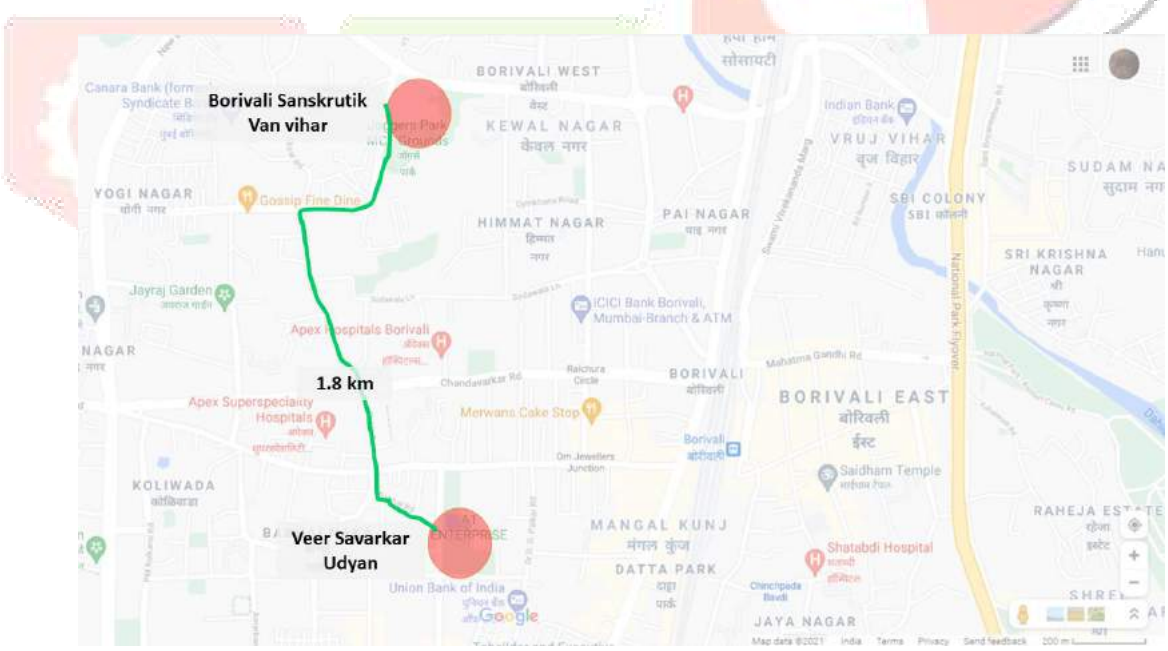

Image 3 – Google image reference of both the parks & the distance between them

The following comparison of the two parks, lying in close proximity to each other (less than 2 kms. away), differ in some of the aspects with regards to their usage.

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Table 1 – Comparison of both the urban parks based on listed parameters.

PARAMETERS	VEER SAVARKAR UDYAAN	BORIVALI SANSKRUTIK KENDRA VAN VIHAR
Opened in year	2006	1994
No of registered users (approx)	2500	1000
Area (Sq M)	25,395	9500 (approx)
Open on Days	All days	All days
Timings	6:00 AM - 10:00 PM	7:00 AM - 9:30 PM
Total open hours (daily)	16 hours	14.5 hours
Activities	Walking/ jogging track	Natural Joggers Track
	Temple	Green grass track
	Children's play area	Yoga training area
	Senior Citizen's park	students' study area
	Lawn	Senior citizen's & Housewives Interaction area
	Boating Lake (man-made pond)	Open Auditorium (1000 pax) (Gyaan Sagar)
	Open air gym	
	Open Auditorium	
	Skating Rink & dashing cars	
	Badminton court	
	Yoga training area	
	Amphitheatre	
	Library	
	Jungle themed kid's play area	
	Activity plaza	
	Football ground	
Facilities/ Amenities	Toilets (2 Nos)	Toilets (1 Nos)
	Drinking Water Cooler (2 Nos)	Drinking Water Cooler (1 Nos)
	Piped Background music in the entire premises	
Accessibility	No provisions for Universal design	No provisions for Universal design
Parking availability	No provisions within the premises	No provisions within the premises

The Borivali Sanskrutik Kendra Van Vihar is more of a natural habitat for the flora and fauna whereas the Veer Savarkar Udyaan is essentially a man-made recreational activity urban park.

Though the operational timings for both the parks are similar, the Veer Savarkar Udyaan has an added advantage as it starts earlier which is beneficial for early morning risers and provides a wider range of activities.

About Veer Savarkar Udyaan, Borivali

The Veer Savarkar Udyaan, about 1.6 kms from Borivali West Railway Station, is located in the heart of the suburb in the Gautam Nagar area and is accessible by vehicular roads along the North, West & the Southern boundary of the plot, having an area of 25,395 sq. mtrs[10] and is an open park offering multiple options of recreation for different groups based on age, interests, activities and

preferences of individuals. The park is designed to offer a wide range of activities including various gathering and seating areas, lake with boating facility with an overlooking pavilion, children's play area, skating rink, amphitheatre, special yoga rooms, library, grandparent's corner, badminton area, outdoor gym equipment area and pedestrian walkway with piped music being played across the premises. The park receives increasing attention and valuation as it forms a significant community asset and serves as a place of refuge amidst the densely populated residential area.

As an urban park, the need to understand Veer Savarkar Udyaan's significance in the socio-cultural fabric of the suburb, is important, especially from the perspective of the users. Understanding the user demographics, temporal usage patterns, annual activity mapping, park use behaviour, park use demands and available facilities is pertinent to analyse and improve the park's efficacy in providing user comfort and satisfaction.

Image 4 – Aerial view of the park

Image 5 - Entry to the Udyaan from the West

Image 6 - Entry to the Udyaan from the South

Stakeholders

The term stakeholder in any project, refers to a tool or set of tools for generating knowledge from an individual or a group or organization, to understand their behavior, intentions, interrelations, and interests; and for assessing the influence and resources they bring to bear on decision-making or implementation processes and in turn may be affected by a decision, activity, or outcome of a project[11].

With reference to the Veer Savarkar Udyaan, based on the engagement, three key stakeholders identified are the designer, the user, and the implementing agency. All the three groups participate in the entire process to ensure the outcomes meet all demands & expectations. The designer facilitates the entire process; however, the user and the implementing agency are crucial in the success of the project.

The stakeholder analysis is used to increase chances of project success during its preparation, implementation, and during or after project completion for its evaluation. It is applied in the interconnected areas of policymaking, strategic and operational management, and project implementation[12].

Ensuring stakeholder participation in planning and designing or redesigning of existing urban parks improves the usability of such spaces, amongst the residents/ users. To provide a positive contribution to urban life and adoption of design, it is important for the user to be involved & actively participate in the design of the environment to cater to their own benefits.

Veer Savarkar Udyaan's redesign proposal is modelled on a stakeholder participation model. In this context, the process run with the stakeholder participatory design approach (Fig. 1) is discussed further.

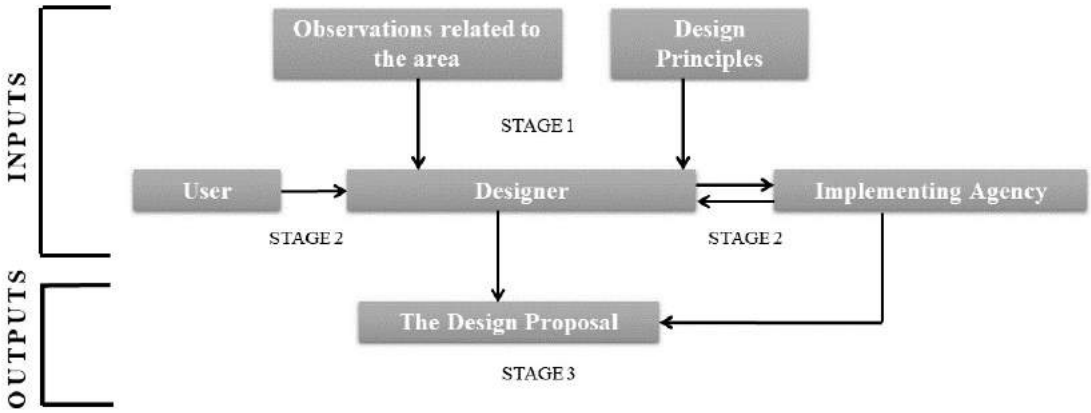

Figure 1 - The chart of the project process.

In the chart of the project process conducted with the stakeholder participatory approach technique, the inputs which included the internal and external data providers and the outputs of the process are shown. Designer's observations made on the existing area and activities, define the internal inputs and demands of the users and implementing agency constitute external inputs to the designer.

The design proposal is the output of the process.

Process - Stage 1

In the first stage, the physical data related to the area have been compiled with observations and design principles, which are the internal inputs.

Physical survey (see Appendix A for full survey questionnaire) of the park, along with the spaces & activities currently accommodated within the park premises were documented. Activities were monitored and studied at different time intervals within a single day. This monitoring was carried out over a period, to identify the common patterns of usage based on age and gender.

This examination incorporated methods of observation of use, activity, and behaviour mapping. The observations and behaviour mapping were conducted during December 2020. The fieldwork was organized for four periods of the day (morning, noon, afternoon, and evening).

The on-site interviews were conducted through Microsoft Forms application, using a Tablet, to facilitate on site responses. Alternatively, a database of email addresses of the park users, shared by the park's implementing agency, were emailed a copy of the survey form, to record their responses.

Image 7 - Existing Site Conditions supported with images of Veer Savarkar Udyaan.

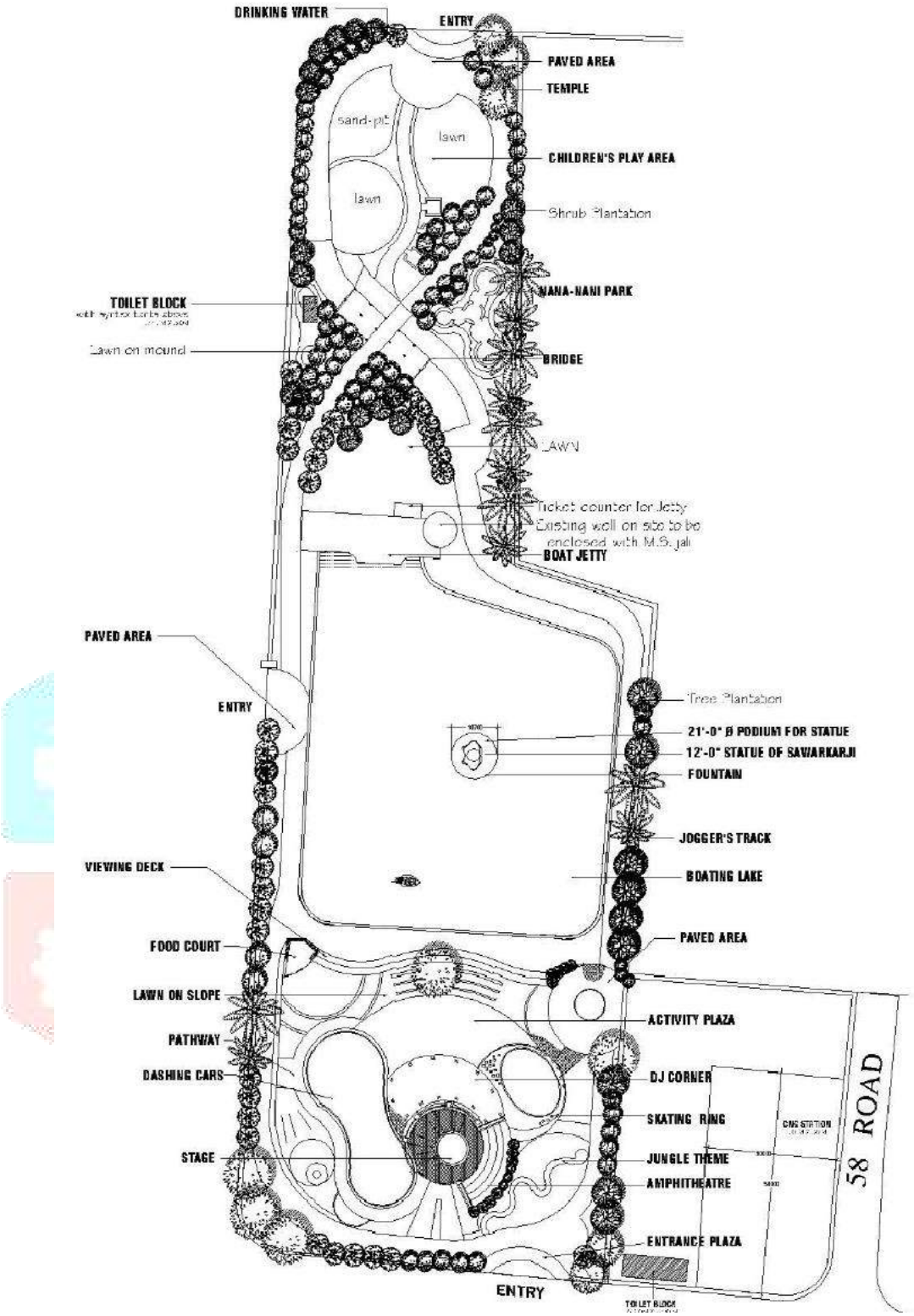

Image 8 - Existing Site layout plan of Veer Savarkar Udyaan

Designer's Observations (on site)

- Mornings 6:00 AM - 7:30 AM witnessed a higher percentage of people from the age group of 18 yrs to 70 yrs., inclusive of young adults, office-goers & senior citizens, to use spaces for fitness & exercise, did not have a high percentage of house-wives, women or children.

- Evenings are mostly utilized by community groups for interaction and children


Image 9 (left) & 10 (right) - Users using the park in the evening

- Several facilities like the amphitheatre, seating pavilions etc are under utilized.

Image 11 - Underutilized pavilion facing the boating lake

- Seating benches have been provided in excess, near the north entrance, hampering the space for joggers

Image 11 - Underutilized & excessive number of seating spaces provided, blocking the jogging pathway

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- Lack of provisions for universal accessibility.

Image 12 - Inadequate provisions for universal accessibility

- Elements like benches, pavers, other street furniture are not maintained

Image 13 (left) & 14 (right) - Non-maintenance of facilities & installations

- Civic facilities like the Toilets are not adequate & are not maintained well, no provisions for feeding booths or diaper-change areas for babies.

- Inadequate artificial lighting in the park premises, especially hampering late evening usage of the spaces. Damaged electrical provisions.

Image 15 (left) & 16 (right) - Inadequate artificial lighting & non-maintained installation

- Library - inadequate reading space, inadequate lighting & natural ventilation hampers usage of the facility.

Image 17 -Inadequate space, lighting & ventilation in Library space

- No dedicated cycling track or provision of cycle parking & cyclists.

- Open-air gymnasium equipment installation crowded in a smaller space and only installed at one location in the entire park, leading to crowding and queuing of people, eager to use the same.

Image 18 - Crowded spots with limited installations & more users trying the use them.

- Amphitheatre is devoid of any acoustical treatment & echo is experienced in the space, hindering the usage of the space.

Image 19 - Lack of proper acoustics within the amphitheatre

- Lack of seating in shaded areas and unshaded hardscape areas

Image 20 (left) & 21 (right) -Lack of seating in shaded areas.

- The peripheral railing for the boating lake does not encourage people experiencing the water body and has multiple rows of barricading.

Image 22 - multiple levels of barricading towards the boating lake edge

Process - Stage 2

In the next stage, a survey interface for the receipt of users' demands, expectations, and feedback on existing facilities, was created. As a result of this, the users have been included in the redesign process, and having a say in the redesign process, which impacts them directly, is provided. Also, it is aimed to ensure public participation by taking user demands or expectations through the survey.

The questionnaire related to the area is important for the determination of.

- User profile (by which part of the community is the park used).
- The strengths and weaknesses of the park besides the observations; and
- Demands and expectations related to the redesign of the park.

The questionnaire form was prepared as short as possible to keep it goal oriented. After the first section which receives personal information as gender, age, occupation & proximity to the park, following questions were asked:

- The frequency of use of the park by the respondents.
- With whom the respondents use the park (Family, children, friends, etc.)
- accessibility of the park.
- Time zone of the park use.
- The security of the park.
- Unchanged properties of the park.
- Liked/unliked properties of the park.
- Sufficiency level of the services in the park.
- Entry fee charges to the park & increase in the same.
- Requested uses and facilities in the park in future.

Answers in the form of priority ranking have been sought when open and closed-ended questions are formulated.

The survey was conducted in the park with approximately 100 respondents, selected by random sampling method, across people of all age groups, occupation, gender, resident, or visitor, during the different time of the day.

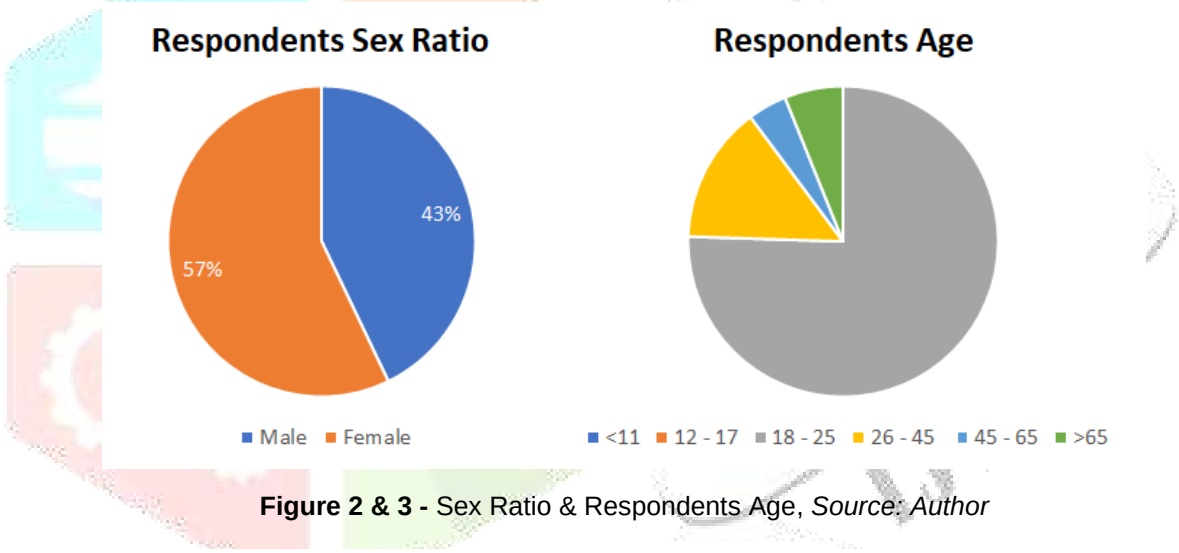

Figure 2 & 3 - Sex Ratio & Respondents Age, *Source: Author*

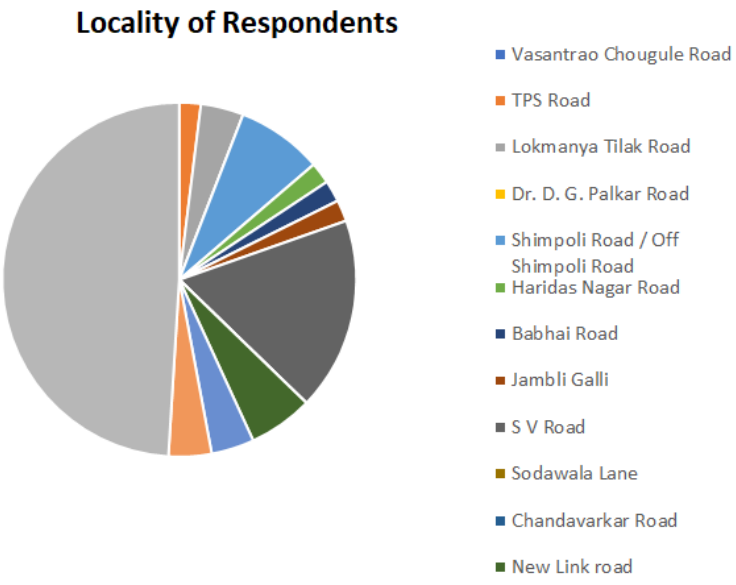

Figure 4 - User Locality, *Source: Author*

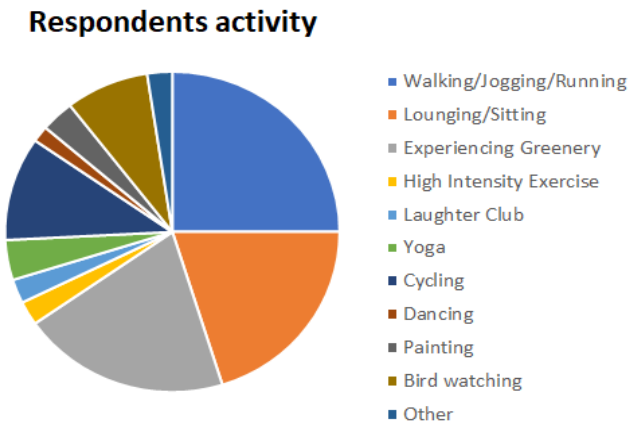

Figure 5 - User Activity, *Source: Author*

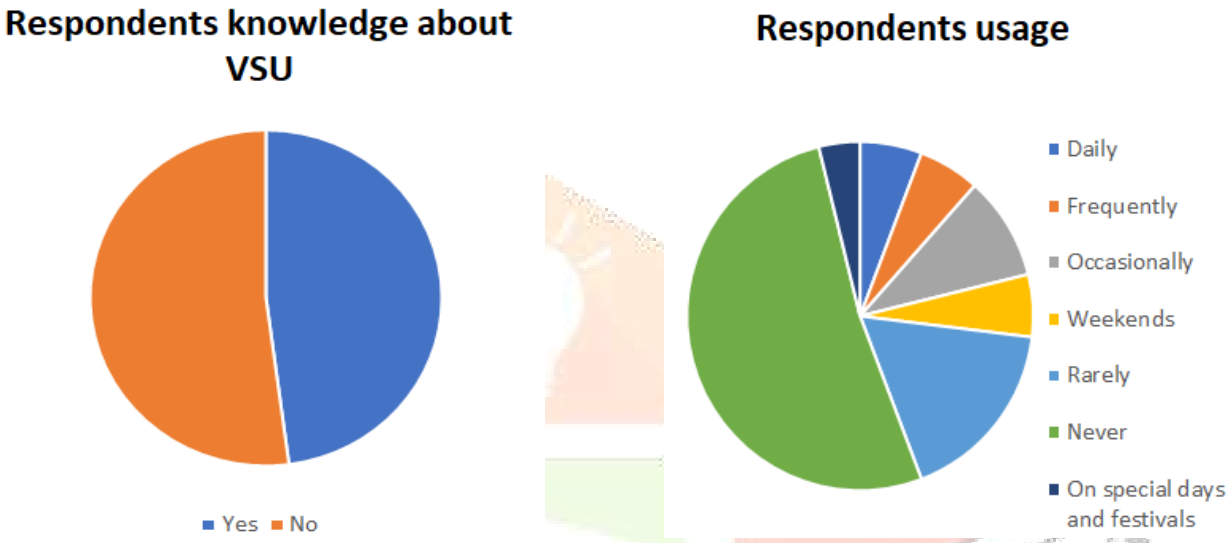

Figure 6 (left) & 7 (right) - User knowledge & Activity Pattern, *Source: Author*

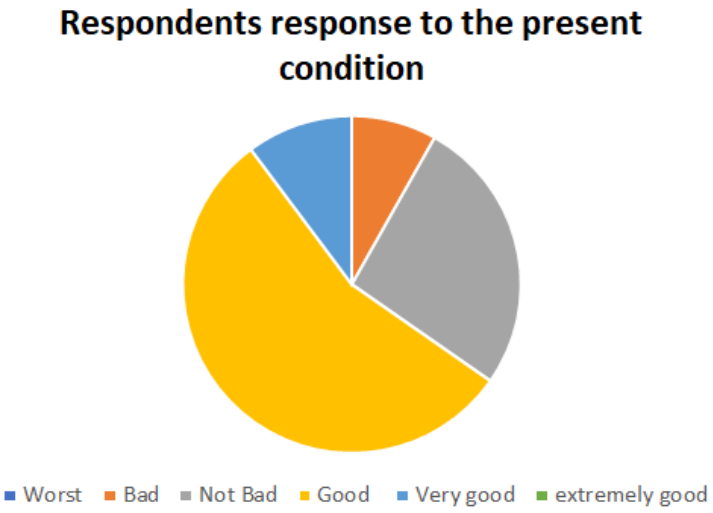

Figure 8 - User Present experience, *Source: Author*

Figure 9 (left) & 10 (right) - User Basic Facilities, *Source: Author*

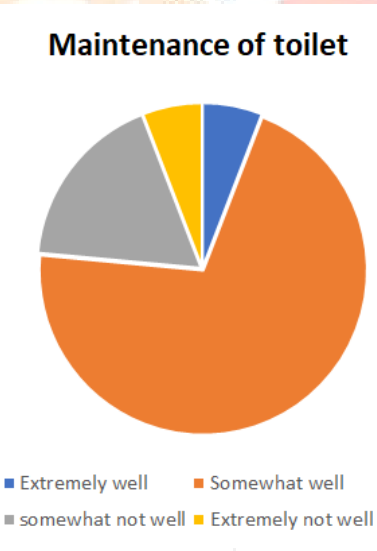

Figure 11 - User Basic Facilities, *Source: Author*

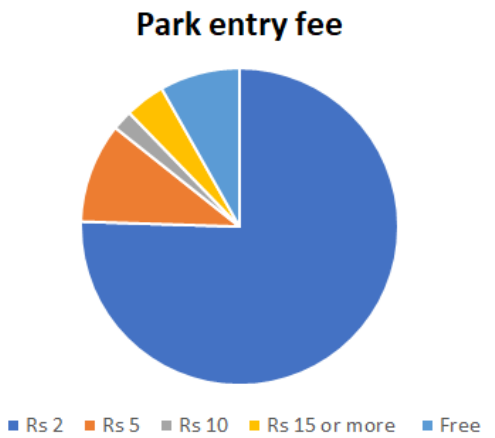

Figure 12 (left) & 13 (right) - User Opinion of Park Entry Fee & Increase in Fee, *Source: Author*.

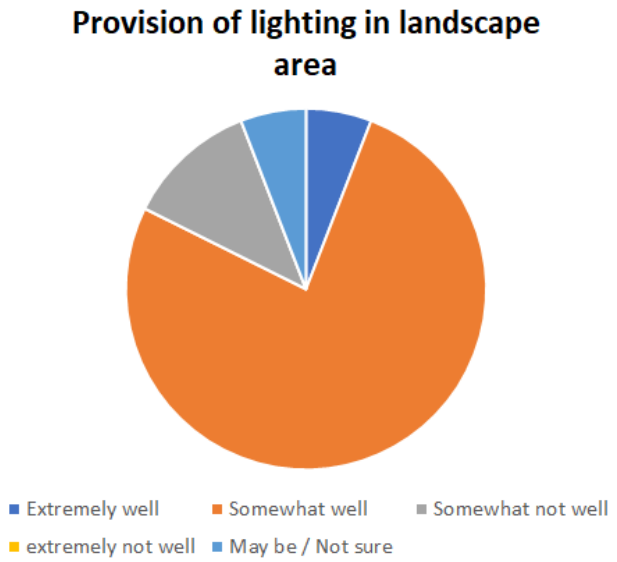

Figure 14 - User Opinion about Lighting in Park, *Source: Author*

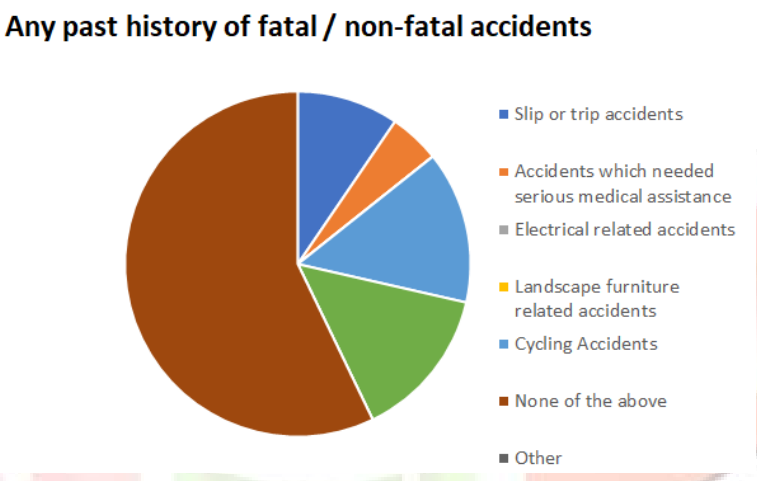

Figure 15 - User Experience of past accidents, *Source: Author*

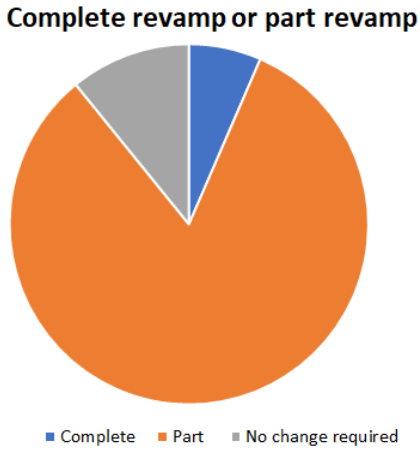

Figure 16- User Opinion for Revamp, *Source: Author*

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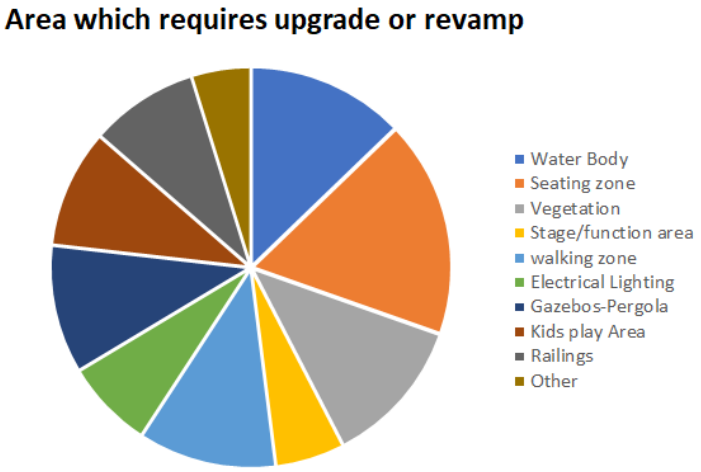

Figure 17- User Poll for Revamp & Upgrade, *Source: Author*

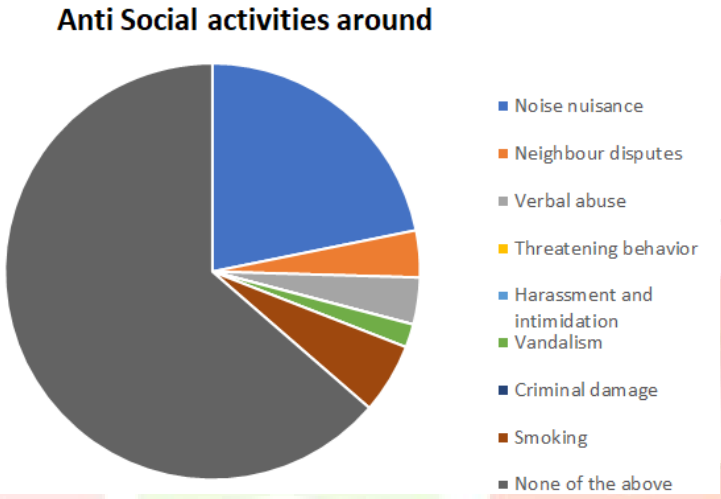

Figure 18- User opinion on Anti-social activities in & around the park, *Source: Author*

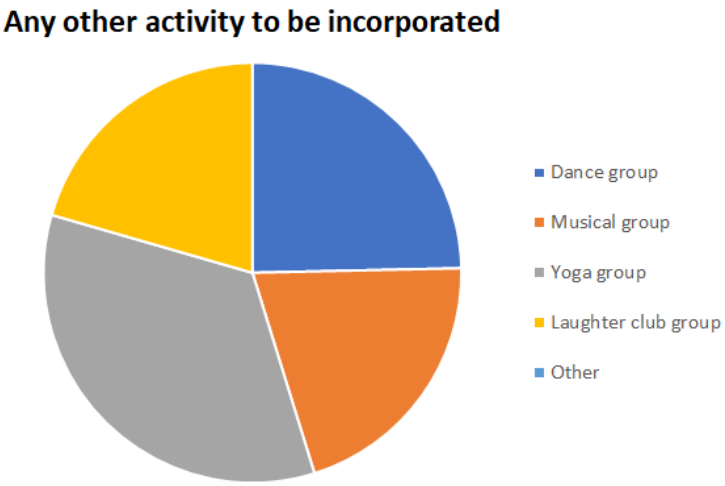

Figure 19 - User Opinion for Activity to be Involved Survey Response of VSU.

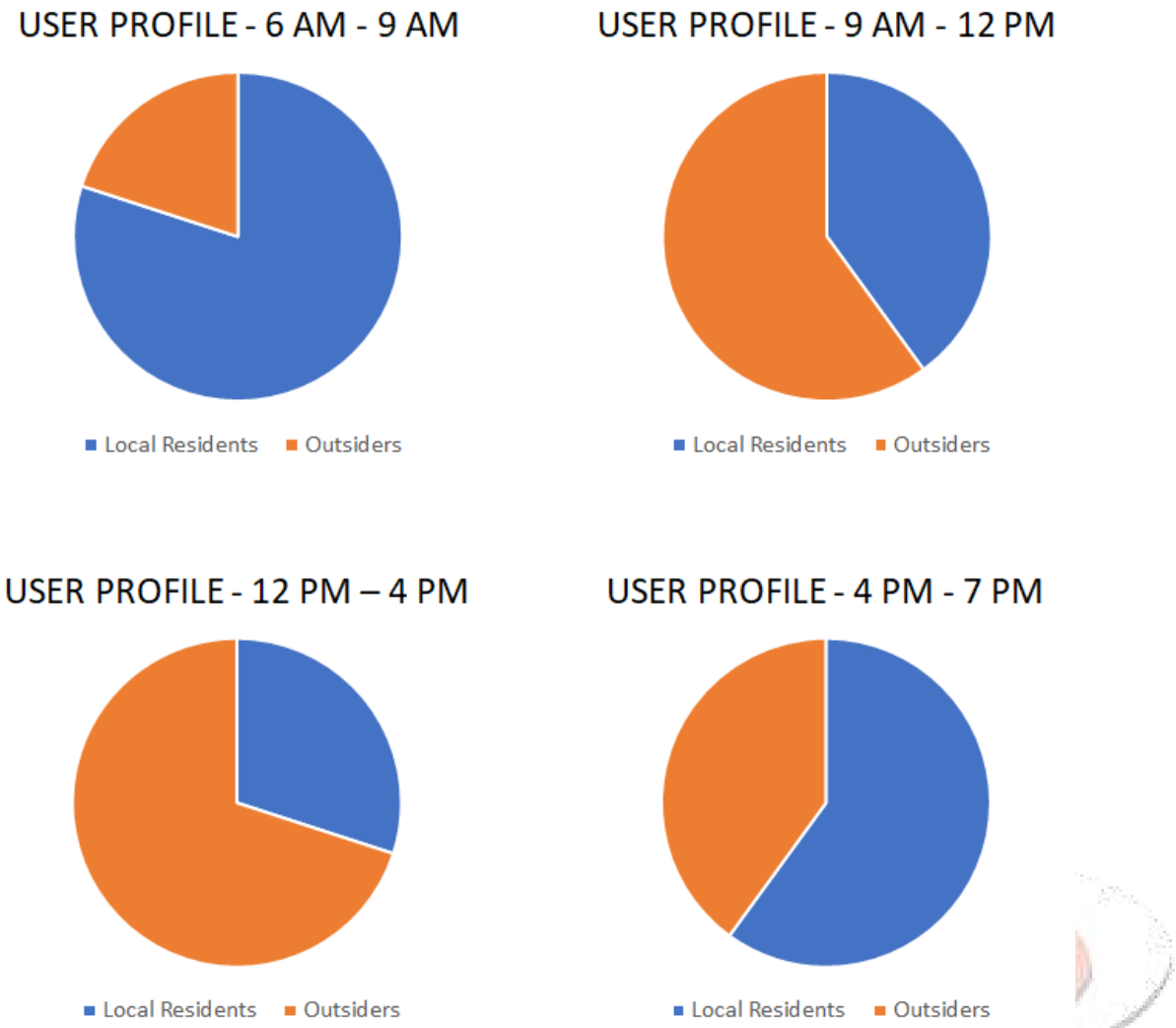

Figure 20 - User Profile with respect to time zone of the day Survey Response of VSU.

Survey Responses

SR.NO.	OBSERVATIONS	INFERENCES	SUGGESTIONS
1	Female respondents is more than 10% greater than male user group		
2	Predominantly the younger generation are actively participating in the usage and review of the VSU premises.		
	The park is majorly used by the senior citizens in the early morning hours whereas the younger people prefer going there during evenings.		
3	Majority of the users are not local and have listed their area of residence 'OTHER'.	Since the users agree predominantly college going age group they may be studying at institutes located near VSU and are visiting before or after college hours.	Study group facilities can be provided.
4	Currently none of the respondents and their family members are having any disabilities	Starting from the main entry the park requires universal design strategies to be implemented	
5	Primary activities fitness (walking, jogging, running, cycling) and recreation (lounging, sitting & bird watching)		
6	The awareness about VSU is lesser amongst the local residents than amongst outsiders		
7	Locals residents are rarely visiting the park		
8	Majority of the respondents appear to be satisfied with VSU		
9	Fee structure needs ot be reviewed since there is significant variation in the responses.		
10	Majority of the respondents were aware of the the availability of wash rooms		
11	Majority of the respondents are not using the toilets		
12	Majority of the respondents expect better hygiene and cleanliness in the washrooms		

13	Majority of the respondents expect better artificial lighting conditions		
14	As per responses, very few accidents were reported. The ones that are reported are primarily with regard to cycling, tripping and animal/insects issues.	Separate cycling track needs to be provided to ensure safety of all user & adequate measures need to be planned for controlling pests and insects.	
15	Majority responses are positive towards developing parts of the Park rather than the whole.		
16	As per the responses the primary areas that require revamp are Seating, water body & vegetation. Additionally pathways, railings, gazebos & kids play areas also require upgradation		
17	Predominantly the responses show that the park is safe and the primary nuisance is noise.	Adequate planting needs to be provided to create buffer on the periphery to prevent outside noise and quite areas need to be designate within the park to minimize disturbance to passive activities.	
18	The respondents have shown interest in the inclusion of specific activities such as yoga & laughter clubs as well as music and dance groups	Designated zones for quite activities to eb provided separate from other loud activities.	

In addition to the user demands and internal inputs such as design principles and observations made on the area, demands of the implementing agency added to the process as external inputs. The adoption of the basic principles of the design by the implementer through face-to-face meetings were aimed. Demands of the implementer are shaped by the needs of the city and the area in accordance with their own vision.

The expectations of the implementing agency listed the addition of a nature's trail within the park, to engage young children to identify & learn about various flora & fauna, assess the scope of reintroducing boating within the lake, which is currently defunct due to maintenance issues. Dedicated zone with a mural celebrating the life & efforts of martyr Veer Savarkar, after whom the park has been named, was to be added in the premises.

Process - Stage 3

To derive appropriate & accurate design solutions, it is imperative to assess all the findings & observations of the input data received.

Preliminary findings show that users find the park to be pleasant and attractive in general, yet, many negative aspects emerged. Generally, users pointed out the lack of trees and shade, the lack of care, the excess of constructed elements and unfinished places as the main negative aspects

of the park. Conversely, playgrounds, circular pathways and shady settings seem to be very much appreciated. Overall, users were more critical about maintenance and safety issues, finding them more important than the visual qualities of the park, in response to social and their own needs. Even so, their suggestions towards the improvement of the park seemed to point mostly towards the aspects related to the usability.

The survey findings provide very important contributions in the process of identifying the problems. Results confirming the observations made by the design team have created an important input for the project. Insufficiency of shaded seating areas and park facilities, planting problems and lack of maintenance of the park were highlighted and expectations were presented for solution by stakeholders.

The majority of the park users are essentially involved in physical activity, which is consistent with the fact that the most occupied areas in the entire park are pathways, outdoor gymnasium and shaded activity areas. The presence of trees and shade opportunities seem to be seen as one of the greatest benefits of the park. The sitting areas, especially when they are not in the shade, seem to be less preferred than the shaded areas. Additionally, lack of boating activity or use of the boating lake for any kind of recreation emerged as another negative aspect.

The sedentary users seem to prefer the sitting areas by the boating lake; under the trees, which provide appealing shades; or those by the pathways.

General design suggestions for the design proposal includes the following:

- Sturdier benches and better street furniture
- Better lighting and signage
- Better equipped and multiple outdoor gym facilities
- Amphitheatre with better acoustics,
- Solar trees
- Energy saving measures
- Herbal garden
- Solid waste management for the waste generated within the park
- Better, sturdier & more exciting children's play equipment
- Dedicated Bicycle/tricycle loop with cycle parking space
- Seating enhancing experience of the boating lake
- Nature & Butterfly Park

Conclusion

Before the design proposal, it was determined that the park was used efficiently by the people in the vicinity, including women, young people, and children due to variety of activities present. However, the lacuna in the accessibility and homogenous use of all spaces was a challenge to improve the efficiency of the park. The changing process initiated by the implementing agency, started from identification of the problems, has been continued with incorporation of the user into the design with "stakeholder participatory design approach" adopted by the designer.

In the design proposal, the user profile is expanded with increased variety of specific user-group based activities, the sufficiency of facilities and finally the park shall become a beautiful place of freedom, recreation and restoration, grounded in local realities, cultural and ecologically-oriented, open to the city and to everyone.

The process adopted is applicable and real. The success of the process is associated with faith and commitment of the stakeholders.

It is experienced that especially the participatory design process effect the stakeholder involvement & satisfaction in a positive way and the design is adopted by the users. It can be concluded that the participatory design process plays a key role in ensuring user satisfaction.

This is an exploratory study and thus it requires development. Further analysis of the data and the particularities for each of the parks as well as further fields of research, such as expert evaluation,

will allow a more in-depth tracing of the qualities of the parks and needs and preferences of users, and also in developing a comparative analysis with findings from other similar research.

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Appendix

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ABODE FOR WORKING WOMEN IN A METROPOLITIAN CITY

Solicitude regarding issues faced by working women in an alien city.

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Abstract: In today's ever-changing world and with the provision of a bundle of opportunities women are migrating to urban areas for jobs and better living standards. However, even when for innovation, technology, and success the sky is the limit there are yet certain complications when it comes to providing basic rights to a woman. When it comes to working women living in a different city, due social stigma accommodation is a major cause of concern due to security issues, hygiene, and specific facilities for a certain criterion of working women. These issues have been critically analyzed in the research providing solutions on basis of infrastructure and facilities promoting healthy living and a stress-free environment for personal growth. The focal point is creating a space where women may find solace promoting good physical and mental health. The way to deal with that part is to surround yourself with those who feel the same way. An attempt has been made to solve problems faced by single mothers who are the bread earners in the family by provision of daycare facilities within the hostel. Thus, with the availability of space, good infrastructure and optimum facilities can help achieve remarkable development not only for women but also for the nation.

Index Terms **- Solace, Security, Opportunities, women empowerment architecture**

I. INTRODUCTION

With the ever-increasing financial demands, availability of opportunities and for better living standards there has been an increase in rate of women migration to metropolitan cities in the past few decades. Metropolitan cities have a higher rate of migration for employment, Women are migrating for a better future, But the lack of safe accommodation is concern which is not allowing women to move freely to the cities. The government of India introduced a working women's hostel scheme launched in 6th of April 2017 that is designed for meeting the housing requirements of working or helpless women. To accommodate the women population with security provisions the government has proposed the scheme of working women's hostel. However, there are yet certain important aspects which have been overlooked due to which severe consequences have been faced. After developing in every sector woman are still not safe and face social problems. Majorly these issues are concerned with lack of security, sanitation facilities and mental health. The study focuses on the need to resolve these issues so as to enhance a healthy and contented living space. After critical analysis of the present circumstances, availability of data and articles issued, measures have been suggested to been considered while designing working women's hostel so as to evade the catastrophes promoting safe environment. Studies found that female-specific problems were not the only issue, but rather work-life balance, relationships in the workplace, and gender differences in work roles could also trigger psychiatric disorders. (Karin Hayashi, 2016). Provision of recreational spaces and counselling session have proved to dwindle stress at a considerable rate. More such basic facilities can be incorporated to enhance living standards generating a sense of serenity.

II. AIM

To study spaces and requirements of working women's hostel so as to provide security and hygiene incorporated in spatial planning.

III. SCOPE OF STUDY

This study highlights aspects such as current planning scheme adopted; its impact providing key factors for future planning and implementation.

IV. OBJECTIVE

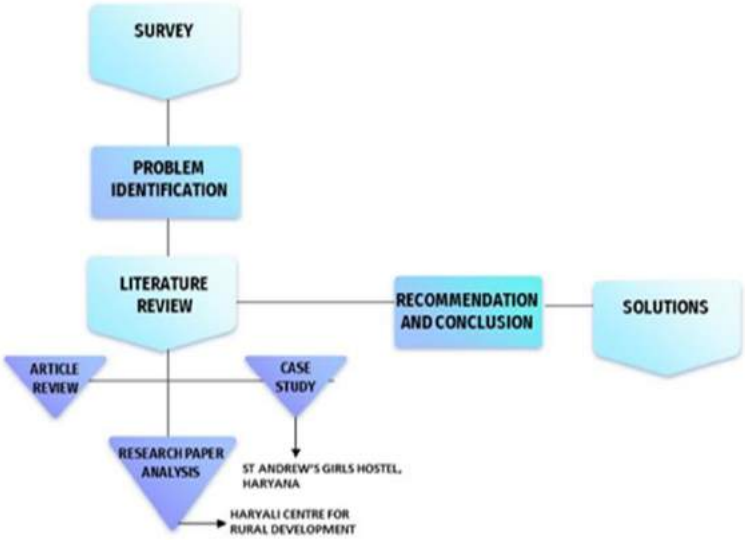
To study the present scenario of the working women's hostel identifying various aspect in terms of security and hygiene and providing solutions for the same.

V. NEED OF STUDY

To solve problems faced by working women in an alien city and making their habitation more secure and healthy.

VI. METHODOLOGY

The research commenced with survey followed by analysis of problems with reference to previous research papers and recent articles giving solutions with each problem identified. The research proceeded as follows.

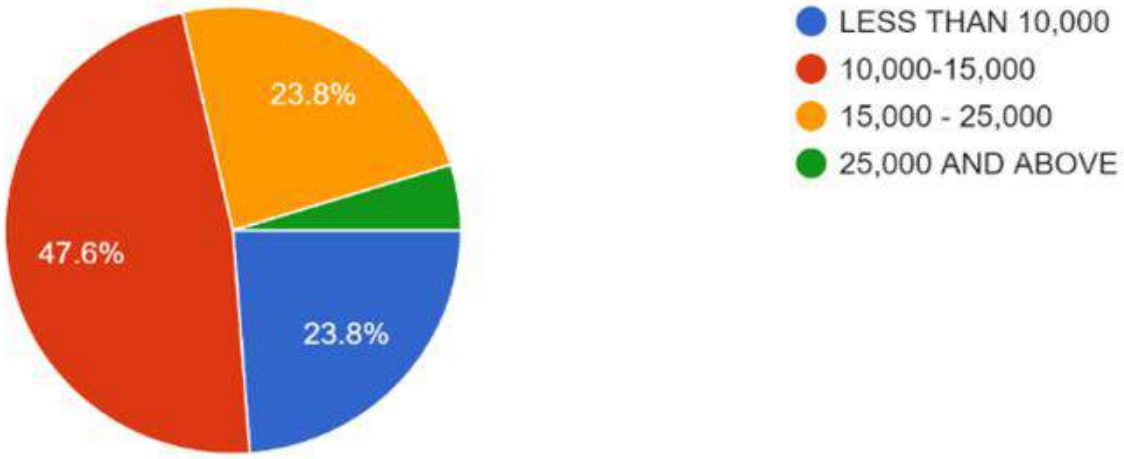


VII. SURVEY

The following research questions will be studied in the process of investigation –

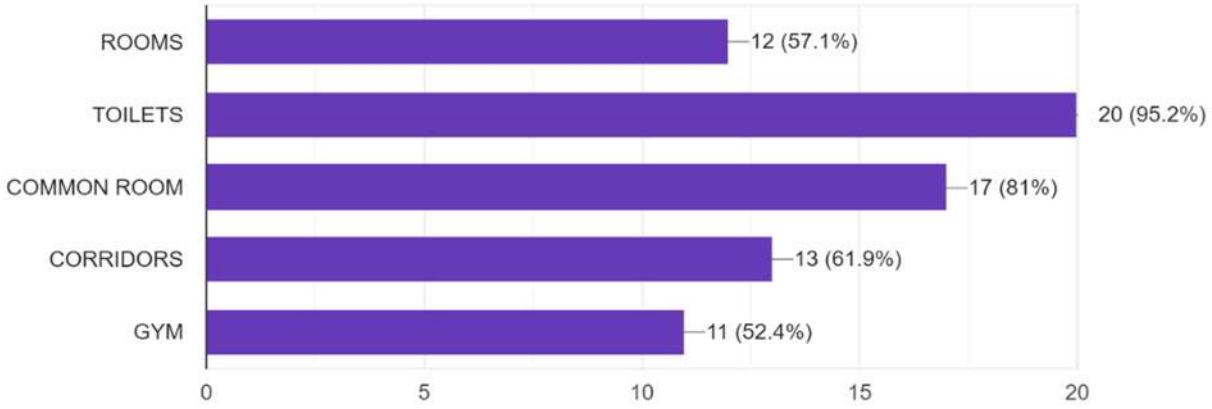
1. Whether proper security and protection is provided to the Working Women staying as inmates in these hostels?
2. What are the problems faced by the inmates of these hostels?
3. Whether sufficient staff is appointed to take care of the routine management and administration of these hostels.
4. What is the impact on personal and family life of working Women staying in these hostels?

According to the survey, around 47.60 % of women choose to stay in a place which cost about INR -10,000-15,000 per month.



Most of the women who comes from a middle-class family likely stays in a hostel ranging from ₹10000-15000 which is quiet cost effective. Very few women can afford hostels ranging from ₹25000 and above. Hence majority of women prefer to stay in a low-priced hostel.

Hygiene Level in Different Spaces in Women Accommodation



Majority of women believe that the hostel's toilet should be the cleanest place. For women's sanitization plays a major role in their personal life and for that toilets should be prioritized in a hostel.

Conclusion: -

1) This survey concludes that according to women's their hostel does not provide enough security which is a major concern. There are very less hostels which provides high security.
2) The majority of the women believe that a room entry card is necessary.
3) According to the results of a study, most women prefer double rooms with attached toilets to single rooms with attached toilets.
4) According to the survey 72% of women's feel that all the facilities are functioning well in the hostel. Good facilities can be helpful for women's refreshments and to cease their boredom.

VIII. CASE STUDY

i. AIM:

To study a space that is specific to women by understanding their psychology, needs and activity.

ii. OBJECTIVE: -

a) To keep the building cool and create shaded spaces inside, each brick was to be rotated.
b) At a specific angle to block solar radiations. Main objective was to provide recreational spaces and interactive spaces in courtyards and bridges for women to sit, relax and enjoy.

iii. OBSERVATION: -

a) Climate sensitivity was an important parameter, followed by solar radiation and air movement analysis in order to develop a second skin on the facade that allowed thermal insulation and light permeability.
b) Solar radiation and direct heat gain on facade are minimized by rotating angles of blocks. Direct and diffused radiations were reduced by 70% on the principal facade by doing this.
c) Brick jali is used which gives the facade character and texture.
d) The main design challenge was to build a safe haven for the girls — a campus inside a campus that fit into the urban master plan and allowed them to travel freely while maintaining a link to nature.

iv. THINGS THAT COULD HAVE BEEN BETTER:

a) Security could be measure of concern as there are no walls only parapet walls are provided at dead wall side.
b) Rooms do not get enough day light due to over shading.
c) No measurements taken for disabled women.

v. ANALYSIS:

a) The hostel is designed in a way that the indoor and outdoor spaces connect physically as well as visually at different levels.
b) The planning of staircase and façade plays a major role as the staircase are hubs for social interactions.

IX. RESEARCH PAPER ANALYSIS

Scope and Coverage of the Study At present there are about 830 Working Women's Hostels constructed under the Working Women Hostel scheme of Department of Women and Child Development throughout the country in 25 states and 5 union Territories. Out of this the project in hand is proposed to cover Working Women's Hostels in Four adjoining states of Maharashtra, Gujrat, Madhya Pradesh, and Andhra Pradesh were covered under this project. There are about 236 Working Women's Hostels in these states and the break-up is as under – (1) Andhra Pradesh -38 (2) Gujrat -26 (3) Madhya Pradesh -60 (4) Maharashtra -112.

Construction of building in accordance with approved plan the hostel managements were asked as to whether the hostel buildings were constructed in accordance with the plan approved by the government. It is evident from the data indicated in the above table that out of 183 hostel managements about 96 per cent confirmed that their hostel building is constructed in accordance with the approved plan. However, in 4 per cent of the cases hostel buildings were not constructed in accordance with the approved plan and some significant variations were noted. By and large, in majority of the cases (about 96 percent) the hostel buildings are constructed as per the approved plan. (Evaluation of Working women's Hostels In The states Of Andra Pradesh, Gujarat, Madhya Pradesh and

Mahrashtra).Medical Facility Guidelines of the scheme suggest that the hostel managements should make the arrangement of doctors for consultation for the inmates. In response to the question whether the management has made such type of arrangements, all the hostel managements have stated that there is provision of visiting doctor, in some cases the doctor's clinic is within the vicinity, and further referral services are provided through Government and Private Hospitals.

FACILITIES OF DAY CARE CENTER FOR CHILDREN IN HOSTEL BUILDING - There is a provision of Day-Care centers in the WWH Scheme. The management of hostel may provide Day-Care center for children of working- women, having intake capacity for 25 to 30 pre-school children. Minimum floor space of 20 sq. ft. per child should made available and should have 2-3 rooms of 150 sq. ft. each with a kitchen, a washroom, and a lavatory each of 50% sq. ft. in a city and one room of about 150 sq. ft. with a small washroom in a rural area. (Evaluation of Working women's Hostels In The states Of Andra Pradesh, Gujarat, Madhya Pradesh and Mahrashtra) The data pertaining to Day-Care center was sought from the hostel management. The details are given below.
The distribution clearly indicates that out of 183 hostel managements about 29 per cent of the hostel managements have provided the facility of Day Care Centre for children in hostel building or attached to it. It is observed that about 71 per cent of the hostel management have not provided the facility of Day Care center for children. It can see that in majority (71 per cent) of the cases the hostels do not have Day -Care center facility for the children of working- women.

SR.NO.	ATTACHED TO HOSTEL	FREQUENCY	PERCENTAGE
1.	YES	53	29.17
2.	NO	130	70.83
	TOTAL	183	100.00

The distribution clearly indicates that out of 183 hostel managements about 29 per cent of the hostel managements have provided the facility of Day Care Centre for children in hostel building or attached to it. It is observed that about 71 per cent of the hostel management have not provided the facility of Day Care centre for children. It can see that in majority (71 per cent) of the cases the hostels do not have Day -Care centre facility for the children of working- women.

After critically analysing previous research papers which were specifically dedicated towards highlighting issues faced by females who are living in working women hostel, following key factors have been identified.

1. Number of hostels to be established – Housing too many women is no easy job. However, the central government has approved the construction of 70,000 working hostels for women to meet the demand for housing. As a first step toward achieving the target, construction on 938 has already begun.
2. Day Care Centre – Working mothers are unable to bring their children to their place of employment. The hostel administration will also provide Day Care facilities to assist such mothers. When their mothers are not present, the children will be cared for here. The service will be charged separately. (Working Women Hostel Scheme - PRADHAN MANTRI YOJANA, 2017)

Provisions for People with Disabilities - The scheme has a provision for differently abled working women to be accommodated. However, only a few hostels complied with this requirement and provided the specialized services needed by the disabled. Close supervision by the hostel management committee to ensure that reservations and services for the differently abled are accessible. (HARYALI CENTRE FOR RURAL DEVELOPMENT, February , 2017)

Security Arrangements

To ensure the safety and security of the women, 79 percent of the sample functional hostels have specialist security services. Surat's hostel lacks advanced security facilities.

CCTVs

To ensure women's safety and protection, several states have proposed installing CCTVs on entry and exit routes of hostels with recording capabilities. It was discovered that 50% of hostels have a CCTV system. Around 44% of hostels have CCTV on the main entrance, 44% have it at the office entrance, and 43% have it all over the hostel grounds. Working women's hostels were preferred by 82 percent of respondents because they were more comfortable than other accessible lodging options. (HARYALI CENTRE FOR RURAL DEVELOPMENT, February , 2017).The hostels were often located in safe areas in the heart of cities that were well connected, and security guards were provided. Furthermore, there was increased security as a result of the large number of women living together in a household, as well as security and other personnel such as the warden. Regardless of the scheme proposed by the government certain rules and regulations have been deliberately overlooked which have proven to cause adversity which have affected standard of living to a great magnitude.

Some of the issues are listed follow:

i. 210 women live during a space meant to accommodate 60 at the govt Working Women's hostel (GWWH) at Suryaraopet in Vijayawada.
ii. The hostel, however, has absence of proper facilities and services like clean washrooms, permanent cooks, helpers, watchmen etc. Total money charged is 1584, out of which Rs 960 is that the mess and dining charge and therefore the left over Rs 624 is that the hostel charge.
iii. The hostel lacks fundamental amenities like adequate fire safety equipment and first aid kit. Two 4.5kg expired fire extinguishers are available at the hostel. The sanitary pad dispensing unit is never reloaded, and hence it remains unutilized.

iv. There are 16 washrooms on each floor with shattered tiles and doors, which are to be used by 105 women. Only eight of them are in proper condition. The rooms, very small and tiny in size, each accustoms three girls. At present there are no beds, and hence the women need to sleep on the ground.
v. The sanitation is poor. The washroom drains get blocked once every month. Some doors do not have bolts, some washrooms don't even have doors. In summer, there is a shortage of water. (Srinivas, 2017)
vi. Absence of security guards at the entrance. The students and therefore the women employees staying in our hostel can leave and enter freely. Even they need not sign in any register (Srinivas, 2017)
vii. Expressing concern over the poor maintenance of the working women's hostel, the student unions demanded the State government taking immediate measures to run it on proper lines. The local police should strengthen security within the hostel area to guard the lady inmates from the threat of eve-teasers and stalkers, the unions said. (Anjaneyulu, 2016)

X. CONCLUSIONS & RECOMMENDATIONS:

The Hostel Management Committees are functioning property in majority of the hostels. However, only about 50 percent of the of the managements are submitting quarterly report to the Government.

i. It is observed that there is no regular annual inspection of the hostels either by the State Government or by the Central Government. Only about 50percent of the hostels were inspected so far by the Inspection committees appointed by State/ Central Government.
ii. About 91 percent of the Working Women Hostels are not getting any maintenance grant from the government. As a result, the managements are charging higher fees and collecting charges at higher rates from the inmates.
iii. A large majority of the Working Women residing in the hostels are unmarried and only 24 percent are married. They belong to different religious and casts and represent different social and economic sections of the society.
iv. The proportion of women hostelers coming from nuclear family set up is slightly higher than those from joint family set-up.
v. A large majority of women preferred to stay in hostels because they felt more secure and protected in these hostels.
vi. The average monthly expenditure of working women on room rent of the hostel was reported to be Rs. 300 which they said was reasonable. However, the average monthly expenditure on mess charges (food) was much higher.
vii. In almost all the cases the women hostelers reported that their stay in the hostels has enriched their life as far as the physical, psychological, social, and economic aspects are concerned. However, some of them also reported a negative impact like feeling of loneliness, insecurity, and criticism by relatives (HARYALI CENTRE FOR RURAL DEVELOPMENT, February , 2017)
viii. The community leaders reported that the facilities in the hostels were satisfactory but not up the mark, hostels were not properly maintained, the buildings were not in good condition, the quality of food served to the inmates was poor and there was no proper arrangement of health care of the inmates.

XI. SOLUTIONS

The entry/ exit of the hostel plot should be given towards the street which incorporate maximum activity and circulation day and night.

i. The spaces incorporated within the site should enhance interaction with people as well as landscape (nature).
ii. Landscape should incorporate enough water bodies as they play an important role in enhancing the landscape by sound and texture, creating sense of harmony which promotes mental health.
iii. For security purposes following aspects must be strictly inculcated / incorporated:
iv. Sufficient number of security cameras (CCTV)
v. The common facilities(public) and the rooms (private) should be designed in such a way that they maintain specific distance and alignment to serve the purpose of providing privacy and so that circulation is not interrupted.
vi. Sanitary and plumbing fixtures should be maintained at regular intervals.
vii. Hygiene should be strictly maintained in areas such as kitchen, dining, corridors, pantries, and toilets. This can be accomplished by sanitizing the spaces at least once in three months.
viii. Meditation spaces and sport spaces should be provided to enhance physical and mental growth.

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FINDING WORKABLE SOLUTIONS TO THE ISSUES ADVERSELY AFFECTING THE CONSERVATION LED REHABILITATION OF BUILT CULTURAL HERITAGE IN INDIA

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Abstract: The primary postulation of this paper is to examine existing urban planning and design strategies and policies in relation to conservation and rehabilitation of residential and commercial built heritage by critical examination of existing case studies in India. An analysis of three case studies – Nizamuddin Basti - Urban Renewal Project led by AKTC, Shekhawati and Pune's historic core, will help achieve the objective of how social, economic, and political conditions affect the state of built fabric and the resident communities living in the vicinity. To validate a case study a "success," certain criteria for evaluation need to be introduced. Based on three case studies, the evaluation criteria will be composed of certain common themes, which are important indicators of positive change, with a few germane variations, which may or may not have an inadvertent effect on the outcome. This paper will carry out detailed comparative analysis of current Indian government policies against successful urban planning, design strategies and policies adopted globally, highlighting the parameters of successful policies such as tax incentives and the means to successfully implement them in residential and commercial built heritage conservation in India. Traditionally, in the Indian context, conservation, and rehabilitation of major built heritage in India has been approached from an antiquarian and archaeological point of view whereas residential and commercial built heritage remains neglected. This built heritage stock has a huge capacity to generate financial benefits to the owners while already contributing to the social identity of the place. Finally, the paper shall also highlight the negative ramifications of demolition of such built heritage to make way for new buildings both environmentally as well as from a socio-economic standpoint.

Keywords: *Conservation, Rehabilitation, Residential and Commercial Built Heritage, Social identity, Socio-economic benefits, Tax incentives, Shekhawati, Nizamuddin Basti Urban Renewal, Pune's historic core*

AN OVERVIEW

When we think about conservation from an Indian lens the most common postulation that comes to our minds is a historic monument like the Humayun's Tomb, the Red Fort, or the Taj Mahal, and rightly so because of how rich the palimpsest of India's history is. The other extreme in this conservation and adaptive re-use rhetoric is heritage hotels – wherein palaces and forts have been converted into hotels. While both examples are correct, they do not actually address the bulk of structures that do indeed meet the criteria deeming them to be historic but are seemingly often ignored or forgotten to the point that they suffer what can be termed as demolition by neglect. It is also important to note in terms of revenue streams – the target audience for most heritage hotels belong to a financially affluent background, meaning in the process of conservation and adaptive re-use of such structures, it is effectively turning its back to more than 2/3rd of the country.

In terms of existing urban planning and design strategies and policies that already exist, there is a lack of attention being paid to this existing building stock, with conservation related information more often than not finding its place towards the end of visioning documents such as Development Plans (if at all), and laws pertaining to conservation related matters being fairly antiquated and still based on their pre-independence roots. Such scenarios then make historic building stock vulnerable to what is known as the builder lobby, who are then able to find loopholes in the law, acquire lands that are unprotected since they fall through the cracks between the tussle of state and central machinery, and develop these lands into modern townships or commercial office complexes that have no connect to the history or social fabric of the place, thereby permanently gentrifying the existing historic fabric. It is therefore pertinent to acknowledge the otherwise neglected residential and commercial built heritage stock and effectively conserve and/or adaptively re-use the structures before it reaches a stage where they become unsalvageable.

AIM / PURPOSE

The primary postulation of this paper is to examine existing urban planning and design strategies and policies in relation to conservation and rehabilitation of residential and commercial built heritage by critical examination of existing case studies in India. An analysis of three case studies – Nizamuddin Basti - Urban Renewal Project led by AKTC, Shekhawati and Pune's historic core, will help achieve the objective of how social, economic, and political conditions affect the state of built fabric and the resident communities living in the vicinity. To validate a case study a "success," certain criteria for evaluation need to be introduced. Based on three case studies, the evaluation criteria will be composed of certain common themes, which are important indicators of positive change, with a few germane variations, which may or may not have an inadvertent effect on the outcome.

CASE STUDY 1: NIZAMUDDIN BASTI URBAN RENEWAL LED BY AKTC INDIA

Nizamuddin Basti, located in the city of New Delhi, is a compact, self-contained urban settlement with high count of landmark structures dating from the 14th to 17th centuries. Due to severe developmental pressures, inadequate social and physical infrastructure has led to the serious decay of the built environment, with heritage structures being impacted in a major way. As a result, the historic settlement is constantly undergoing socioeconomic, political, and spatial changes.

Located in the heart of New Delhi, adjacent to World Heritage Site of the Humayun Tombs, Hazrat Nizamuddin Basti is named after the revered Sufi saint Hazrat Nizamuddin Auliya, who lived here in the early 14th century. This settlement developed during the saint's lifetime and it has been continuously inhabited ever since. Hazrat Nizamuddin Basti is the densest ensemble of medieval Islamic buildings in India, occupied by a vibrant local community with 700 years of living heritage.

This case study like many other historic cities in India represents a concentration of a large number of abject poor in urban environments. Due to these circumstances, it is not just a case of socioeconomic issues that has to be addressed as these people, owing to their poor conditions, further aggravate the problem faced by historic cities in India and other parts of the developing world. This project relates to other case studies in terms of the community's aspirations for development, a raised quality of life, and the process that has been undertaken by the Aga Khan Trust for Culture to address the issue.

Nizamuddin Basti is dotted with several monuments of significant historic value. Years of neglect and uncontrolled urban growth around the monuments have taken their toll on these structures and their settings. The project area was chosen for the high density of historically significant buildings and for the potential of conservation initiatives to be coupled with a socioeconomic-development program that would benefit the resident population, the unique 'living culture' exemplifying religious tolerance within a prominent location in the capital, as well as for the development of an ecological zone of significance to the city.

The Nizamuddin Basti has a resident population of approximately 20,000. It has one of the highest densities of populated areas in the city of New Delhi. Apart from the resident population, there is also a floating pilgrimage population, which resides there for shorter periods. The pilgrimage population runs into the millions.

The Aga Khan Trust for Culture is the principal implementation body and facilitates between the various partner agencies. The public partners in this project are the Archaeological Survey of India, Municipal Corporation of Delhi, and Delhi Development Authority. The institutional purview focuses on interventions in health, education, and sanitation in order to address the most immediate needs of the women, children, disabled and the elderly. Simultaneously, renovation of open spaces and landscaping of parks, coupled with community mobilization and making these spaces safe for the women and children to access, are high on the priority list. Rapid physical densification and uncontrolled population growth have put enormous strain on Hazrat Nizamuddin Basti, especially in terms of environmental sanitation, waste

management and infrastructure. In addition, there are grave threats to some of the historic monuments located in the Hazrat Nizamuddin Basti. Baoli.

The primary objectives of the project are to integrate heritage conservation, socioeconomic development, and improvement of urban environment in consultation with the people and key stakeholders.80 The intent is to improve the quality of life for the residents by strengthening basic services through interventions in the field of health, education, environmental sanitation, and engaging community through regular interactions and cultural activities.

The immediate priorities of a depressed historic area like Nizamuddin Basti are first and foremost social and economic. The other major concern is to connect people with existing employment opportunities instead of creating new jobs to foster employment. The Nizamuddin Basti area is now one of the most congested, underdeveloped, poorly served ghettos in this otherwise prosperous part of the capital. Like most communities occupying historic spaces, the people of the Basti Nizamuddin area were initially wary of any deviation from a time-honoured way of life. Because of their disenchantment with elected representatives to provide even basic amenities, such as schools, dispensaries, parks, libraries, night shelters and livelihood options, the local population was initially sceptical, to say the least. But their scepticism faded when the people realized that AKTC was not in the business of throwing away money; it simply wanted to combine conservation, urban improvements, and socioeconomic-development initiatives to achieve the United Nation's MDGs.

The hope behind this urban-revitalization project is that the series of small, grassroots changes will eventually turn into a meaningful, sustainable model over the course of time. Moreover, it will become a model for similar projects in dilapidated historic areas, where the resident communities' exhibit signs of desperation and cynicism, when faced with an opportunity to turn things around for a better future.

The approach taken by the Aga Khan Trust for Culture becomes important, because it attempts to acknowledge the presence of inherited tangible and intangible culture in framing the development and conservation proposals and policies for the urban revitalization of Hazrat Nizamuddin Basti.

In Hazrat Nizamuddin Basti's case, financial resources, technical capabilities coupled with administrative and political have permitted Aga Khan Trust for Culture to immediately address the issues adversely affecting the social aspects, as well as the built heritage. The quality of life has improved as a direct result of the socioeconomic interventions. Thus, this initiative fulfils both the utilitarian evaluation goals and neglected aspects of socioeconomic development.

Case Study 2: Shekhawati

Nestled in the desert area of Rajasthan, the Shekhawati region is renowned across the world for its frescos that adorn the surfaces of innumerable traditional buildings. Shekhawati is claimed to have the highest concentration of painted structures anywhere in India, spread over the three districts of Jhunjhunu, Sikar and Churu. Fresco-painted havelis (mansions) are a distinct feature of towns in the Shekhawati region, constituting the bulk of its heritage. Mostly built in the period between the 1850s until the 1930s, Shekhawati's havelis have withstood adverse conditions. The havelis (mansions) are the remnants of the vast riches controlled by the business community. Though the Marwari merchant personally never stayed in these for long, the haveli came to represent the scale of his prosperity. The more prosperous had bigger mansions, replete with the best frescoes, painted by the best artisans.

However, in the absence of patrons, havelis are now in a derelict state. Many these structures are privately owned and do not come under ambit of heritage regulations for the protection of built-cultural heritage. The typology of these buildings has outlived its usage. With changing socioeconomic and political conditions, and preferences for a contemporary lifestyle, these buildings have fallen into disrepair. Lack of periodic monitoring and regular maintenance has led to the theft of historic wooden and stone architectural elements that are being sold in the antique markets. Simultaneously, unplanned development, inappropriate additions and alterations have accelerated the deterioration. Many havelis are deliberately being neglected, so that they can be declared unsafe and demolished to make land

available for new construction. The reclaimed land is being used to construct buildings that are non-contextual, visual eyesores, erasing an important link with the past. The surge in tourism activity is negatively affecting this heritage as well.

This case study relates to the broader issues of Indian heritage. Literally, every district and *taluka* of this country is bestowed with several heritage buildings, which instead of being properly cared for, are languishing in disrepair due to lack of attention and funds. Moreover, due to growing developmental pressures and insufficient knowledge about appropriate restoration with traditional construction technology, inappropriate alterations and use of cement cause much damage.

To combat these conditions, the Shekhawati Virasat Abhiyan's (literally meaning Shekhawati Heritage Initiative) Haveli Owners Awareness Program was initiated by conservation architect, Urvashi Srivastava, with the support of Department of Science and Technology, Government of India, and the New Delhi Office of UNESCO. The project area is endowed with many culturally significant buildings and was chosen for its potential for a conservation effort to be coupled with an awareness-raising program, training of traditional craftsman, and better management of historic resources. The project exposes haveli owners, caretakers, tenants and craftsman with the concepts, methodology and issues surrounding the conservation, repair, and maintenance of havelis.

Under this initiative, all the four stakeholders were brought together onto a common dais. A contributory strategy including management of historic resources and preventive conservation was intended to augment in safeguarding of built cultural heritage, including havelis and other structures in Shekhawati. In order to make a significant addition to preservation in Shekhawati, individual stakeholders were made aware of their individual obligations and part in the process.

The single biggest contribution of the Shekhawati Virasat Abhiyan has been to create awareness amongst the stakeholders and public at large about the immediate issues facing the built heritage. More importantly, it brought the various stakeholders together through discussions for the very first time. Through participatory workshops, appropriate and scientifically correct training with traditional materials and technologies is imparted to the craftsmen to both prepare and repair the murals. This is a cost-effective method of successfully safeguarding the murals and aids in the continuity of traditional building and artistic skills.

One critique of the initiative is that no major restorations or adaptive reuse projects have been conceptualized or executed. Thus, there is no immediate impact on the quality of life of the community. Due to extremely limited funding resources and negligible government support, it would not have been prudent to aim for major conservation or urban rejuvenation.

Case Study 3: Pune's Historic Core – The Vanishing Wadas of Pune

Pune today is known as Oxford of the East and a technological hub, but it traces back its origins to the 13th Century. Pune's historical point of origination is Kasba Peth, from where the city organically grew. And it is in this organically growing city that a young Chhatrapati Shivaji Maharaj along with his mother settled and laid the foundations of what is today known as the Maratha Empire.

Traditionally, after the reign of Chhatrapati Shivaji Maharaj, Pune was the stronghold and seat of the Peshwas, who were the ministers of the Maratha Empire, and it is under their reign that the Shaniwar Wada was built. Subsequently the settlements that we now call the Historic Core of Pune, developed around this Shaniwar Wada, growing in an almost organic yet concentric manner along the 17 original Peths or streets of the historic core, eventually developing into independent neighbourhoods delineated by profession, and each centred around one principal nobleman's house or Wada. A Wada can be thus compared to the Rajasthani Haveli or the Bengali Bari, is a form of the courtyard housing typology and usually belonged to either noblemen from the Peshwa's court or affluent merchants and was a homestead for a large joint family.

During their heyday, these Wadas were highly ornamental with carved wooden beams, archways, columns, and screens, and usually contained at least one courtyard and had dedicated and segregated public and private spaces. The larger the Wada, the more affluent or prominent its owner. Today however, most of these Wadas are a shadow of their former glory. They have been divided into tenement housing and leased out, have had many ad-hoc structural changes made, thereby destroying the original characteristics and unlike their Rajasthani or Gujarati counterparts, most of these Wadas have multiple owners – both descendants of the original owners as well as tenants that have lived for over 20+ years further adding to their current dilapidated state. Since most of these are privately owned, and money is tight owing to both rent control and lack of finances, many Wadas have suffered a fate of demolition by neglect. Not all suffer this fate however and some (although very few in comparison to the privately owned ones) that are under state or central government control, have been restored and in some cases adaptively reused (Vishrambaug Wada is used as both a museum as well as a post office).

With an ever-increasing population, need for modern amenities and an ambitious builder lobby, most of these private (and albeit non-litigated) Wadas shall eventually make way for modern buildings and the historic character, the social/community fabric and essence of Pune's otherwise hustling and bustling historic core shall be lost forever. Others that face litigation currently shall suffer demolition by neglect and endless court battles but shall also eventually make way for modern buildings. Unfortunately, owing to the lack of clear heritage and design control guidelines, lack of political will, funding for conservation and restoration work or other government subsidiaries such as tax incentives, not much can be done as of this moment, and other than the monitoring and control of the on-ground situation under the supervision of the Pune Municipal Corporation by INTACH Pune Chapter and local conservation architects not much seems to have been done. It is however interesting to note that the Pune Municipal Corporation acknowledges the importance of this historic core and does indeed have plans for the same in the Development Plan for Pune. Now it remains to be seen as to whether these plans are carried out in actual practice per the visioning document, or it remains forever on paper alone.

CREATING AN EVALUATION CRITERIA TO ESTABLISH A BASELINE FOR BEST PRACTICES

For the scope of this thesis, the larger issues that affect the built-cultural heritage in India, and probable mechanisms to cope with them can be funnelled into the following questions:

- How do we define a successful preservation initiative and is success an intermediate goal, whose importance is contingent on what it finally contributes to human life?

- Is the link or disconnect between heritage conservation and people, fundamental or perceived?

Based on these questions, and to create a baseline for best practices an in-depth analysis of the above case studies was carried out. The current status of built heritage in Shekhawati is ambiguous. Efforts of various stakeholders are not coordinated, and there is a lack of a coherent vision. It will be impossible to make any progress in the direction of heritage conservation if there is no coordination and consensus amongst the stakeholders. Only successful partnerships between owners, the local community, tourism industry, visitors and government can help preserve the cultural legacy.

Due to the emotional value attached to the historic sites, conservation activities can acquire broad support in local communities, especially when undertaken on community assets. Adaptive reuse of historic sites in semi-urban India is a developmental service catering to the people, just as heritage tourism does.

Local communities need to understand the potential benefits arising out of conservation of monuments, which in turn will lead to emotional and pragmatic attachment to heritage sites and ensure long-term preservation of the same.

The process of urban conservation should involve reactivating people's abilities to take care of themselves and their surroundings. These can be initiated by linking their lives to the creation of jobs, apprentice opportunities, and making resources available to motivated residents.

Decentralization and people's participation can lead people to become active drivers of good management and development of urban services, rather than merely passive recipients. People's engagement ensures access to basic services, especially for the weak and marginalized sections of society.

The intangible aspect of the human and cultural dimension made the creation of historic cities possible. This dimension needs to be re-appropriated, to regain a sense of community for stakeholders, and the links to the tradition and culture that are embodied in these special places. Indeed, historic cities are the repositories of these values, memories, roots, and traditions.

The overall conservation-based strategies, coupled with incentives, facilitate (both financial and non-financial) appropriate development. Incentives, such as an upgraded physical infrastructure, help mitigate the inefficiency and apathy of the local administration, thus gaining the trust of the people.

Another important ingredient is the application of traditional-construction methods in the upkeep of historic buildings. This aids in continuity of skill by training both craftsmen and apprentices in traditional construction and conservation.

Based on the inferences drawn, the following criteria was identified to establish a baseline for Best Practices:

- There is a need for stricter urban design guidelines, more central government schemes such as HRIDAY and AMRUT (that take care of upgradation of the surrounding infrastructure along/around/within the historic precinct and/or have revenue generation models that make the project financially viable and sustainable) and stronger laws to protect existing built heritage
- It is pertinent to test run pilot projects for SMART Cities scheme within the historic core/traditional settlements – it is easy to bring in SMART City initiatives into an already modern environment to upgrade the standard of living, it is more challenging and beneficial to do so in traditional/historic settlements.
- Monetary incentives such as tax credits or tax breaks need to be introduced to the general population to further encourage them to avoid demolishing and building anew.
- Financial assistance and/or additional/compensatory TDR/FAR needs to be given to the general population who cannot afford to restore/re-use their historic property.
- A list of locally available industry experts such as architects and contractors need to be made easily accessible to ensure that appropriate materials are used when restoration works are carried out.
- Community engagement workshops need to be held to encourage community pride while explaining the benefits of having/restoring existing built heritage and the negative ramifications that come with demolition both deliberate as well as through neglect. These include disturbing the existing balanced eco-system (because new construction doesn't only affect humans but all living creatures), monetary problems (tall/modern buildings also increase expenditure since modern building infrastructure maintenance cost is higher in comparison to traditional/historic structures), material costs and building energy (larger and newer the buildings the more it costs to build and the less it is energy efficient since most modern building materials are not climate sensitive).
- Faster and just/sound grievance redressal needs to be made accessible so as to reduce legal costs while ensuring that every person involved has a fair stake/claim or adequate compensation (this is applicable to both landlords as well as tenants – just because your tenement comes under rent control doesn't mean you get to take advantage and bleed the landlord dry; conversely just because you're a landlord stuck with rent controlled tenants you cannot make the premise unhabitable thereby forcing either gentrification or demolition by neglect).
- An agency/organisation needs to be established that is both independent of the local, state and central government (as may the case be) but answerable to the local population, that shall be responsible for implementation, monitoring and control of updated government norms without any for profit motive, governmental/political interference.

- A list of companies as well as various CSR initiatives that can be mutually beneficial to both parties involved (companies as well as the local population; initiatives such as adopt a street/road/highway, community amenity beautification projects, creation/maintenance of local community civic infrastructure such as community/public toilets, schools, parks, gardens, health clinics etc, vocational training as well career counselling workshops/facilities to the local youth).

Finally, to both inspire as well as prove that with a few changes, such adaptive re-use projects (both residential and commercial) can be made successful as well as be beneficial to the community as whole, we have identified a list of projects that have successfully managed to blend the old with the new, while giving a new life to a historic building/structure, and they are as follows:

- The Ferry Building, San Francisco – office space and market
- Zeitz MOCAA, Cape Town – Silos converted into an Art Museum
- The Warehouse Hotel, Singapore – A spice warehouse/godown has been converted into a boutique hotel
- The Cinnamon Boutique, Bengaluru
- The House of MG, Ahmedabad – boutique heritage hotel and homestay
- Vishrambaug Wada, Pune – as a post office and museum (semi-successful since it is not commercially popular)
- Thakur Bari House Museum – as a part of the Rabindra Bharati University, Kolkata
- Sassoon Dock Art Project by St+art India Foundation – Temporary Art Exhibit housed within the 140+ year old Dockyard Complex highlighting the fishing and maritime history especially of the Koli Community using Modern Art as a tool of expression

KEY TAKEAWAYS

In the cases of both Shekhawati and Hazrat Nizamuddin Basti, poor civic infrastructure, inconsistent new development, dilapidation of historic buildings, and government apathy accompanied by lack of funds and intent, apart from affecting the life of people on a daily basis, also act as a hurdle in the packaging and upgrading of these two sites as international-tourist destinations. In the case of Pune's historic core demonstrates much altered condition of authenticity and significant urban transformation. Its geographical and economic propinquity has exposed it to the ill effects of urbanization and, in a sense, further degraded the integrity of its monuments for posterity.

In the end, it is pertinent to remember that heritage conservation, restoration and adaptive re-use is not just about the pretty picture – about the physical restoration of the structure, it is also about giving a new yet purposeful life to the structure, it is about community development and engagement – creating a sense of community pride and enhancing the historic identity of the space while seamlessly blending with modern times. And none of this is possible by having a unilateral focus, be it political, social, economic, or ecological. All these aspects along with the physical building itself are intrinsically interlinked. It is also pertinent to create more awareness about the positive impact of such large-scale community development and conservation efforts and pushing for reform in the development plans and laws, and creation of appropriate urban design guidelines. Because at the end of the day, the beneficiaries of such urban development reforms are the people inhabiting the urban/peri-urban spaces itself, and demolition whether deliberately or by neglect benefits no one, and what we end up creating is a cold, clinical, unsustainable built environment, or sprawl with none of the community engagement character and climate and material sensitive built form that historic cores or traditional settlements had.

For the creation of community assets, one of the institutional models that should be adopted is the multi-sectoral linkages and coupling of preservation goals with existing central-governmental schemes at the national-policy level, like the National Rural Employment Generation Guarantee Act (NREGA) and Barefoot Innovators initiated by the National Innovative Foundation, Department of Science and Technology, Government of India. With over $33 billion spent between 2007-2013, NREGA164 is the world's largest poverty-alleviation scheme providing 100 days of employment,

which includes activities with a 60:40 ratio of an unskilled manual-labour component to the material component. Conservation of historic buildings could be coupled with NREGA, as conservation typically has a much higher labour component.

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From GREY to GREEN- ASustainable Design Approach for Green Roofs

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ABSTRACT

The global climate changehas hada direct effect on the climaticweather patterns. Increased urbanisation and encroachment in green belts haveled to a rise in urban heat island effect, reduced urban air quality, limitation to storm water management and improved water run-off quality;at the same time contributing significantly for the degradation of biodiversity.The top covering of a building i.e.roofs which is directly exposed to solar radiation has been identified as the capable component that could contribute in providing substantial amount of energy savings and environmental benefit. This research focuses on comparison between electrical energy consumed to achieve stipulated indoor air temperatures and reduce the overall cooling load demands of a building by adopting alternative thermal insulation methods for roofs, rather than having a standard conventional flat roof.

Keywords:Comparative Analysis, Software Simulation, Vegetative Flat roofs, Solar Heat ingress, Heat gain

Vegetative flat roofs for commercial buildings in composite climatic zone.

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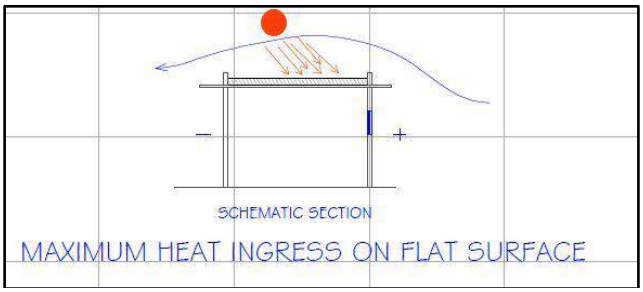
1.0 INTRODUCTION

Today, India is witnessing a paradigm shift. After the Industrial revolution, urban development flourished, leading to anextensive expansion in the urban population.This demand was catered to at the expense of green areas. Decrease in green spaces has createdimportunate pressure on earth's surface resulting in the need to develop the concept of sustainability. While looking for the larger aspect of sustainability, habitable spaces should be taken into consideration, which are utilized throughout the year.

Any building essentially contains walls and roof which are directly exposed to external environment. Undoubtedly the most critical part of the whole building surface is the roof as it receives the maximum solar radiation, particularly in the summer months, thereby increasing the heat load on the buildings. Walls and roofs are thebuilding elements which ingress maximum solar radiation;where surface of walls receives about 2/3 of solar radiation and roofsare directly exposed to the sunlight for maximum part of the year.We can also summarize this by the period of disposition of directsolar radiation on wallsis shorter than on roofs.

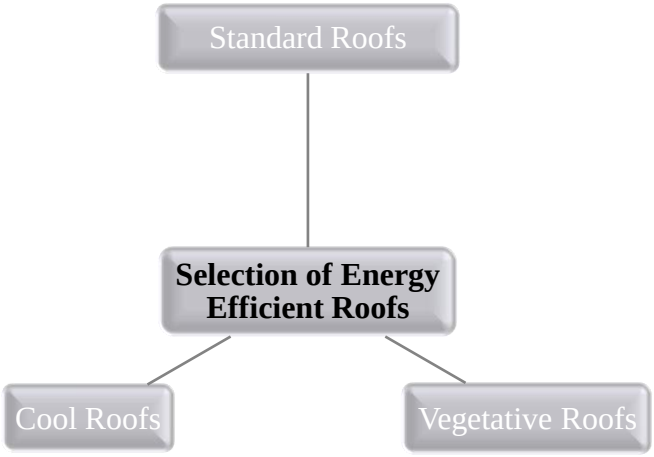


(Fig-1) Represents Schematic section showing maximum heat ingress on flat surfaces
Source: Author

Direct solar ingress on the surface and roofabsorbs solar heat, thus raising the temperature inside the room. The environmental, social, and visual contributions that green roofs can make towards sustainable living in high-density cities have been widely acknowledged worldwide. Green roofs are one such sustainable approach,which can help in insulating the buildings and thereby contributing to better energy efficiency for the same. In addition, Green roofs also provide habitat to different species, reduce the rainwater runoff, and better manage the carbon-dioxide cycle. Despite these benefits, "Green roofs" are not as common a feature in India as they are in other European and American cities.

2.0 Selection of Energy Efficient Roofs

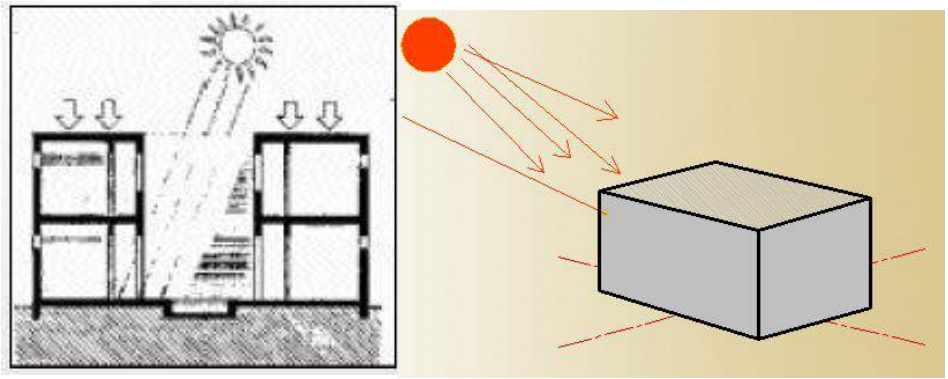
There are popular energy efficient roofing options that may be a good fit for habitable spaces. With new innovations always on the horizon and improvements regularly made to existing energy efficient roofing options, one must carefully considerthe needs and look for roofing materials, that will help to find the right roof for residential spaces. this can be done by understanding the energy efficient roofing materials available and how various energy efficient roof types can come into play, which can make a positive impact on the environment. The further study will revolve around 3 types of roofs where analysis will be done based on simulationassessment.



(Fig-2) Represents Schematic selection of different types of roofing techniques
Source: Author

3.0 Heat gain from roofs

Heat gain and heat losses from surfaces in buildings are the main factors that are responsible for determining heating and cooling loads in the structures. Summer heat enters through walls and openings when the temperature outside is warmer than the temperature inside. This is referred to as heat gain. Winterheat loss occurs through the building structure, including the walls, windows, doors, and roofs. Solar heat gain is dependent on the walls, windows, door, and roofs.Whereasthe thermal performance of a building is affected by the solar absorptance of the roof. Roof as a building surface that has the most exposed area to the sun, contribute most of heat gains in the building. Therefore, the amount of solar heat gain on the roofs needs to be minimized by roof structure configurations.



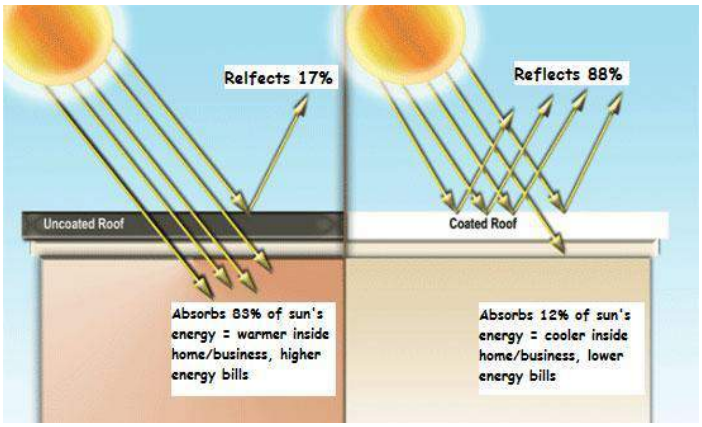
(Fig-3) Represents Schematic section showing maximum heat ingress on flat surfaces
Source: Author

3.1 Vegetation on Flat roofs

Vegetative roofs, also known as green roofs, are thin layers of living vegetation installed on top of conventional flat or sloping roofs.Vegetative roofs are divided into two categories:1) extensive vegetative roofs, which are 6 inches or shallower and are frequently designed to satisfy specific engineering and performance goals,and2) intensive vegetative roofs, which may become quite deep and merge into more familiar on-structure plaza landscapes with promenades, lawn, large perennial plants, and trees. extensive vegetative roofs. Extensive Green Roofs – An Ecological Alternative to Conventional Surface Protection. Extensive landscaped roofs are an ecological alternative to conventional surface protection or ballast layers such as gravel and pavers. They are lightweight and have a shallow build-up height.Such type of extensive vegetative roof includes controlling storm water runoff, Improving water quality, Mitigating urban heat-island effects, Prolonging the service life of roofing materials, Conserving energy, Reducing sound reflection and transmission, Improving the aesthetic environment in both work and home settings, Mitigation of wildlife, Cost/benefit, etc

3.2Cool Flat roofs

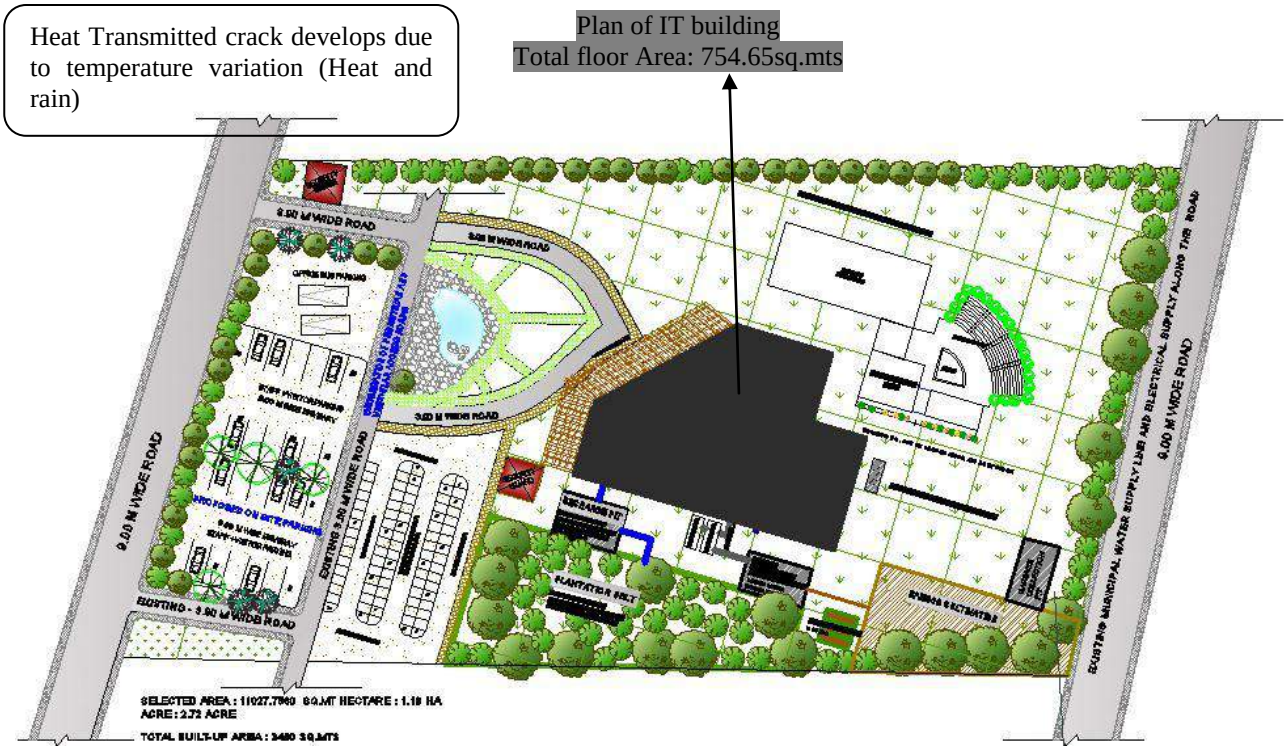
There is a considerable amount of reduction in heat gains from cool roofs. A cool roof is a roofing system that delivers higher solar reflectance (the ability to reflect the visible, infrared and ultraviolet wavelengths of the sun, reducing heat transfer to the building) and higher thermal emittance (the ability to radiate absorbed, or non-reflected solar energy) than standard designed.A cool roof is one that has been designed to reflect more sunlight and absorb less heat than a standard roof. Cool roofs can be made of a highly reflective type of paint, a sheet covering, or highly reflective tiles or shingles. and reduces the temperature by 10-16 degrees. A cool roof is one that has been designed to reflect more sunlight and absorb less heat than a standard roof. Such roofs are made up of a highly reflective type of paints, a sheet covering, or highly reflective tiles or shingles. and reduces the temperature by 10-16 degrees.These roofsare often the most significant surface for summer heat gain and winter heat loss. lowering that transmission through the roof can have a serious impact on heating and air conditioning energy expenses.



(Fig-4) Represents Schematic representation showcasing heat reflects on coated/uncoated surfaces
Source: Cool-roof-Detail-Image

3.3 Base Case Used for Simulation

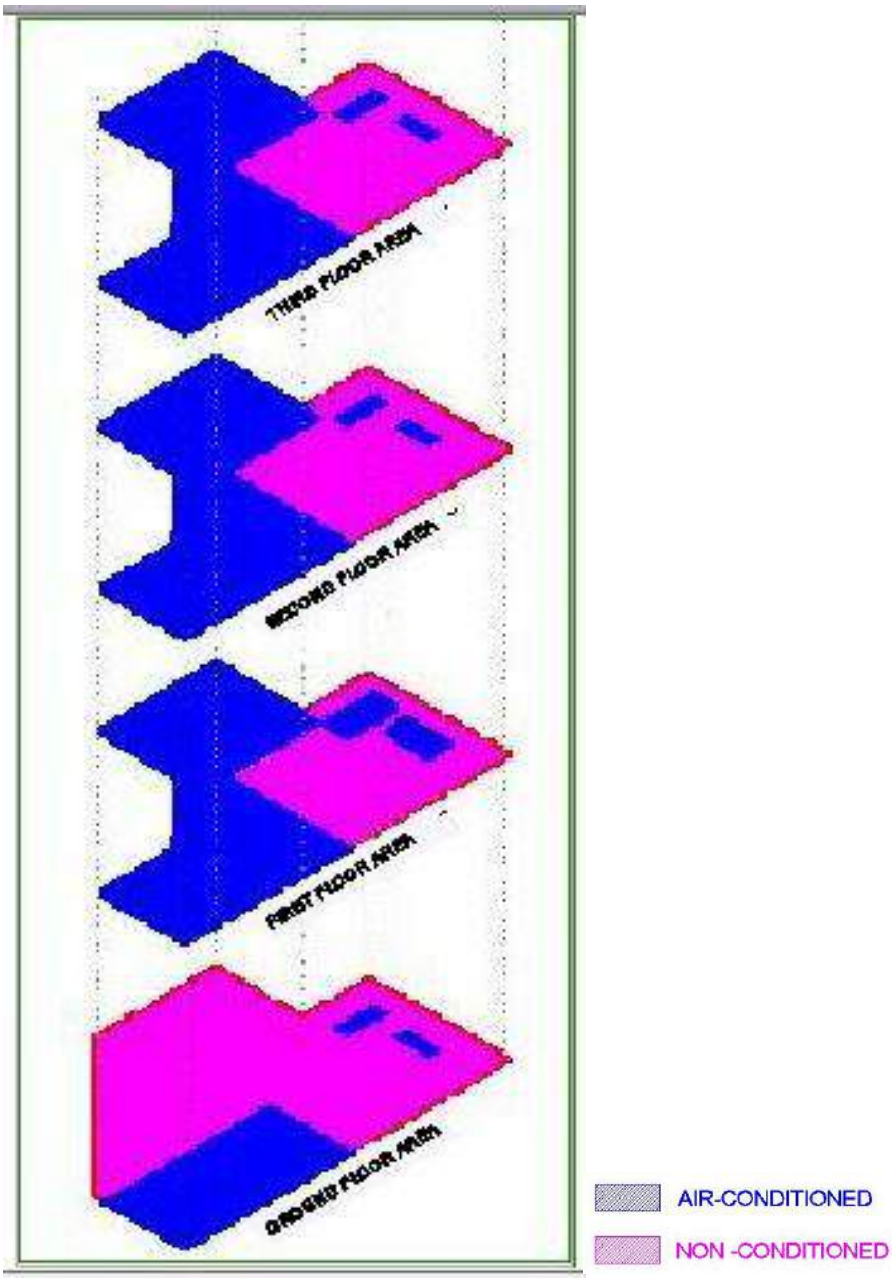
The Application case selected for simulation was based in Composite climatic of Nagpur. Where Nagpur lies at 21.15-degreeNorth, whichhas hot and dry climate throughout the year.Generally, it experiences only 2 months of rainfall in the months of July-August,2 months of chilled winters and rest 8 months are full of fierce sunlight for almost 8-9 hours/day i.e.from (10am -6pm).The proposed site is located at Govt. Labour Institute, near SMS building IT park road, Parsodi, Nagpur. whereas the proposed IT building has abuilt-up area of about 3450sq.mts with G+4 structure.



(Fig-5) Base case for simulation
Source: Author

The base case used in (Fig 5) for accessing comparative analysis with the help of simulation software in order to examine the heat gain due to direct ingress of solar radiation from roofs on energy parameters was analysed on the basis of heating/cooling loads which largely depends upon the operating hours, energy efficiency measures, sample size, climatic zone etc. on Design Builder. The floor plates at each floor showcases conditioned and nonconditioned areas, kitchen

building services and active core is not conditioned. The active core consists of sustainable passive cooling strategies, thus reducing the energy load on the structure. As the building is operative on 24 hrs basis, the workstations on each floor are fully conditioned, thereby increasing the pressure on mechanical cooling systems.Thus, this study focuses on comparison between electrical energy consumed to achieve stipulated indoor air temperatures and reduce the overall cooling load demands of a building by adopting alternative thermal insulation methods for roofs, rather than having a standard conventional flat roof.



FLOOR PLATES SHOWING CONDITIONED AND NON-CONDITIONED AREA ON EACH FLOOR(Fig-6) Base case for simulation
Source: Author

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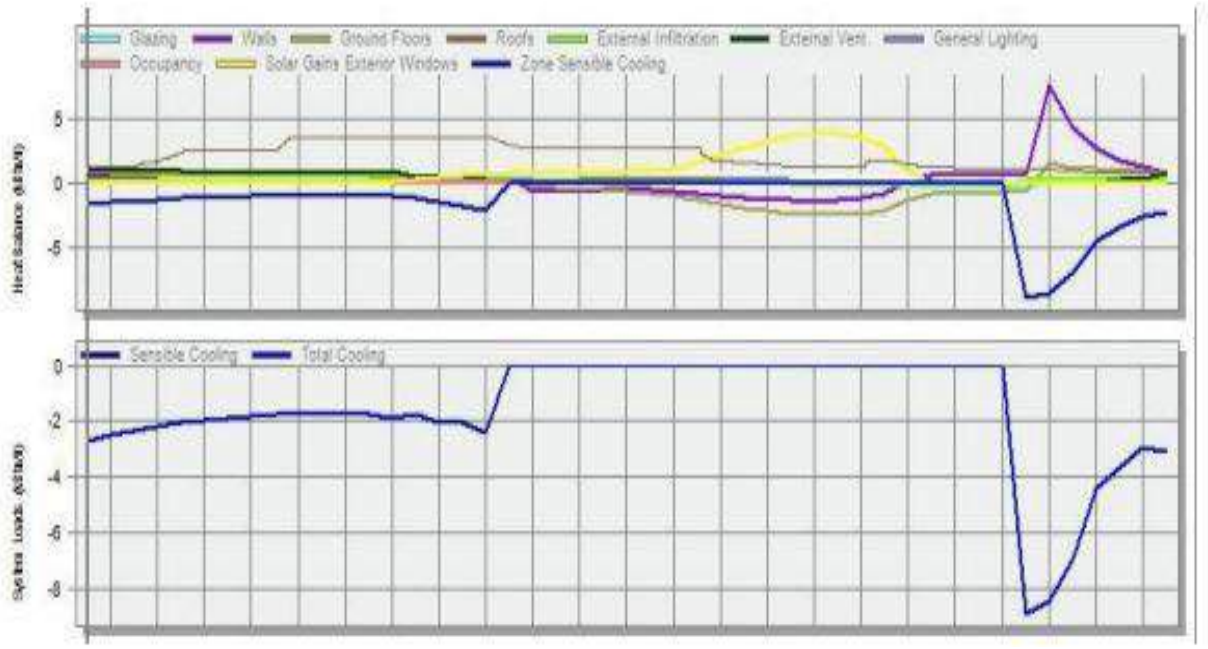
3.4 Results of Base Case after Simulation

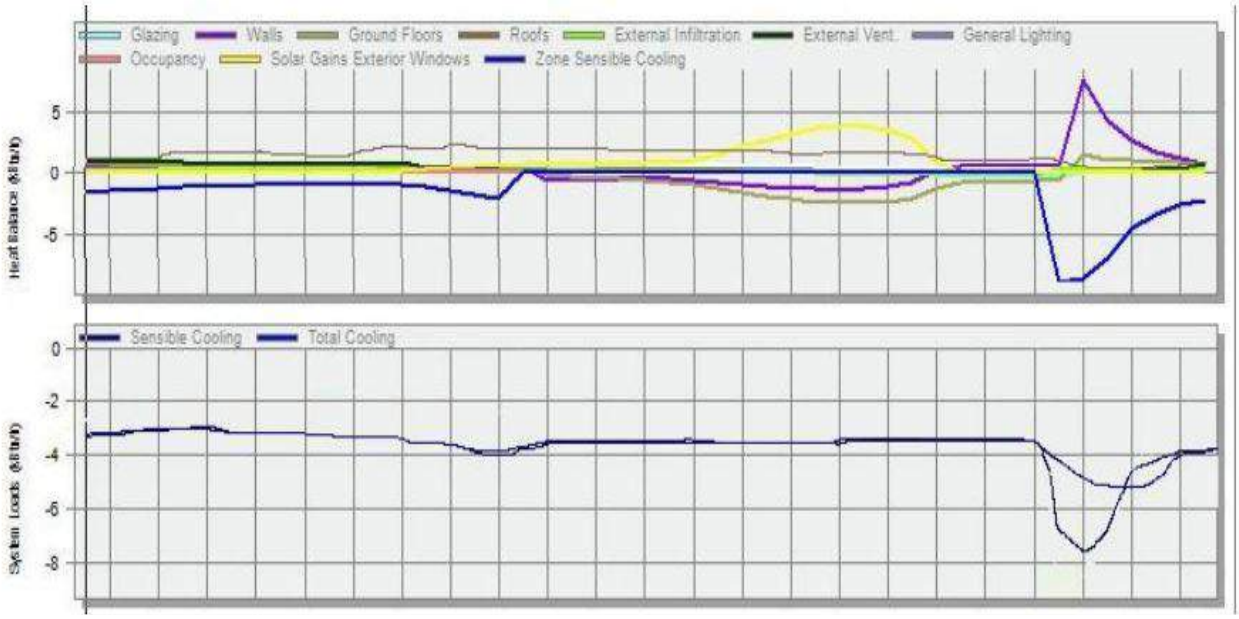


(Fig-7) Graph represents cooling load required when the roof type is **Standard flat roof**
Source: Design Builder Interface

This above chart states graphical representation- on Standard roofs with no treatment where the light brown band illustrates the heat gain from standard flat roofs

whereas the blue band below portrays the cooling load required by the standard flat roof for IT building

More the flat surface area, more is the amount of energy required for cooling entire surface.Directly pressuring on natural resources for Energy consumption for meeting energy needs

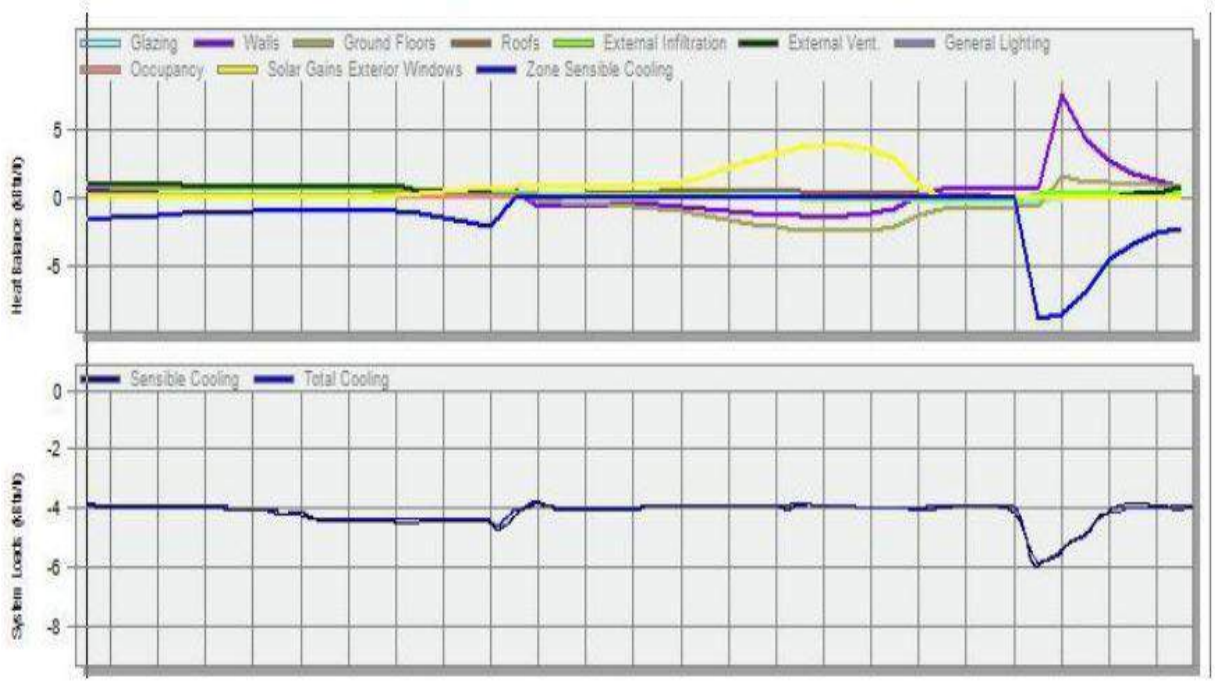


(Fig-8) Graph represents cooling load required when the roof type is **cool roofs**
Source: Design Builder Interface

(Fig-8) is graphical representation of cool roofs conveys the light brown band which is seen is the heat gain.

whereas it is clearly seen that there is reduction in overall heat gain while the blue band shows cooling load required which is further lowdown than standard roofs.

Though the amount of heat gain is reduced to a considerable amountwhich is upto 20-30%which can be clearly seen in graphical representation,whereas the results gained by Vegetative roofs proofs to be more beneficial.



(Fig-9) Graph represents cooling load required when the roof is **Vegetative Flat roofs**
Source: Design Builder Interface

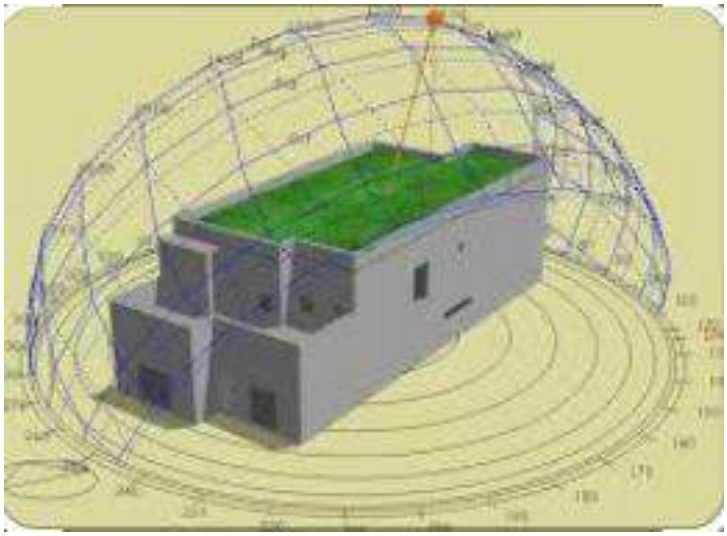
The graphical representation above states that in Vegetative type of flat roofs the light brown band is superlative and the amount of heat gain is reduced

hence further aiding in optimising overall energy consumption requirements for cooling the office space.

By overall study it states that the Energy requirements by Vegetative Flat roofs is least ie. saving upto 40-50% of energy consumption and hence adopting one such passive technique is more fruitful.

CONCLUSION

The study mainly aimed at analysing with facts on the type of flat roofs technique which can be adopted instead of conventional flat roofs.



(Fig-10) Schematic Representation of sunpath on typical green roof
Source: google image

whereas the comparative analysis clearly showed that energy requirements by Vegetative Flat roofs is least where the saving is up to 50% of energy consumption and hence adopting one such passive technique will be more beneficial in composite climatic conditions.

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IMPROVEMENT OF PARKING FACILITY FOR SUBURBAN MUMBAI REGION (RAILWAY STATION)

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Abstract: The use of vehicles is increasing unprecedentedly, thereby increasing the need for parking spaces. The current scenario of parking facilities has resulted in illegal parking on the road, which ultimately reduces the effective use and efficiency of the road, which further leads to traffic congestion. Considering the relevant problem, detailed investigation is necessary, with requirement of a proper installation. This study selected the Naigaon Local railway station as the case-study area. During the field investigation, Naigaon local-railway station was observed to be one of the stations where the parking area is insufficient, especially for two-wheelers. To overcome the problems mentioned above, multi-level parking is required which would allow the vehicles to be parked floor by floor, therefore reducing space. By using the tiered parking plan, parking congestion can be reduced drastically as we can park more than 3000 bikes at the same time, which is much better than the current parking capacity (<500 bikes). And so, the existing parking system is complemented to ensure maximum use of space.

Key words: Parking area, Railways, Public transport, Multistory parking.

1. INTRODUCTION:

The annual growth rate of the urban population during the last two decades has been an average growth of more than 1%. The urban population constitutes a major part of the population, which means that around 50% - 55% live in metropolitan areas. In metropolitan cities, the proportion of two-wheelers was still 75% decades ago, on average, sales of two-wheelers in April-March 2018 grew 12 percent compared to April-March 2017. Within the two-wheeler segment, scooters and motorcycles grew by 27.06 %, 2.85 percent, & 6.51 percent respectively in April / March 2018 compared to April / March 2017. In general, a vehicle remains in the parking lot for 8,360 hours out of 8,760 hours per year (5% of the time of day).

It is a generally accepted fact that the availability of parking spaces should be guaranteed for at least almost 22 hours a day if only the vehicle is in use for two hours out of 24 hours a day. This means that every time a new vehicle hits the road, there is an additional demand for parking in the city. The availability of parking spaces needs to develop more regularly with urbanization and rapid motorization, which means cities are densifying and planning and implementation removes the bottlenecks that future high-density development may be associated with. high space costs. All cities in India face significant parking problems. Due to the anonymous increase in traffic in India, parking along with pollution and poor roads has become a new problem. The demand for parking spaces is an urgent need. This is particularly since the growth of the infrastructure of Indian cities cannot keep up with the increasing demand for parking spaces.

The first question that encounter while explaining project is “what is the need of multilevel parking system?”. The answer for above question would be parking more no vehicles in limited available room and space constraint is the major

objective of this project. Due to lack of parking space accessibility people tend up to park their vehicle on roads or nearby areas of railway station which produce traffic congestion. The lack of dedicated space in urban areas has increased the demand for parking space especially in areas like railway stations because it is the only hub for peoples to migrate from one place to another which provides easy and flexibility for connectivity of various works to carry out.

The MSRDC has provided parking lots at 17 different locations, like JV link road, Sion, Chheda Nagar, Elphinstone Road and Vikhroli, mainly below flyovers. There is a need to build multi-storey parking near railway station as its lifeline for Mumbai to help citizens.

1.1 OBJECTIVES:

The objectives of this study are as follows:

- To study existing parking conditions,
- To analyse parking demand of our study area.
- To formulate strategies for better management for parking.

1.2 PROFILE OF STUDY AREA:

Various suburban station was assessed to find a particular site which faces a severe congestion of traffic and parking issues for 2-wheelers specially. The major railway stations of Mumbai-megacity and its suburban areas including Vasai, Borivali, Thane, Bhayander, Naigaon, Kandivali and many other sites were visited to investigate the most appropriate site for parking development. Thereafter, Naigaon station was selected as site for parking development.

Fig.1 Satellite view of site (Naigaon railway station)

The field study was carried out at Naigaon railway station parking lot and 250 meters radius around the parking. As per parking studies norms Naigaon railway station is a busy station along the western line on the Mumbai suburban railway. The VVMC bus stop located just in front of the parking station on the eastern side of the suburb which is the point of origin for localities of Naigaon East like Juchandra, Chandrapada, Bapane. Bus services also hand out distant destinations like Vasai and Nallasopara.

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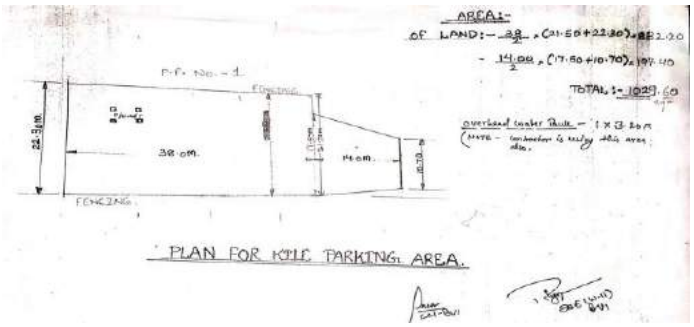

Fig.2 Plot area of site

Fig.2 shows that plot area of the site for which the survey is conducted. It has area of 1029.60 sq.m. with an Floor Space Index (FSI) of 2 which is under railway authority.

1.3 Scope of study:

Naigaon station is a developing hub in the context of its major commercial and residential activity, so parking is an important factor to ensure the safe and comfortable movement of the inhabitants of this area. If the actual demand and the existing & actual scenario of the parking system are determined, it can help to ensure an effective parking & sustainable management system for the inhabitants. By this way the Naigaon area can be converted to a well parking facilitated as well as a well transportation management system.

2. SURVEY PROCEDURE

The survey was conducted in two stages i.e., Site Reconnaissance Survey and actual survey.

The Site Reconnaissance Survey as shown in fig.2 indicated that the current scenario of the site was observed and the capacity of the site was noted, over loading of the vehicles which are without parking and trying to find the solution for parking maximum vehicles. Further the site was surveyed for 250m radius and found that parking area was separated approx. 1 half by railway section. It was observed that the different lanes which are arriving at the site, were noticed that some lanes were full of parking which were leading to congestion in road system and this problem can be easily solved by giving parking place. Then the lanes were combined into several combinations like 1-7, 2-8, etc as per the requirements of survey.

The actual survey was done by parking usage survey by patrol. Under actual survey parking area count, lanes count, and classified vehicles count, these three counts were successfully completed with the help of local students and few labours. They were divided into three batches. Survey conducted was of 15 hours according to the norms including peak hours. The day selected for survey was a midday which was unaffected from any public holidays, or any other factors. The survey was conducted on 18th Dec 2019 from 7.00 am to 9.00pm.

Each group was asked to perform the parking survey on street as well as off street. For records. The license plate numbers were also recorded. The survey volunteers were allotted in each lane, on every half an hour group of people were allotted to take a round of entire lane and taking record of each 2-wheeled vehicle parked in lane. For every next half an hour again another group of volunteers were allowed to take readings of the whether a particular vehicle is present at same location or not. Thus, finding particular vehicles parked for number of hours at a particular lane.

3. Data Analysis / Output

3.1 CLASSIFIED VOLUME COUNT:

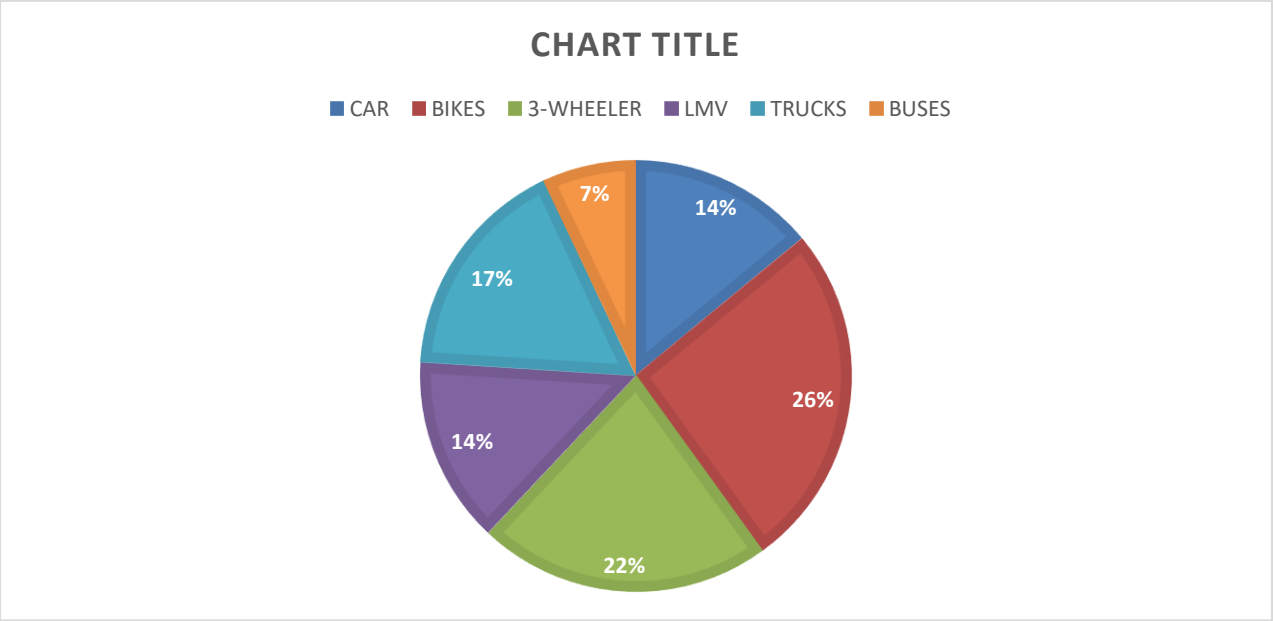

Fig.3 Classified vehicle count.

Classified volume count was carried out for the full duration to know the traffic composition. It was carried out manually by group of 3 students on the main road opposite to the parking lot for interval of 5 minutes. It was simultaneously carried at all the students to understand the loss of vehicle in between if any. It was seen that maximum 3-wheelers and 2-wheelers were seen.

3.2 PARKING CHARACTERISTIC:

After surveying for 15 hours data was analysed and number of vehicles requiring spaces for parking was counted. Accordingly, pie chart for classified vehicle count, time v/s no of vehicles accommodation was made.

Table 1. Vehicles Accumulation.

TIME DURATION	VEHICLE IN	VEHICLE OUT	VEHICLE ACCUMULATION
07.00am-07.30am	143	21	132
07.30am-08.00am	214	8	206
08.00am-08.30am	345	11	334
08.30am-09.00am	465	9	456
09.00am-09.30am	542	1	541
09.30am-10.00am	596	2	594
10.00am-10.30am	637	1	636
10.30am-11.00am	639	4	635
11.00am-11.30am	652	1	651
11.30am-12.00noon	650	2	648
12.00noon-12.30pm	655	6	649
12.30pm-01.00pm	669	2	667
01.00pm-01.30pm	674	5	669
01.30pm-02.00pm	681	3	678
02.00pm-02.30pm	689	4	685
02.30pm-03.00pm	698	2	696
03.00pm-03.30pm	697	7	690
03.30pm-04.00pm	702	1	701
04.00pm-04.30pm	712	1	711
04.30pm-05.00pm	714	7	707
05.00pm-05.30pm	712	3	709
05.30pm-06.00pm	707	7	700
06.00pm-06.30pm	695	15	670
06.30pm-07.00pm	685	16	669
07.00pm-07.30pm	584	115	469
07.30pm-08.00pm	506	86	420
08.00pm-08.30pm	413	109	304
08.30pm-09.00pm	327	92	235

Following is the data calculated and from this table the maximum capacity of the existing parking lot can know which comes nearby to 700 vehicles at optimum capacity.

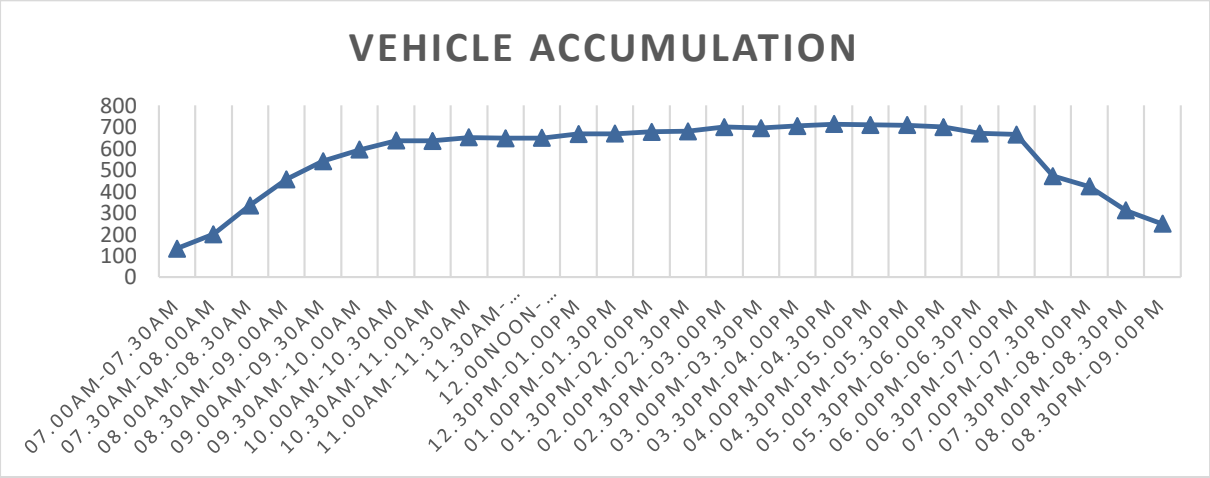

Fig.4 Vehicle accumulation.

Above figure shows the number of a vehicle which are entering, and which comes out of the parking area which results in the accumulation of number of vehicles which are being parked for number of hours. Thus, resulting in the highest number of vehicles i.e., 713 from 4.00pm to 4.30 pm and the lowest count of the area resulted to be 132 from 7.00am to 7.30am. It was assumed that more than 150 vehicles were send back as there was no space for parking in parking lot.

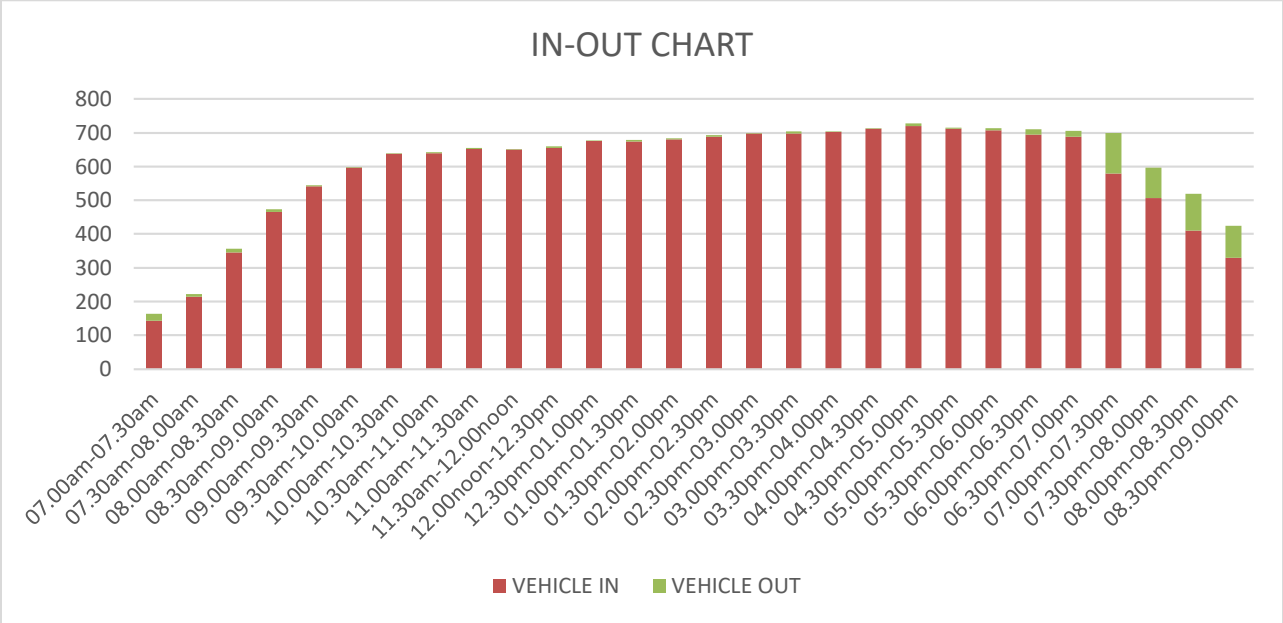

Fig.5 Time duration v/s in-out number of vehicles.

Fig.4 shows the number of vehicles entering the parking lot and the number of vehicles coming out of parking lot from every half an hour slot. It shows that that there is maximum intake of vehicles in morning hours and maximum outcome in evening hours i.e., from 7.00 am to 8.00am and 6.30pm to 8.00pm respectively. Its shows that already more than 100 vehicles are parked before the survey were started.

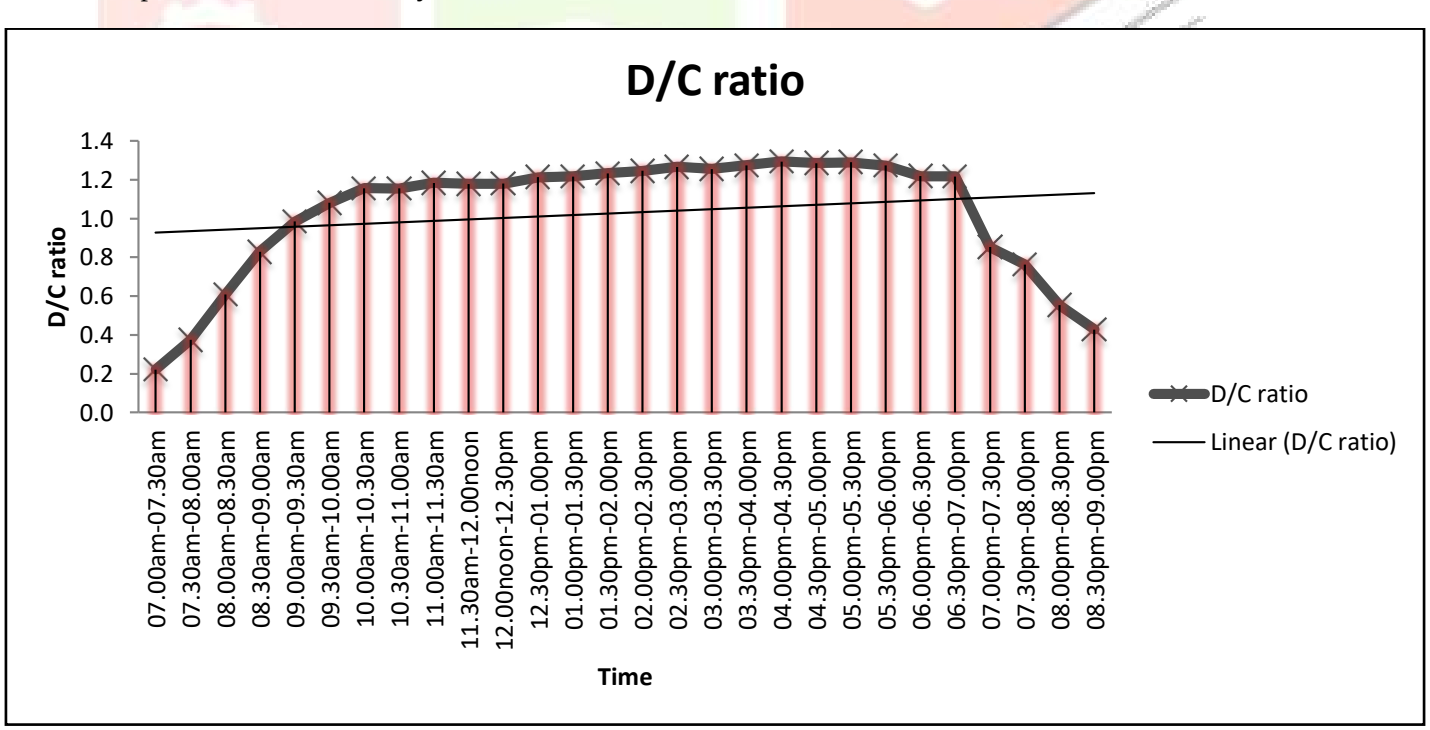

Fig 6. Demand to Capacity Ratio

The above graph states the existing parking system after 9.30 am the demand is beyond the capacity or the inventory available to fulfil the demand up to 7.30 pm in the evening. The field survey showed that the average demand of parking is more than the actual supply with a demand-supply ratio of 1.42 during peak hour, therefore indicating the lack

of parking facilities in existing setup of Naigaon station area. Therefore people are forced to park their vehicles on the street either willingly or in absence of enough parking facilities.

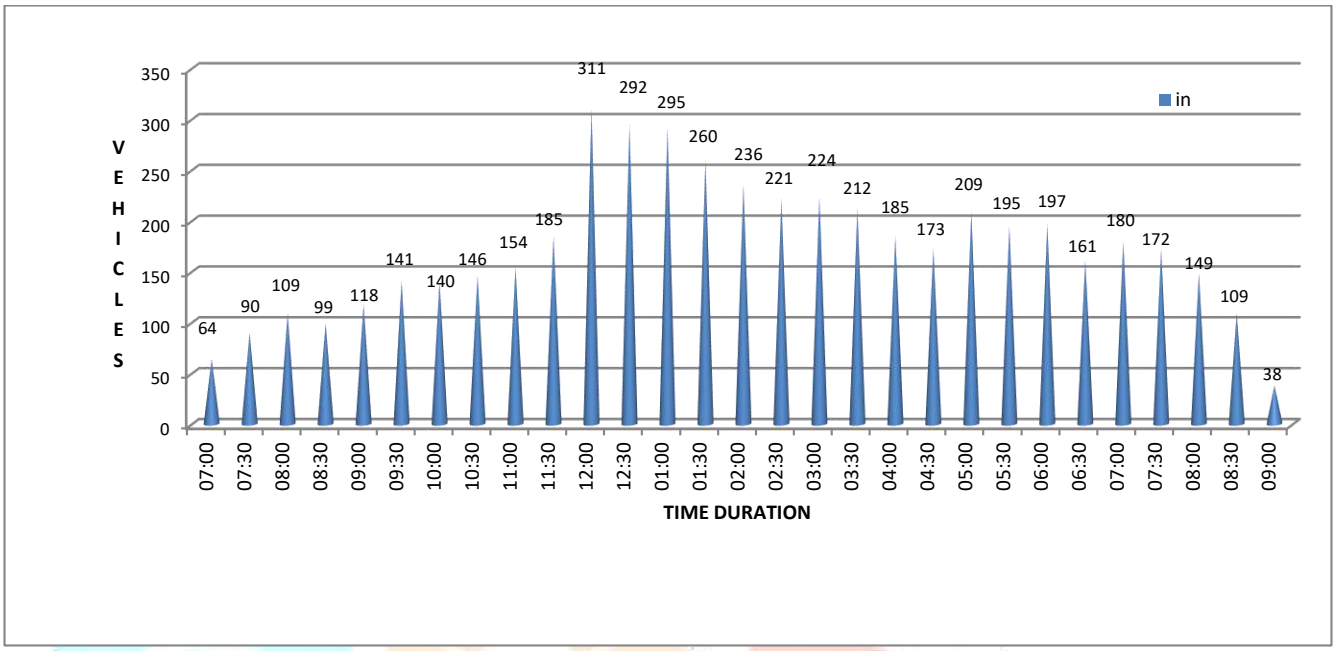

Fig.7 Vehicle accumulation in lanes.

The above figure shows the total count of the vehicles parked in the area each lane. This bar chart shows that from 12.00 noon to 1.00 pm there is maximum peak of 311 vehicles parked in all lanes, indicating congestion and thereafter disrupting the government public transport system.

The on-streetcar parking causes traffic due lack of pavement width available for traffic movement and also causes hindrance to the flow during parking manoeuvre.

3.3 PARKING DEMAND:

As it has been analysed from the survey data that in parking lot area even on having only capacity of 550 vehicles per day, the present scenario shows that around 711 vehicles are parked at peak hour and on an average more than 150 vehicles are not allowed to park because of insufficient place of parking in addition to 311 number of vehicles parked in lanes which leads to congestion. For proposing any facility to the above demand, we need to analyse the futuristic growth of traffic in that area. As Naigaon comes under Vasai-Virar Administration we have derived the futuristic growth rate of traffic for Palghar District which will assure us with the increasing demand of parking facilities in such areas. A simple linear regression model was performed considering traffic growth as independent variable and per capita income as dependent variable to estimate the growth rate of 2- wheelers.

Table 2. Regression Analysis

REGRESSION OUTPUT FOR TWO WHEELERS								
Regression Statistics								
Multiple R	0.995							
R Square	0.991							
Adjusted R Square	0.989							
Standard Error	0.021							
Observations	6.000							
ANOVA								
	df	*SS*	*MS*	*F*	*Significance F*			
Regression	1.000	0.194	0.194	438.348	0.000			
Residual	4.000	0.002	0.000					
Total	5.000	0.196						
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	-0.285	0.697	-0.409	0.704	-2.219	1.650	-2.219	1.650
X Variable 1	1.202	0.057	20.937	0.000	1.043	1.361	1.043	1.361

Table 3. Projected Annual Traffic Growth.

Sr. No.	Vehicle Type	Projected Annual Traffic Growth Rates											
		Pessimistic Approach				Normal Approach				Optimistic Approach			
		2019-24	2024-29	2029-34	Beyond 2034	2019-24	2024-29	2029-34	Beyond 2034	2019-24	2024-29	2029-34	Beyond 2034
1	2 Wheeler (PCI)	8.10	7.70	6.60	5.30	11.20	10.60	9.10	7.40	14.80	14.00	12.00	9.70

Since the growth rate of vehicles from 2019 to 2024 is 11.2%, the estimated parking requirement escalates up to 2055 vehicles at peak hours, which turns infeasible with existing 550 vehicles facility.

4. Multi Storey Parking Facility Plans

As per the survey analyses, the G+2 with basement multilevel parking is proposed in order to avoid the existing parking challenge.

Table 4. Area for parking

Type	Length	width
Non gear	1.9	0.7
MC with gear (125cc)	1.9	0.6
MC with gear(150cc)	2	0.7
MC with gear(180cc)	2	0.7
MC with gear(200)	2	0.7
MC with gear(220)	2.1	0.7

In the survey it was found that most of the bikes range from 125-180cc, therefore the parking space was considered as 2m x 0.75m.

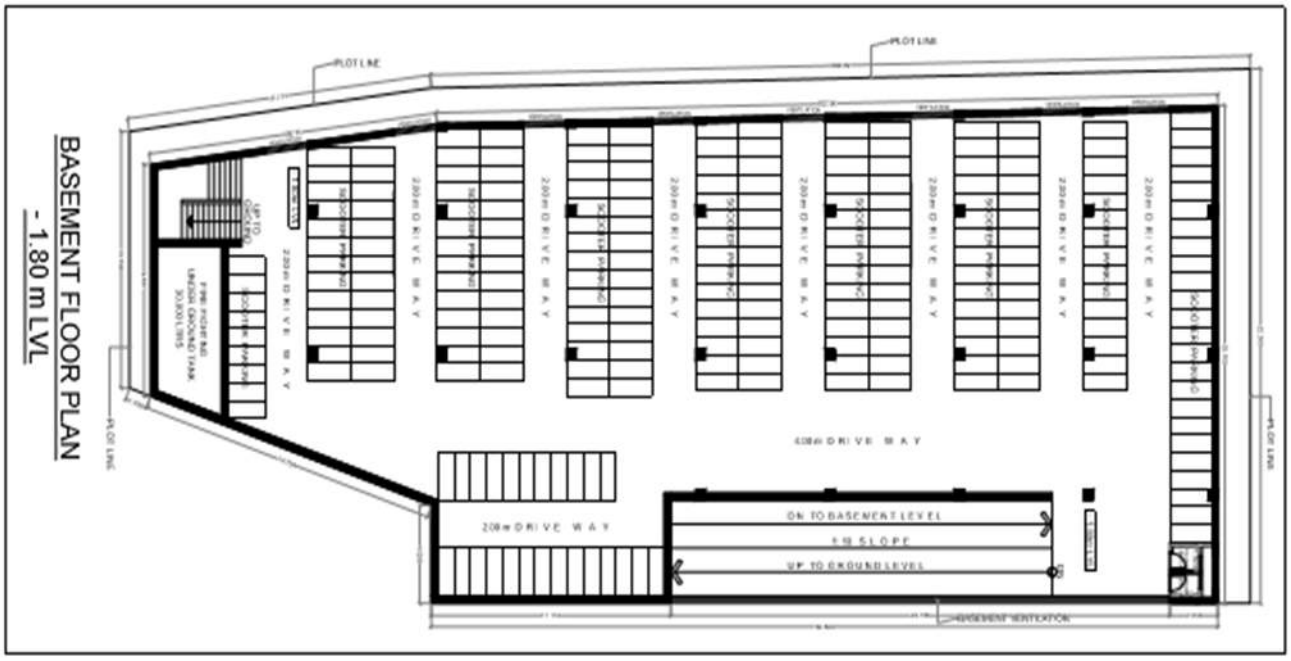

Fig.8 Basement floor plan

Considering the available plot area of 1029.6 sq.m area, planning was executed. With reference to above parking space standard, the capacity of basement floor is planned for 300 bikes with driveway of 2m.

From ground floor to basement, the ramp is provided with slope of 1:10, 2 ramps are provided of 2m width. Staircase is provided connecting basement with ground floor.

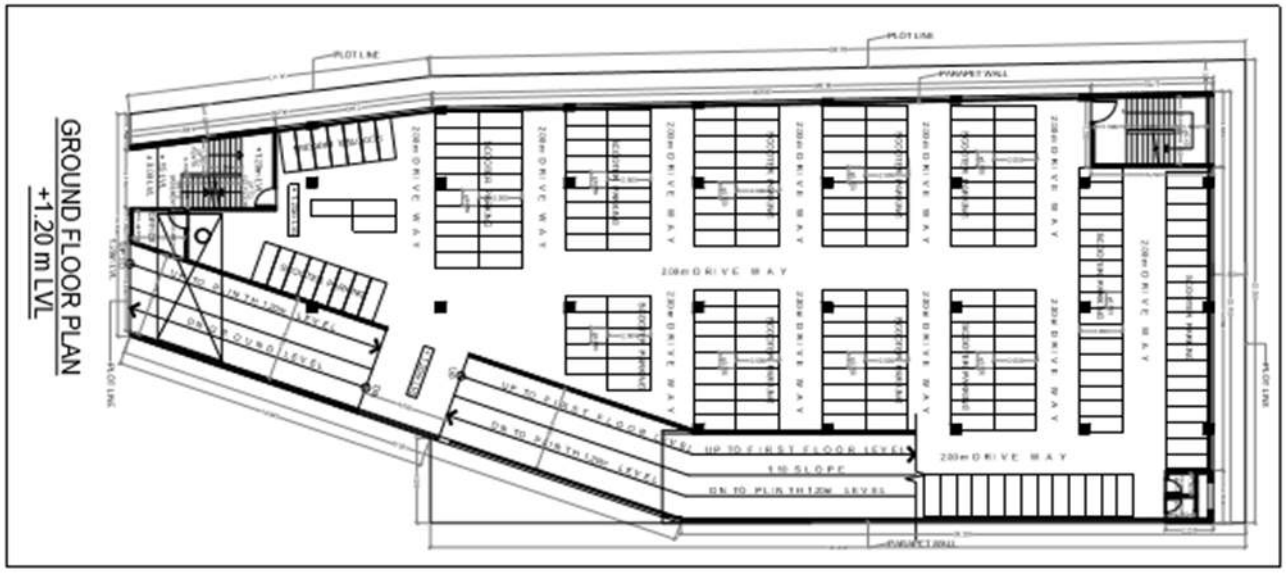

Fig.8 Ground floor plan

As per ground floor planning parking space for 240 bikes is available with 2m driveway. Two staircases are provided i.e., one in front and one in back. Two ramps are provided with slope of 1:10 with 2m width. Office space is provided for official work. Separate toilets are provided.

JAMSHID ADI BHIWANDIWALLA

Digitally signed by JAMSHID ADI BHIWANDIWALLA
DN: c=IN, o=Personal, postalCode=400102, l=Mumbai, st=Maharashtra, street=Beheram Baug, Jogeshwari West S.O, Maharashtra India- 400102-2/101,Meherabad Behram Baug Parsi Colony, title=9991, 2.5.4.20=9220a4d196fbc43778bff4989036659ea7c69c4847304a80878b156058c04ec3, serialNumber=adb0d20b78fac79601b296d699d280e3a1823edeade60bbd2d5814ea9e72bdcd, email=principal@aditya-arch.edu.in, cn=JAMSHID ADI BHIWANDIWALLA
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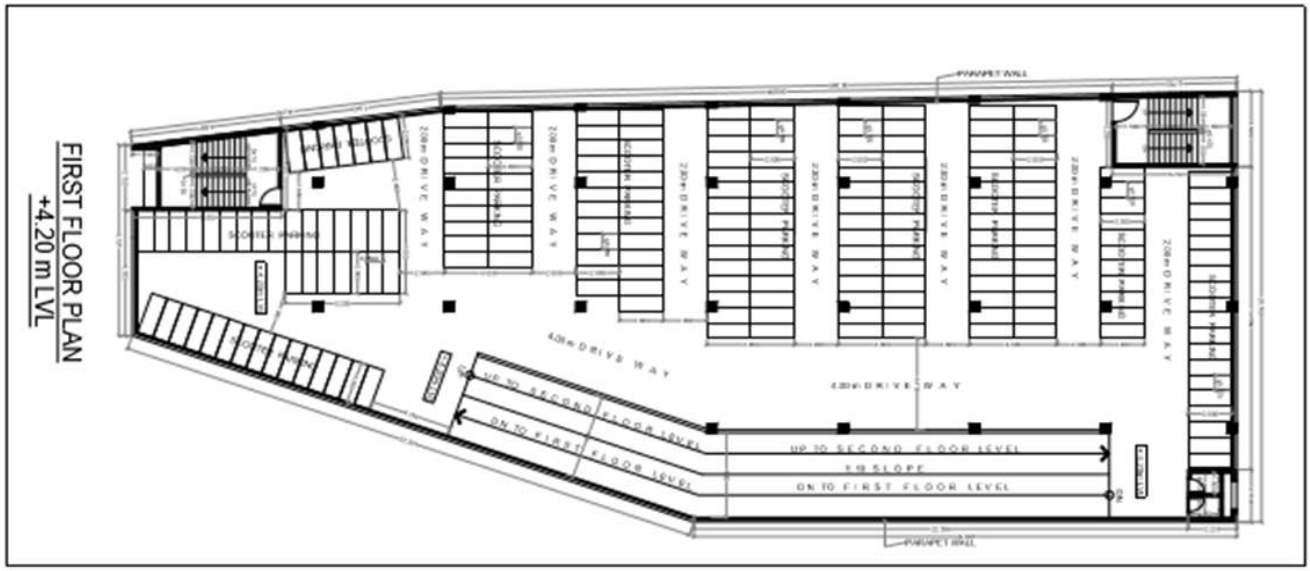

Fig.9 First floor plan & Second Floor plan.

The planning of parking space for 230 bikes is available with 2m driveway. Two staircases are provided i.e., one in front and one in back. Two ramps are provided with slope of 1:10 with 2m width. Separate toilets are provided. Second floor is provided open to sky.

5. CONCLUSION

- The average demand of parking is more than the actual supply which get from the field survey.
- The ratio of the demand and supply is 1.42 during peak hours.
- There is no doubt that the lack of parking facilities is already exists in the Naigaon Station area according to the demand of the parking.
- The functionality of the buildings & much intersection of the roads are responsible for which the illegal parking on the roads occurs.
- Based on the analysis it has been concluded that there is huge parking requirement near this station and there is necessity of solution that is multilevel parking.
- The variation of growth of vehicular demand and population multi-storey parking lot is planned which can accommodate minimum of 1000 bikes.
- Also, the cost estimation of the project will be done which will aid government to show interest for investment in parking-related public project. The invested money can be regained by charging vehicle owner for parking on time base.

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Empowering Communities in Waterfront Development: The Role of Participatory Design in Theoretical Processes

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ABSTRACT

Waterfront development projects are not only about reshaping the physical landscape but also offer opportunities for the empowerment of local communities. This research paper explores the significance of participatory design in waterfront development and how it contributes to empowering communities. By examining theoretical processes, case studies, and success stories, this study underscores the importance of community engagement, decision-making, and sustainable development in waterfront areas.

Index Terms **- Waterfront development, participatory design, community empowerment, theoretical processes, case studies, sustainable development, community engagement, decision-making, urban planning, and inclusive development.**

INTRODUCTION

Waterfront development projects are not mere undertakings in urban transformation; they are the canvas upon which the future of communities is painted. As cities around the world grapple with the complex task of reshaping their waterfront areas, one aspect emerges as paramount—the empowerment of local communities. This research paper embarks on an exploration of the multifaceted relationship between waterfront development and community empowerment, focusing on the role of participatory design in shaping more sustainable, inclusive, and thriving waterfront areas.

In the wake of urbanization and globalization, waterfronts have become sites of immense potential. Yet, this potential often remains untapped, leaving behind communities whose voices are drowned in the waves of progress. The revitalization of waterfronts is not merely a process of redesigning physical spaces; it is an opportunity to empower communities and enhance their quality of life. This endeavor calls for an approach that places community members at the center of decision-making, known as participatory design.

Participatory design is a concept deeply rooted in community engagement, where individuals and groups actively contribute to the planning and design of spaces that affect their lives. It entails a departure from conventional top-down planning processes, shifting the focus to inclusivity, democracy, and sustainable development [1]. The theoretical foundation of participatory design in the context of waterfront development rests on principles of collaboration, empowerment, and meaningful participation. As Sanoff (2005) suggests, community participation in riverfront development can foster an environment of collective ownership and stewardship, ensuring that the voices of the community are heard and valued [1].

The power of participatory design lies in its potential to empower local communities, economically, socially, and environmentally. Goudie, Khan, and Kilian (1999) emphasize the transformative capacity of community involvement in projects like waterfront development, highlighting the potential for black empowerment, heritage preservation, and identity formation beyond historical constraints [2]. Participation not only results in better-designed spaces but also enhances the collective identity and sense of belonging among community members.

Shepard (1993) reflects on the broader implications of community empowerment, emphasizing its significance in addressing complex societal issues [3]. Empowered communities are more equipped to address environmental challenges, such as brownfield redevelopment, as Gute (2006) suggests [4]. The transformation of waterfront areas is not merely an aesthetic pursuit; it is a response to environmental concerns and a commitment to sustainability.

Furthermore, community empowerment does not exist in isolation but is interwoven with the policy landscape. As Clark, Southern, and Beer (2007) contend, the governance structure and policies play a crucial role in enabling

community empowerment, as they discovered in their case study of the Isle of Wight [5]. Effective policy frameworks encourage and support community involvement in urban development and waterfront transformation.
This research paper delves into the heart of the theoretical processes underpinning community empowerment through participatory design in waterfront development. By examining the principles, mechanisms, and benefits of community engagement, we aim to underscore the importance of giving voice to communities in shaping the future of their waterfront areas. The paper also draws insights from practical case studies that showcase how participatory design can translate theory into real-world success stories. In doing so, it illuminates the path toward a more inclusive, sustainable, and thriving urban waterfront landscape.

As we navigate through the dimensions of community empowerment in waterfront development and explore various participatory design methods, it becomes evident that participation is not a passive process but a dynamic force that transcends the theoretical realm. By bringing communities into the decision-making process, we foster a sense of collective responsibility and shared achievement, shaping waterfront areas that are both aesthetically pleasing and socially vibrant. Our journey is a testament to the potential of participatory design to transform not only physical spaces but the lives of the people who call these waterfronts home.

In the following sections, we embark on this exploration, drawing on the theoretical foundations, real-world case studies, and the voices of communities to unravel the multifaceted relationship between waterfront development and community empowerment..

THEORETICAL FRAMEWORK

Participatory design in waterfront development is founded on a robust theoretical framework that emphasizes the principles of community engagement, empowerment, and collaborative urban planning. It seeks to integrate the knowledge and insights of local communities into the design process. The theoretical foundation is rooted in the belief that the people who live and work in a waterfront area have valuable perspectives and expertise that should inform the planning and development of these spaces.

The core principles of participatory design in waterfront development are inclusivity, collaboration, and shared decision-making. It recognizes the importance of involving community members in shaping the future of their waterfront areas. This section explores these principles in greater detail, emphasizing that participatory design isn't just a concept; it's a commitment to valuing community input.

In participatory design, the community becomes an active participant in the design and decision-making process, moving beyond the role of passive observers. The theoretical framework highlights the importance of creating an environment where community members feel empowered to voice their ideas, concerns, and aspirations for their waterfront spaces. It underscores the need for transparent communication and mutual respect between designers, planners, and community members.

COMMUNITY EMPOWERMENT IN WATERFRONT DEVELOPMENT

Community empowerment in the context of waterfront development is multi-faceted. This section delves into the various dimensions of community empowerment, focusing on how participatory design enhances the economic, social, and environmental empowerment of communities.

Economically, community empowerment means providing opportunities for local businesses, entrepreneurs, and residents to benefit from the development of waterfront areas. Participatory design ensures that economic activities are aligned with the needs and aspirations of the community, promoting sustainable livelihoods and equitable economic growth. Case studies will be explored to illustrate how community involvement in the design process can lead to economic empowerment.

Social empowerment involves fostering a sense of ownership and belonging within the community. Through participatory design, waterfront areas can become vibrant, inclusive spaces where residents feel a strong connection. This section discusses how involving the community in planning decisions contributes to enhanced social cohesion, reduced social inequalities, and a higher quality of life for residents.

Environmentally, community empowerment means that residents are actively engaged in the preservation and improvement of the natural environment surrounding their waterfront. Through participatory design, communities can take an active role in sustainable practices, environmental conservation, and green space development. Case studies will demonstrate how community involvement has resulted in environmentally empowered communities.

The section emphasizes that community empowerment isn't a passive outcome but rather a deliberate and transformative process that is advanced through participatory design in waterfront development.

PARTICIPATORY DESIGN METHODS

Participatory design in waterfront development relies on a variety of methods to engage and involve communities in the design process. This section explores these methods, including charrettes, workshops, public consultations, and other techniques that facilitate community input.

Charrettes, intensive design workshops that bring together community members, designers, and planners, serve as a key mechanism for collaborative design. Workshops provide a platform for creative brainstorming, idea sharing, and the co-creation of design concepts. They encourage the active involvement of the community in generating and refining design proposals.

Public consultations involve open dialogues with community members through public meetings, surveys, and online platforms. These consultations aim to gather input and feedback from a broad spectrum of residents and stakeholders. The collected data is then integrated into the design and planning processes.

The involvement of architects, urban planners, and local authorities in implementing these methods is essential for their success. They play a pivotal role in facilitating and guiding community engagement activities. Furthermore, this section underscores the importance of providing appropriate training and resources to ensure that these professionals can effectively harness community input in the design process.

CASE STUDIES

Case studies are the living proof of the transformative power of participatory design in waterfront development. In this section, we present detailed case studies of real-world waterfront development projects where community empowerment was a significant outcome of participatory design. These case studies will showcase the practical application of participatory design principles in various contexts.

1. The Harborfront Regeneration Project: This case study highlights a waterfront regeneration project that successfully empowered the local community. By involving residents in the decision-making process, the project led to the creation of a vibrant, economically empowered community with increased access to job opportunities and enhanced social cohesion.

2. The Riverside Greenway: The Riverside Greenway project exemplifies the transformative impact of participatory design on environmental empowerment. The community actively contributed to the creation of green spaces, promoting eco-friendly practices and fostering a stronger connection to the natural environment.

3. The Historic Waterfront Redevelopment: This case study explores the redevelopment of a historic waterfront district that had fallen into disrepair. Through a collaborative design process, residents and businesses worked together to revitalize the area, leading to significant economic empowerment and a revitalized, thriving waterfront community.

Each of these case studies illustrates the potential of participatory design in fostering community empowerment in various aspects. These practical examples demonstrate how communities have benefited from their active engagement in the design and planning of waterfront spaces.

BENEFITS AND CHALLENGES

Participatory design in waterfront development brings forth a multitude of benefits, but it also presents a unique set of challenges. This section explores these aspects to provide a comprehensive understanding of the practice.

The benefits of participatory design include improved urban planning, enhanced quality of life for residents, and the promotion of sustainable development. Community involvement leads to more responsive design solutions that address the specific needs and desires of the community. This approach can enhance the overall liveability of waterfront areas by creating spaces that reflect the values and aspirations of the residents.

Nevertheless, challenges may arise during the implementation of participatory design. Conflicting interests among community members, limitations in funding and resources, and potential project delays are challenges that must be

addressed. This section thoroughly examines both the positive outcomes and potential obstacles, highlighting the need for careful planning and effective communication to overcome challenges.

SUSTAINABILITY AND ENVIRONMENTAL CONSIDERATIONS

Sustainability is a fundamental aspect of waterfront development. This section investigates the role of participatory design in promoting sustainable practices in waterfront projects. It delves into strategies that address environmental concerns, promote green spaces, and protect natural habitats while simultaneously empowering local communities.

Participatory design encourages communities to actively engage in the preservation and improvement of the natural environment surrounding their waterfront. By involving community members in the planning and decision-making processes, sustainable practices can be integrated into the development of waterfront areas. This section emphasizes the importance of environmentally conscious planning, which includes strategies for reducing waste, conserving natural resources, and promoting biodiversity.

Green spaces within waterfront areas contribute to environmental empowerment by providing opportunities for residents to connect with nature and engage in eco-friendly activities. Participatory design encourages the creation of parks, waterfront trails, and natural habitats that enable communities to interact with and appreciate their natural surroundings. These spaces

CONCLUSION

The conclusion offers a comprehensive summary of the research findings and their implications. It underscores the importance of participatory design in waterfront development and its role in empowering communities. It reinforces the idea that community involvement should be at the heart of urban planning and waterfront development to achieve sustainable, inclusive, and thriving waterfront areas.

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Transforming Signage Systems for Bangalore Metro Stations: Analysis and Implementation Strategies

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ABSTRACT

Effective signage systems play a pivotal role in the functionality and user experience of metro stations. Bangalore, a city known for its rapid urbanization and burgeoning metro network, faces challenges in providing clear, user-friendly signage. This research paper aims to investigate the existing signage systems in Bangalore Metro stations, analyze their strengths and weaknesses, and propose strategies for transformation. By drawing insights from international best practices and considering user feedback, this paper seeks to enhance the overall passenger experience and navigation within the metro stations.

Index Terms **- signage systems, metro stations, user experience, Bangalore Metro, transformation strategies**

INTRODUCTION

Urbanization is an undeniable and pervasive global phenomenon. As cities grow, the demands on public transportation systems intensify, emphasizing the importance of efficient, accessible, and user-friendly transit networks. Bangalore, a city synonymous with rapid urbanization and burgeoning metropolitan expansion, is no exception to this trend. The city's metro network, known as the Namma Metro, has witnessed remarkable growth over the past decade, reflecting both its promise as a mode of transit and its evolving significance in the urban fabric.

Bangalore's metro system, however, is not solely defined by its physical infrastructure and timeliness. The success of a metro network is inextricably linked to the passenger experience and efficient navigation within the metro stations. At the core of this experience lies the often underestimated, yet fundamentally essential, element of signage. Effective signage systems play a pivotal role in guiding passengers through metro stations, providing crucial information on directions, facilities, and services. Signage goes beyond mere functionality; it contributes to the overall user experience, impacts safety, and reflects the city's commitment to offering world-class public transportation.

This research paper embarks on a comprehensive investigation into the existing signage systems of Bangalore Metro stations, analyzing their strengths and weaknesses, and proposing strategies for transformation. By drawing insights from international best practices and considering user feedback, this paper aims to enhance the overall passenger experience and navigation within the metro stations. In a city as dynamic as Bangalore, where urban development intertwines with diverse cultures, the transformation of signage systems is not merely a practical necessity; it is an opportunity to enrich the lives of commuters, foster a positive image of the city's public transportation system, and contribute to the continued urban transformation.

In the following sections, we will explore the importance of effective signage in public transportation, the challenges facing the current signage systems, international best practices, the impact of signage on passenger experience, and proposed strategies for transforming signage systems within Bangalore Metro stations. This research aspires to provide actionable insights that can not only enhance the efficiency and user-friendliness of the metro system but also contribute to the broader discourse on inclusive and sustainable urban development.

LITERATURE REVIEW

The effectiveness of signage systems in public transportation, particularly within metro stations, is a critical aspect of ensuring passenger satisfaction, safety, and efficient navigation. This literature review section provides an overview of the existing knowledge on this subject and sets the stage for understanding the importance of effective signage, the

challenges faced by existing systems, international best practices, and the role of signage in enhancing user experience.

Importance of Effective Signage in Metro Stations

Effective signage within metro stations is essential for several reasons. Firstly, it plays a pivotal role in ensuring passengers can quickly and easily navigate the complex layouts, multiple platforms, and diverse services offered within these transportation hubs. Clear, concise, and well-placed signage minimizes confusion, reduces dwell times, and enhances the overall commuter experience. It also contributes to passenger safety by providing critical information during emergencies, such as exit routes and evacuation procedures.

Furthermore, effective signage in metro stations contributes to the overall success and image of the transit system. A well-designed and user-centric signage system fosters a positive perception of the metro service. Passengers who experience clear and efficient navigation are more likely to have a favorable impression of the transportation system, potentially leading to increased ridership and customer loyalty.

Challenges in the Existing Signage System

While effective signage is crucial for the success of metro stations, many systems, including the Bangalore Metro, face challenges in this regard. Common issues include unclear signage, inconsistent information, limited multilingual support, and outdated design. Rapid expansion and the addition of new stations can lead to inconsistencies in signage design, making it challenging for passengers to adapt to changes.

In many cases, the challenges in existing signage systems can be attributed to the absence of standardized guidelines and design principles. Budgetary constraints and a lack of user-centered design practices have also contributed to the shortcomings in the current signage systems.

International Best Practices in Metro Station Signage

To understand what constitutes effective signage in metro stations, it is valuable to examine international best practices. Metro systems in major cities such as London, Tokyo, and New York have set high standards in terms of signage quality. Key features of effective signage include clear typography, use of pictograms and symbols for universal understanding, consistent design, and comprehensive information.

By studying these international examples, one can gain insights into the principles that contribute to an efficient and user-friendly signage system. These insights provide benchmarks for evaluating and improving the signage systems in Bangalore Metro stations.

Signage as a Tool for Enhancing User Experience

Effective signage systems can go beyond mere wayfinding. They can serve as tools for enhancing the overall user experience. The aesthetic design, cultural relevance, and accessibility of signage contribute to a sense of place and identity within a metro system. Thoughtful integration of digital displays, real-time information, and interactive elements can further enhance the usability of signage for passengers.

Additionally, a well-implemented signage system can contribute to branding and marketing efforts for the metro system, instilling a sense of trust and reliability among passengers.

METHODOLOGY

The methodology section outlines the research methods and approaches used to conduct this study on transforming signage systems for Bangalore Metro stations. The methodology is crucial in ensuring that the research objectives are met and that the findings are reliable and actionable.

Data Collection Methods

To gather information and insights, a mixed-methods approach is employed. This approach includes both quantitative and qualitative data collection techniques. The primary methods include:

Surveys: Surveys are conducted to collect quantitative data regarding passenger perceptions of the current signage system, their satisfaction levels, and specific areas of improvement. A sample of passengers from different metro stations is surveyed to ensure representation.

Case Studies: Case studies are conducted to qualitatively assess the existing signage systems in select Bangalore Metro stations. These case studies involve direct observations of signage design, placement, and content.

Survey and Case Study Approach

Surveys: The survey approach involves designing a structured questionnaire that captures relevant data. Questions are designed to assess the user-friendliness of the current signage, the clarity of information, and the overall impact of signage on the passenger experience.

Case Studies: For the case study approach, specific Bangalore Metro stations are selected for in-depth analysis. These stations are chosen based on factors such as passenger footfall, complexity of layout, and existing signage challenges. The case studies involve direct on-site observations, photographic documentation, and interviews with metro station staff.

Analysis Techniques

The data collected through surveys and case studies are analyzed using both qualitative and quantitative analysis techniques. Qualitative data from case studies are interpreted through thematic analysis to identify common patterns, challenges, and areas of improvement. Quantitative survey data are analyzed using statistical techniques to derive meaningful insights.

The combination of qualitative and quantitative analysis provides a comprehensive view of the current state of signage in Bangalore Metro stations and identifies specific issues that need to be addressed. These findings will inform the proposed transformation strategies.

CONCLUSION

The transformation of signage systems for Bangalore Metro stations is not merely a matter of aesthetic enhancement; it represents a fundamental step toward improving the overall functionality, user experience, and public perception of the metro system. This research journey, spanning the assessment of the current signage system, exploration of international best practices, and engagement with passenger feedback, has provided valuable insights into the significance of effective signage.

The literature review illuminated the pivotal role of effective signage in metro stations. It extends beyond practical wayfinding, impacting passenger satisfaction, safety, and the overall success of the transportation system. However, the challenges faced by existing signage systems are evident, often stemming from a lack of standardized design principles and user-centered practices.

International best practices served as beacons of inspiration, showcasing the impact of clear typography, universal symbols, and comprehensive information. These exemplars provided benchmarks that underscore the potential for transformation within the Bangalore Metro stations.

User experience emerged as a central theme, highlighting the importance of user-friendly signage that enhances not only navigation but also the overall impression of the metro system. Effective signage can serve as an identity and branding tool, fostering trust and reliability among passengers.

The proposed transformation strategies encompass user-centric design principles, wayfinding enhancements, and the integration of digital and traditional signage. By aligning these strategies with international best practices, Bangalore Metro can embark on a journey toward a more efficient and passenger-friendly signage system.

In conclusion, the transformation of signage systems in Bangalore Metro stations is not just a practical necessity; it is an opportunity to redefine the passenger experience and promote the city's commitment to excellence in public transportation. By implementing the proposed strategies, Bangalore Metro can foster a more positive perception, enhance passenger satisfaction, and contribute to the continued growth and success of the metro system.

RECOMMENDATIONS FOR FUTURE RESEARCH

While this research paper provides valuable insights into transforming signage systems for Bangalore Metro stations, there are several avenues for future research in the field of public transportation signage. Some recommendations for further exploration include:

1. User-Centered Design: Future research can delve deeper into user-centered design principles for signage systems, including accessibility considerations for passengers with disabilities.

2. Digital Signage Integration: As digital technology evolves, research can focus on the integration of advanced digital signage solutions, real-time information displays, and interactive features.

3. Impact on Ridership: Investigating the direct impact of improved signage on ridership and revenue generation can provide valuable insights for transportation authorities.

4. Multilingual Signage: Exploring the implementation of multilingual signage to cater to the diverse linguistic needs of passengers, particularly in multicultural cities like Bangalore.

5. Wayfinding in Complex Stations: Conducting research on signage in large and complex metro stations, where wayfinding challenges are more pronounced.

6. Impact of Signage on Safety: Studying the relationship between signage quality and passenger safety in emergency situations.

7. Signage in Other Transportation Modes: Expanding the scope to include signage systems in buses, trams, and other public transportation modes, and exploring the potential for integrated signage strategies.

Future research in these areas will contribute to the continued improvement of public transportation signage systems and the overall passenger experience.

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Revealing the Enigma: An Architectural Expedition into Hyderabad's Mysterious Mausoleums

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ABSTRACT

Hyderabad, a city steeped in history, boasts a collection of captivating mausoleums that hold the secrets of a bygone era. This research embarks on an architectural expedition to uncover the enigmatic past of these mausoleums, exploring their historical significance, intricate designs, and the mysteries that surround them. By examining their architectural features, historical context, and the preservation challenges they face, this study unravels the rich tapestry of Hyderabad's cultural heritage and the importance of conserving these historical gems.

Index Terms **- Hyderabad, mausoleums, historical significance, architectural expedition, enigmatic past, intricate designs, architectural features, preservation challenges, cultural heritage, and conservation.**

INTRODUCTION

The history of architecture is a testament to the cultural and artistic evolution of civilizations throughout the ages. In the vast tapestry of architectural heritage, the Indian subcontinent stands as a treasure trove of diverse and intricate architectural styles that have flourished over millennia. From the grandeur of the Indus Valley Civilization [1] to the intricacies of the Pallava sculptures [6] and the enchanting temples of Chamba [5], Indian architecture reflects a captivating journey through time and space.

One of the fascinating chapters in this architectural odyssey is the birth and evolution of Islamic architecture in the Indus Valley [1]. This historical narrative unveils the confluence of artistic traditions and cultural expressions, resulting in architectural marvels that continue to captivate and inspire. The emergence of Islamic architecture in this region carries a unique tale, one that has been overlooked for centuries but is now gaining recognition and admiration.

This research paper embarks on a compelling journey of rediscovering the genesis of Islamic architecture in the Indus Valley. Through a comprehensive examination of historical records, archaeological findings, and scholarly insights, we aim to shed light on this often-neglected facet of architectural history. By revisiting the roots of Islamic architectural influence in this region, we uncover a captivating narrative of cultural exchange, artistic adaptation, and the lasting impact of this architectural fusion.

As we embark on this exploration, it is important to acknowledge the pioneering works of scholars who have contributed to our understanding of ancient civilizations, such as the revelations of the Indus Valley Civilization by Lahiri [2], the cosmological perspectives on the Deccan ashmounds by Boivin [4], and the studies on the wooden temples of Chamba by Goetz [5]. Moreover, the quest for the truth behind historical artifacts, such as the Hope Diamond, as explored by Kurin [3], has enriched our comprehension of the broader historical context within which architectural developments unfolded.

This research delves into the architectural narrative of the Indus Valley, tracing the influences and cultural exchanges that led to the genesis of Islamic architecture in this region. By revisiting historical accounts, archaeological evidence, and the work of scholars who have unraveled the mysteries of the past, we aim to illuminate the vibrant heritage of Islamic architecture in the Indus Valley and its significance in the wider context of architectural history.

HISTORICAL SIGNIFICANCE

Hyderabad's mausoleums are imbued with profound historical significance, serving as captivating relics of the city's rich past. The historical context of these mausoleums unravels an intricate tapestry that spans centuries. Hyderabad itself has a storied past, characterized by a succession of dynasties and rulers, each contributing to the city's

architectural legacy. The Nizams of Hyderabad, in particular, played a pivotal role in shaping the city's identity, commissioning these grand mausoleums to serve as lasting tributes to their reign.

The QutbShahi dynasty, which reigned in the 16th and 17th centuries, laid the foundation for these remarkable architectural ensembles. The QutbShahi tombs, for instance, are testament to the early architectural advancements of Hyderabad. As we delve into the historical significance of these mausoleums, we uncover the stories of the rulers and the distinct historical periods they represent. The mausoleums stand not only as commemorative structures but also as time capsules, preserving the history of the city through their design and historical context.

ARCHITECTURAL ENIGMA

Hyderabad's mausoleums are architectural marvels that continue to perplex and enchant. In this section, we embark on a visual journey to explore the intricate designs and unique architectural features that make these mausoleums stand out. The Deccani architectural style, characterized by its distinct fusion of Persian, Indian, and Pashtun influences, plays a central role in defining the architectural enigma of these structures.

At the heart of the architectural enigma are the intricate carvings and ornamentation that adorn the mausoleums. These ornate details, meticulously etched into stone, narrate tales of craftsmanship and artistic prowess. The juxtaposition of geometric patterns, floral motifs, and calligraphy infuses life into the cold, unyielding stone, creating an aesthetic experience that transcends time.

As we delve deeper into the architectural enigma of Hyderabad's mausoleums, we come to appreciate the fusion of artistic expression, cultural diversity, and architectural innovation that these structures represent.

MAUSOLEUM MYSTERIES

Beyond their architectural beauty, Hyderabad's mausoleums are shrouded in intriguing mysteries and captivating legends. This section is a gateway to the tales and stories that have been woven around these historical monuments, stories that have persisted through generations. From whispered ghost stories that echo through the chambers of the tombs to unexplained phenomena that defy logical explanations, these mausoleums have become repositories of enigmatic narratives.

Hyderabad's mausoleums have been the subject of various myths and legends that have contributed to their enigmatic aura. Tales of hidden treasures, spectral apparitions, and secrets buried within the mausoleums have endured over time. This section is dedicated to peeling back the layers of these enigmatic stories, delving into the myths and urban legends that add an air of mystique to the historical structures. Our journey to uncover the truth behind these mysteries is an essential part of our architectural expedition.

CHALLENGES OF PRESERVATION

The preservation of Hyderabad's mausoleums presents a formidable challenge. As we venture into the heart of our expedition, it becomes evident that conserving these historical sites is fraught with hurdles and obstacles. The challenges of preservation extend from environmental factors to the pressures of urban development, each posing a unique threat to the mausoleums' longevity and integrity.

Environmental factors such as weathering, pollution, and natural decay gradually erode the structural integrity of these historical structures. Preservation efforts must contend with these elemental adversaries to safeguard the enigmatic mausoleums for future generations. The looming specter of urban development, driven by the ever-expanding city, poses a substantial challenge to the preservation of these historical sites. The need for land for infrastructure and expansion often brings mausoleums perilously close to modern structures, jeopardizing their historical context and physical well-being.

This section thoroughly investigates the challenges and threats to preserving Hyderabad's mausoleums. It is vital to understand the adversaries we face to develop effective preservation strategies and ensure the enigmatic charm of these structures remains intact.

CASE STUDIES

Our architectural expedition is enriched by detailed case studies of select mausoleums in Hyderabad. Each case study provides an intimate glimpse into the individual history, unique architectural features, and the preservation efforts undertaken for a specific mausoleum. These case studies serve as a magnifying glass, allowing us to closely examine

the intricacies of these historical structures, their individual challenges, and their significance in Hyderabad's cultural heritage.

1. The QutbShahi Tombs: These tombs are emblematic of the early architectural achievements of Hyderabad and hold the remnants of the QutbShahi dynasty. The case study reveals the extensive preservation work that has gone into restoring these tombs, showcasing the intricate stone carvings and architectural beauty of the QutbShahi period.

2. The Paigah Tombs: The Paigah Tombs are a testament to the aristocratic excellence of the Paigah nobles. This case study provides insights into the unique blend of Mughal and Rajasthani architectural influences and the preservation efforts to maintain the grandeur of these historical structures.

3. The Spanish Mosque: In the heart of Hyderabad, the Spanish Mosque stands as an architectural curiosity. The case study unravels the architectural mysteries behind this enigmatic structure, which fuses Andalusian and Persian influences. The preservation of the mosque highlights the challenges of urban development and the need for harmonious coexistence with modernity.

These case studies offer a comprehensive view of the intricacies involved in preserving Hyderabad's mausoleums, underlining the need for unique preservation strategies tailored to each structure's specific historical and architectural attributes. Our architectural expedition is not complete without this intimate examination of the individual mausoleums that contribute to the city's enigmatic allure..

CONCLUSION

In our quest to reveal the enigma of Hyderabad's mausoleums, we have explored their historical significance, architectural brilliance, and the mysteries they hold. We've discussed the challenges of preservation, examined case studies, and emphasized the role of the community. The architectural expedition underscores the need to protect these historical gems and the cultural heritage they represent.

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THE GREEN APPROACH- Efficient and Sustainable Design Alternatives through Vegetative Roofs in Indian Context

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Abstract

Global climate change has had a direct impact on climatic weather patterns. A rise in the urban heat island effect, a decline in urban air quality, restrictions on storm water management, and improved water run-off quality have all been brought about by increased urbanisation and the encroachment on green belts. At the same time, biodiversity has suffered significantly as a result. The roof of a structure, which is immediately exposed to solar radiation, has been highlighted as the component that has the potential to contribute to significant energy savings and environmental benefits. This study compares the amount of electrical energy needed to maintain specified indoor air temperatures with the amount of cooling load a building would require if different thermal insulation techniques for roofs were used instead of a conventional flat roof.

Keywords: Comparative Analysis, Software Simulation, Vegetative Flat roofs, Solar Heat ingress, Heat gain

Vegetative flat roofs for commercial buildings in composite climatic zone.

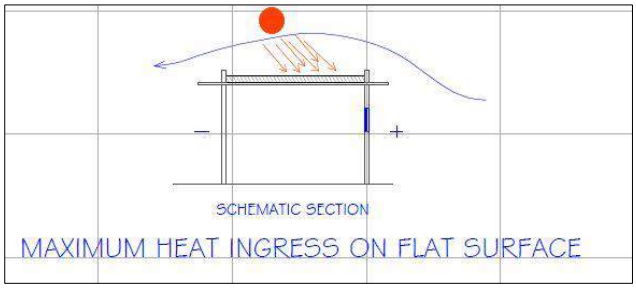
1.0 Introduction

Post the industrial revolution, urban development has undergone a rapid growth, leading to exponential expansion in the urban population of India. As is common practice, this expansion was simultaneously accompanied by a shrinkage in the urban green cover. Given the current trends, this problem is bound to grow even more severe.

Taking into account the rising levels of global climate change, the need to deploy sustainable concepts and practical solutions into every aspect of future development is of crucial importance.

Any building structure has its external walls and roof in direct exposure to the environment. The roof, in particular receives the maximum intensity of solar radiation. This increases the heat load on the building, especially during summer months.

Studies have shown that the walls and roofs contribute the maximum to heat load from solar radiation, with walls receiving 2/3 of the radiation, while roofs receiving it directly. In addition, the period of disposition for the roofs is much larger than that on the walls. This concentrated solar ingress raises the temperature inside the room due to absorption, and consequently is responsible for the increased energy consumption to cool the room.



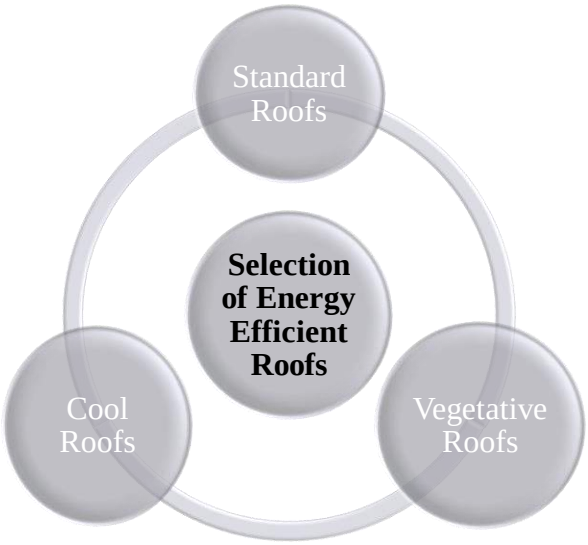
(Fig-1) Represents Schematic section showing maximum heat ingress on flat surfaces
Source: Author

Vegetative green roofs have been proven to be a sustainable solution to this problem by redirecting the solar radiation exposure towards the vegetation growth. In addition, they provide, insulation, reduce rainwater runoff, contribute to maintaining and improving the carbon-dioxide cycle and air quality—particularly in an urban landscape. A well-designed green roof also adds aesthetic and recreational value.

These environmental, social, and visual contributions that vegetative green roofs provide have been empirically observed and widely acknowledged worldwide; however, their adoption in India is severely limited as compared to the urban areas in Europe and North America.

2.0 Selection of Energy Efficient Roofs

Increasing requirement of sustainable solutions have led to the development and adoption of many popular energy efficient roofing alternatives for habitable spaces, and more innovation are always on the horizon. Thus, it is of import that a proper and careful consideration of all available options be undertaken to meet the needs of the structure. In this study, we study the energy efficiency of vegetative roofs, cool roofs, and compare them against a standard roof through simulation techniques.

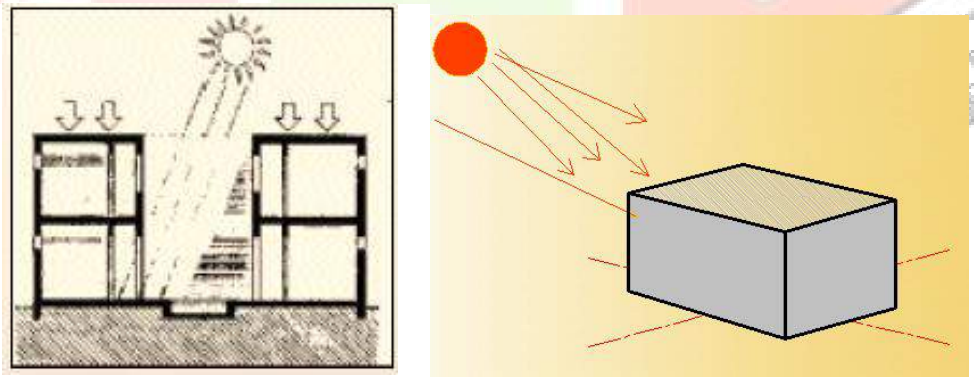


(Fig-2) Represents Schematic selection of different types of roofing techniques
Source: Author

3.0 Heat gain from roofs

The net heat gain from the building surface is the primary factor responsible for understanding the thermal loads in the structure. During summer there is heat ingress through the roof, walls, and openings, since the external temperature is higher than the internal temperature; this is the heat gain. During winter, there is heat egress thorough the walls, roof, and openings, since the external temperature is lower than the internal temperature; this is the heat loss.

For an Indian climate, solar heat gain is the primary concern, and this requires to be minimized by the selected roof structure configuration.



(Fig-3) Represents Schematic section showing maximum heat ingress on flat surfaces
Source: Author

3.1 Vegetation on Flat roofs

A vegetative roof (also referred to as a green roof) consists of thin layers of living, organic vegetation installed atop a conventional flat or sloping roof. This provides complete overlap of the roof surface which is exposed to solar radiation. These vegetative roofs can be further subdivided into two categories:

1. **Extensive vegetative roofs**: these are installations which are six inches or shallower, frequently designed to satisfy specific engineering and energy performance goals for the structure. They are an ecological alternative to conventional surface protection or ballast layers such as gravel and pavers. Being lightweight, they are easy to account for structurally.

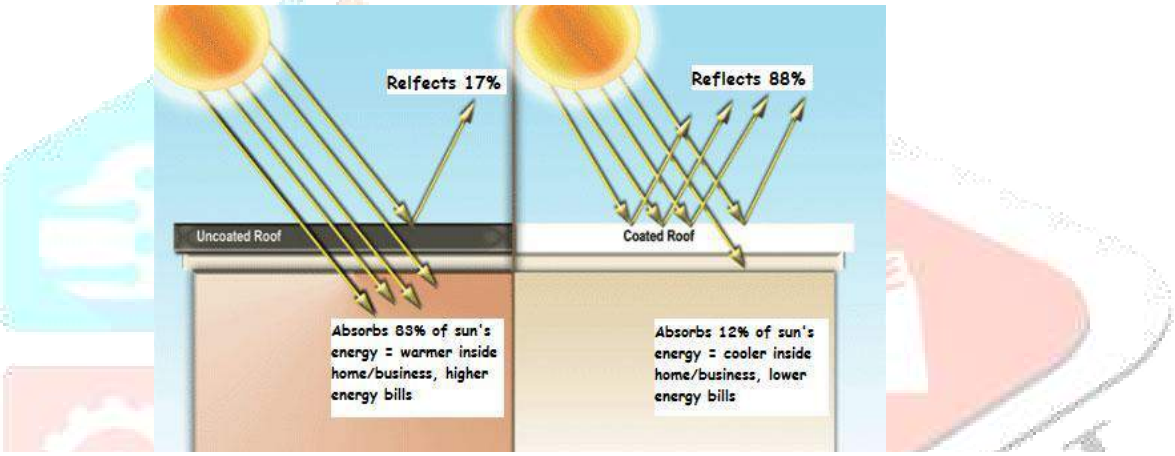
2. **Intensive vegetative roofs**: these are deeper installations, often merging into more familiar on-structure plaza landscapes with promenades, lawns, larger perennial vegetation and trees.

Such vegetative roofs provide multiple benefits including Controlling storm water runoff, improving water quality, mitigating urban heat-island effects, prolonging the service life of roofing materials, conserving energy, reducing sound reflection and transmission, improving the aesthetic environment, cost savings, etc.

3.2 Cool Flat roofs

The term cool roof is used to refer to a roofing system that is designed to deliver a higher solar reflectance (reflecting the incident solar radiation, thereby reducing its absorption) as well as a higher thermal emittance (radiate out the internal heat of the building) than the standard design. Thus, there is a considerable amount of reduction in the net heat gain in structures with cool roofs installed as compared to a similar structure with standard roofs.

They are usually constructed with applying paints with high reflectance, a sheet covering, or highly reflective tiles/shingles. In practice, the temperature reduction observed is 10-16 degrees, reducing air-conditioning requirements.



(Fig-4) Represents Schematic representation showcasing heat reflects on coated/uncoated surfaces
Source: Cool-roof-Detail-Image

3.3 Base Case Used for Simulation

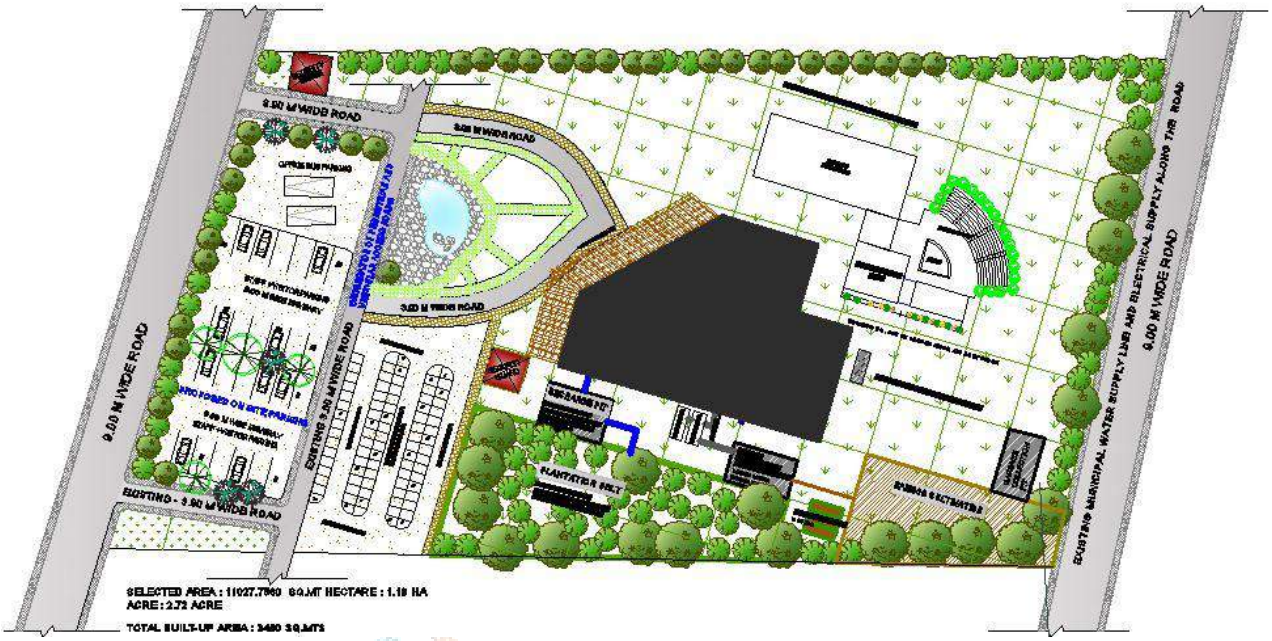
The simulation analysis was conducted on the selected application case based in Nagpur, Maharashtra, a region with composite climatic conditions.

Nagpur is situated at 21.15-degree North, which has hot and dry climate throughout the year. Generally, it experiences only 2 months of rainfall in the months of July-August, 2 months of chilly winters, and 8 months full of fierce sunlight for almost 8-9 hours/day i.e. from (10am -6pm).

The proposed site is located at Govt. Labour Institute, near SMS building IT park road, Parsodi, Nagpur, whereas the proposed IT building has a built-up area of about 3450sq.mts with G+4 structure.

Plan of IT building
Total floor Area: 754.65sq.mts

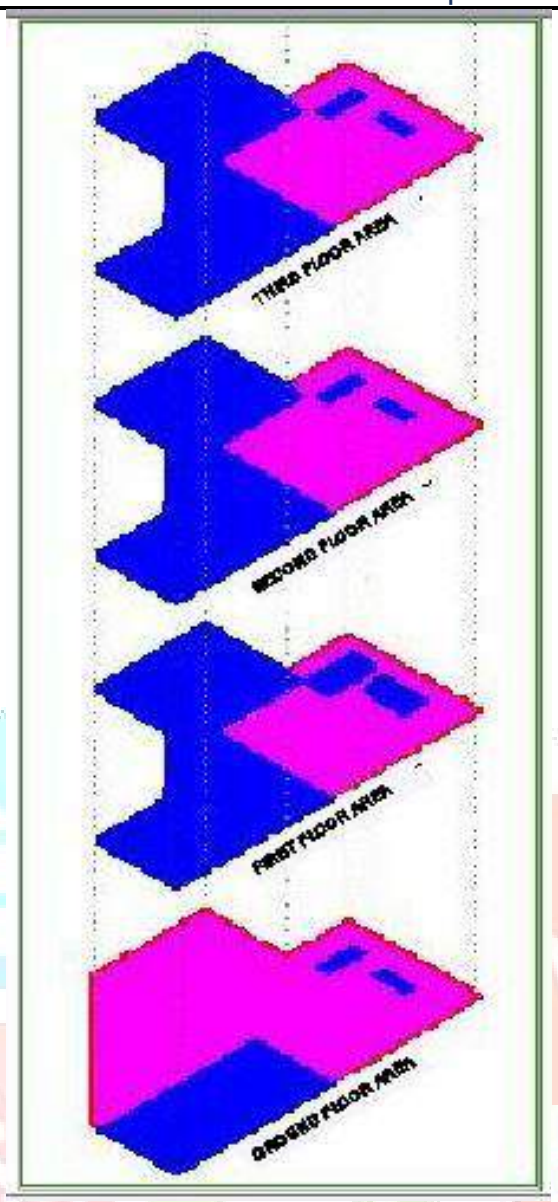
Heat Transmitted crack develops due to temperature variation (Heat and rain)



(Fig-5) Base case for simulation
Source: Author

The base case used in (Fig 5) for accessing comparative analysis with the help of simulation software in order to examine the heat gain due to direct ingress of solar radiation from roofs on energy parameters was analysed on the basis of heating/cooling loads which largely depends upon the operating hours, energy efficiency measures, sample size, climatic zone etc. on Design Builder. The floor plates at each floor showcases conditioned and nonconditioned areas, kitchen building services and active core is not conditioned. The active core consists of sustainable passive cooling strategies, thus reducing the energy load on the structure. As the building is operative on 24 hrs basis, the workstations on each floor are fully conditioned, thereby increasing the pressure on mechanical cooling systems.

Thus, this study focuses on comparison between electrical energy consumed to achieve stipulated indoor air temperatures and reduce the overall cooling load demands of a building by adopting alternative thermal insulation methods for roofs, rather than having a standard conventional flat roof.



FLOOR PLATES SHOWING CONDITIONED AND NON-CONDITIONED AREA ON EACH FLOOR

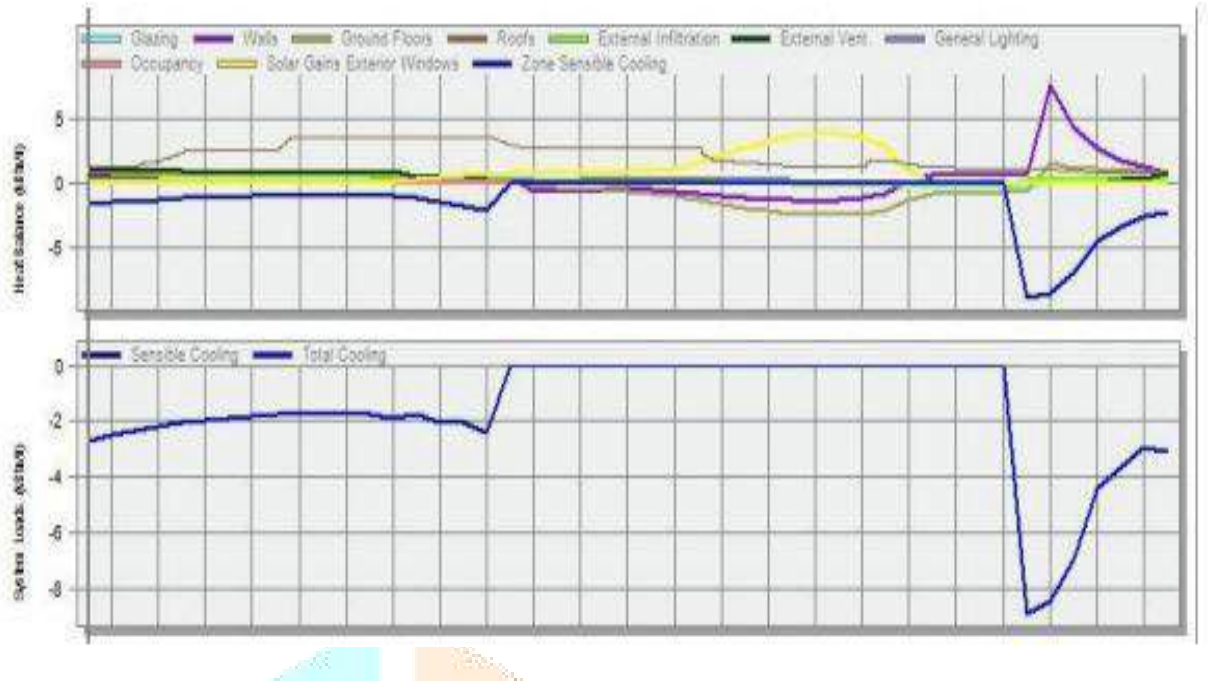
(Fig-6) Base case for simulation

Source: Author

3.4 Results of Base Case after Simulation

A. Standard Roof

First, we see the results of the simulation on a standard flat roof. The below charts graphically represent the findings. The light brown band illustrates the heat gain in the standard case, while the blue band below illustrates the cooling load required to offset the heat gain in the IT building.



(Fig-7) Graph represents cooling load required when the roof type is **Standard flat roof**
Source: Design Builder Interface

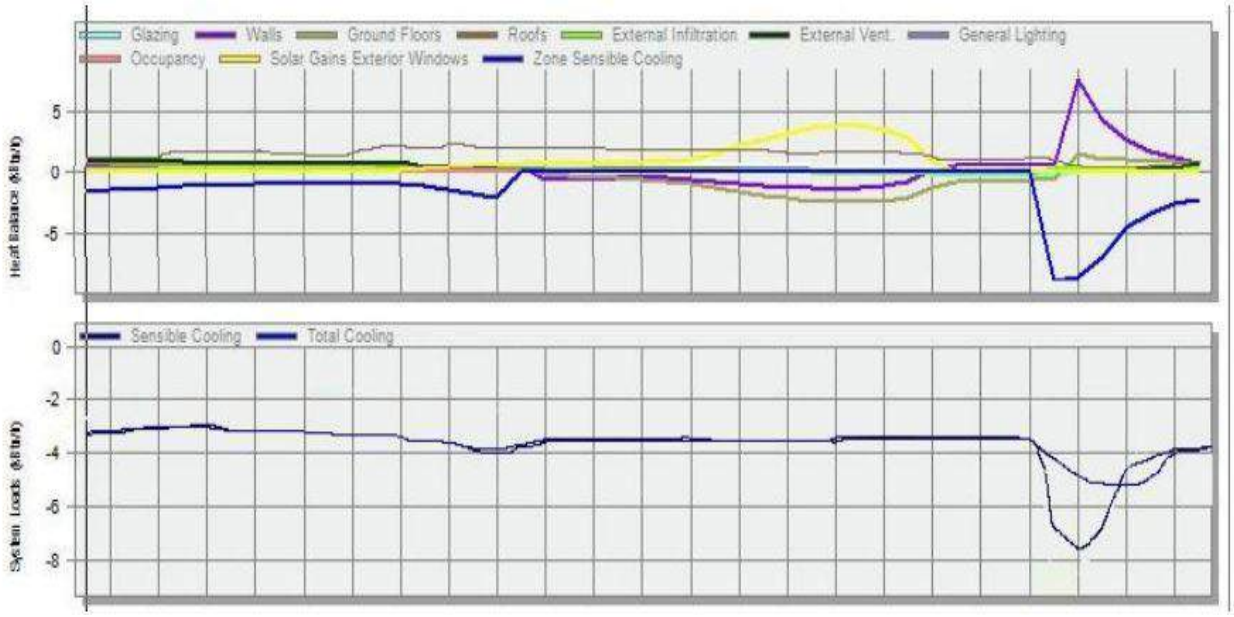
The more the Flat surface area of the roof, the more the heat gain in the structure

The higher heat gain is matched by a higher level of required cooling for the IT building

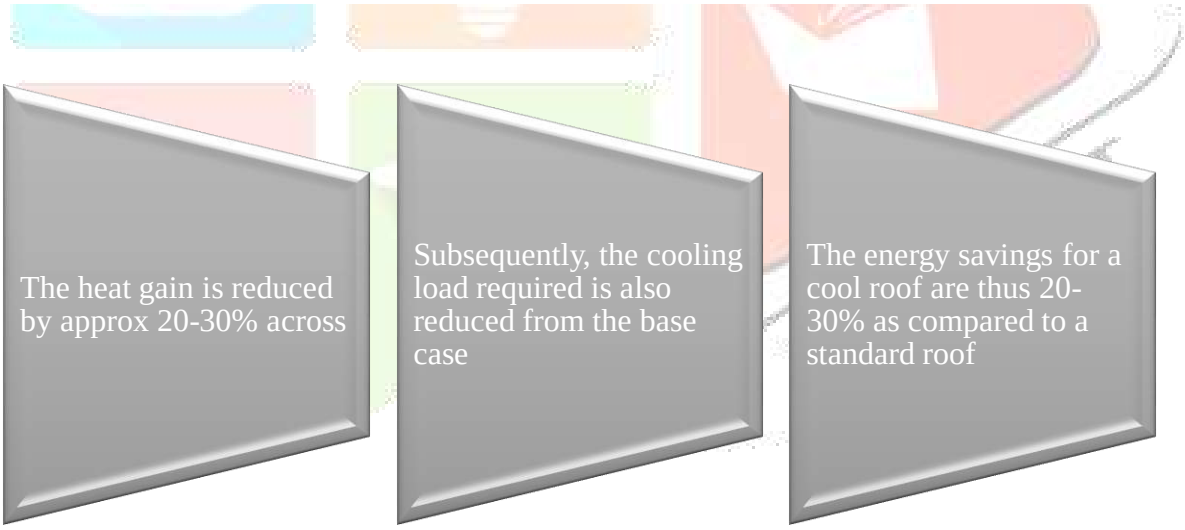
Higher cooling requirements directly correlate to higher energy consumptions

B. Cool Roof

Next, we see the results of the simulation on a cool flat roof. The below charts graphically represent the findings. The light brown band illustrates the heat gain, while the blue band below illustrates the cooling load required to offset the heat gain in the IT building.

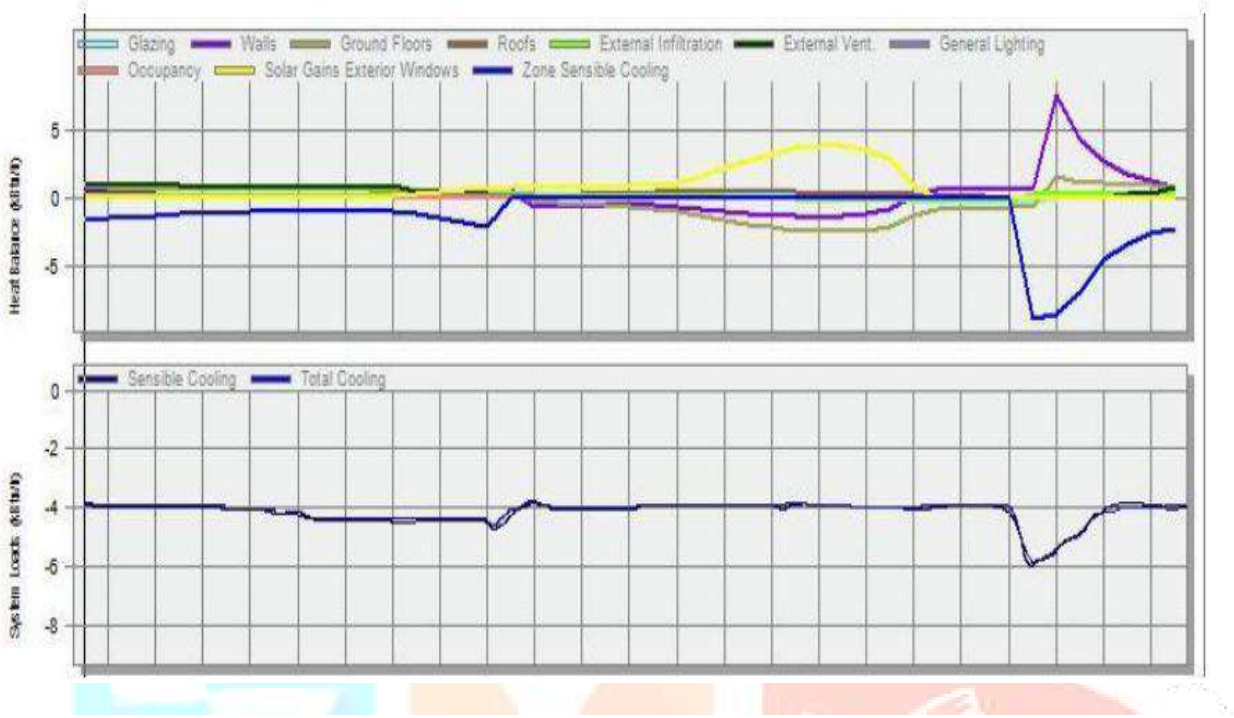


(Fig-8) Graph represents cooling load required when the roof type is **cool roofs**
Source: Design Builder Interface

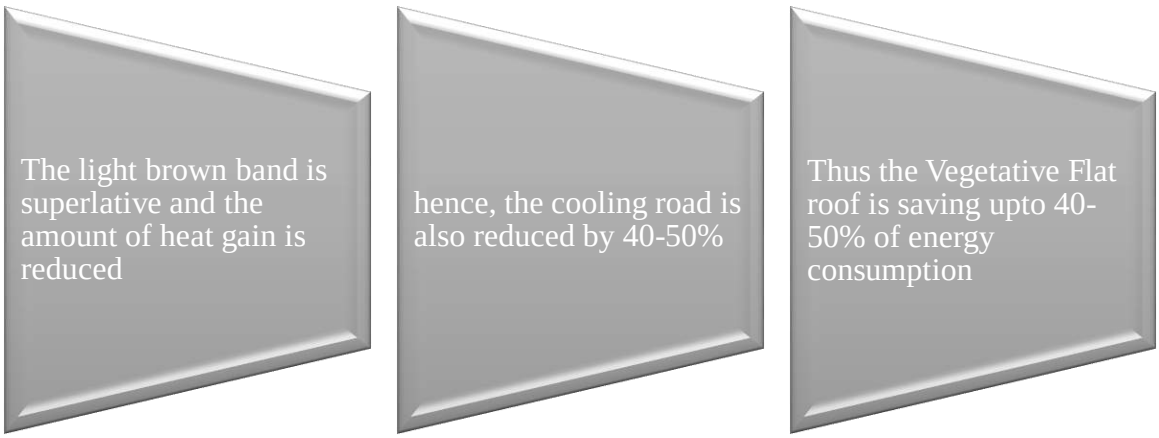


C. Vegetative Roof

Finally, we see the results of the simulation on a vegetative flat roof. The above charts graphically represent the findings. The light brown band illustrates the heat gain in the vegetative roof case, while the blue band below illustrates the cooling load required to offset the heat gain in the IT building.



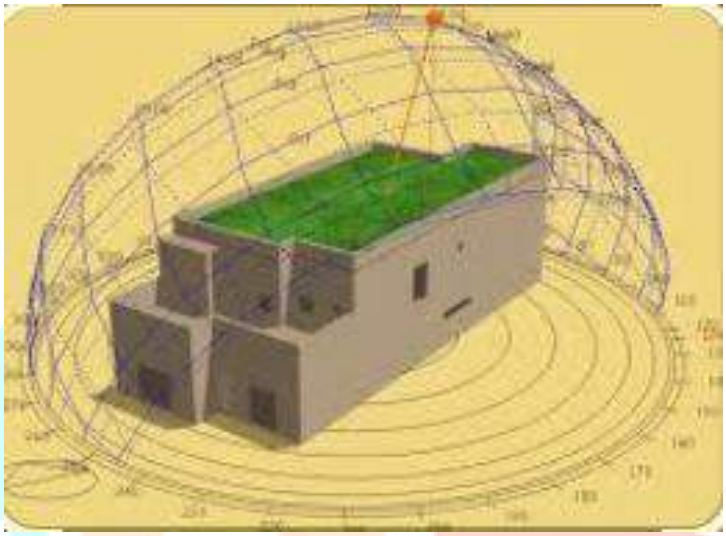
(Fig-9) Graph represents cooling load required when the roof is **Vegetative Flat roofs**
Source: Design Builder Interface



4.0 Conclusion

The current worsening state of the global climate change requires that sustainable solutions be integrated as much as possible. Environmentally responsible and sustainable roofing practices provide positive results, and vegetative roofs are by far the most promising.

This study was primarily concerned with analysing the heat gain patterns on a typical conventional flat roof, and the effects that augmenting such a roof with sustainable solutions has.



(Fig-10) Schematic Representation of the Sunpath on a typical green roof
Source: Google Images

Undertaking a comparative analysis of simulated scenarios on the selected base case, we observed significant reductions in the heat gains on using sustainable solutions, with Vegetative Flat roofs surpassing all others by providing up to 50% energy savings.

This has tremendous potential for adoption in the increasingly warming Indian urban landscape, and the adoption of such a passive and promising energy saving installation will have a significant impact.

Further study should be focused on checking the cost benefit analysis and understanding what other social barriers might pose an obstacle to widespread adoption of Vegetative Green Roofs in India.

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URBAN SUITABLITY FOR STREET CHILDREN.

WHERE DO THE STREET CHILDREN REALLY BELONG?

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Abstract: There are some conversations one never forgets, and one such conversation we had with a child while undergoing our study made us realise that even though we are at a peak of global economic boom, we have failed to consider these children belonging to the streets in every aspect. Be it education or basic healthcare, the street children are often being neglected. Seldom do we hear from our authorities, any major work being undertaken for these kids.

Over the course of time spent studying these street Children, one can effectively agree that children are the first victims of the urbanisation that is being forced upon the world. There are several studies supporting my claim, that around 38000 kids live on the streets of Mumbai who are deprived of the basic facilities of food, clothing, and shelter that is required for their bare survival (according to a report published by TISS and Action Aid India, 2013). Their vulnerability is captured by the fact that two out of five of them have had to face physical, verbal, or sexual abuse and forced starvation at some point of time in their lives. Government protection like the Right to Education Act seems to bypass them, with nearly one out of four in the school-going age remaining homeless and illiterate.

Hence, we believe incorporating these kids in the planning of towns and considering them at urban level is of prime importance, to ensure the primary right of all children: the right to their childhood, for which, we need to focus on the plight of the homeless children by creating some momentum to the existing Urban planning policy to ensure that no more children are delivered up to the harshness of life on the streets by introducing temporary and modular shelters. The first step in all of this is to provide shelter to them where they can live, learn, and work without pressurising the already crowded town of Mumbai.

1. INTRODUCTION

India has witnessed a rising trend in urbanisation in the last few decades due to which there has been a sharp rise of the urban population within the country. Also, a major share of the country's GDP now comes from Mumbai, the commercial capital of the country. Since this maximum city is the breeding ground of economic development, there is a need to realise that for the economy to operate with higher productivity and opportunities for employment, the infrastructure needs to improve to attain an increased economic development. The urban governance system is majorly responsible for the economic development of cities in India.

There are a large number of migrants coming to Mumbai from almost all parts of the country which has led to a steep rise in the homeless population. Now, elaborating about 'Children' in this context, they hold a special place in the society as they symbolise innocence, virtue, and the future. In spite of this, they are a vulnerable population group especially in Mumbai, because their ability to defend their rights, protect themselves against violence and fight critical situations in life is much less (almost non-existent), unlike adults. While it is difficult to identify all children in vulnerable circumstances, whether street children, abused children, destitute and trafficked children, victims of disasters and warfare, victims of child labour, etc., these children can also be classified into three broad categories –namely children in need of care and protection, children in conflict with the law and children in contact with the law, the most vulnerable of them all, being the homeless - the children that live on the streets that actually fall in all the above mentioned categories. It is therefore necessary that these children need to be provided with

opportunities for their physical, mental and emotional development. This will also encourage them to realise their full potential as human being.

The basic purpose of the research is to establish caring systems in collaboration with the state and civil society through democratic spaces for marginalised communities; in particular, children on the streets, homeless communities, and *safai karmacharis* engaged in manual scavenging.

2. METHODOLOGY

2.1 WHY SHOULD WE INVEST?

Children in poor neighbourhoods of Mumbai, like the slums of *Dharavi*, *Kherwadi* and *Mankhurd* to name a few, are isolated from urban services of the other parts of the Mumbai Metropolitan Region (MMR) and experience daily exposure to urban violence, leading to many health and social problems. Limited or lack of access to public amenities such as schools, community centres and libraries reflects the indifference or absence of public investment in these sectors of the BMC, the governing body of the city. It, therefore, fosters disillusion and discontent, giving children the impression that there is no alternative to violence, often confronted with the choice to become a member of a gang or to never leave home. Finally, with rapid urbanisation and the magnitude of the refugee crises with people coming from Uttar Pradesh, Bihar, and other states of India as well as some backward part of Maharashtra, the city is stressed to deliver public services. There are limited accurate population counts, and the current service delivery system is already under pressure. This has resulted into tensions and xenophobia between the local population and newcomers.

2.2 WHAT SHOULD WE PLAN?

Plan safe spaces for children – Both in crisis and post-crisis situations, children need educational institutions (be it on smaller or larger scale) equipment and materials for learning, social and recreational activities. Some organisations like UNICEF and other child focused NGOs like Salaam Baalak Trust provide safe spaces sometimes in combination with psychosocial support for children who are emotionally distressed after conflict experience or tragedy.

Support social urbanism – Popularly known as 'Urban Acupuncture', this type of participatory urban planning has been implemented in existing informal areas and impoverished neighbourhoods in some parts of Europe and Latin-America, using spatial design and community involvement to provide answers to physical and social pressures. This basically focuses on small-scale social infrastructures that are placed at strategically chosen locations. It addresses varied urban challenges like violence, education and severed social connectivity faced by these children.

2.3 HOW SHOULD WE PLAN?

2.3.1 Infrastructure regulations – building scale

Norms and standards to be considered for public amenities, ensuring child-focused accessibility and safety amenities for children:

- Technical security: to ensure protection and stability as well as the evacuation of children in case of an emergency (e.g., safe, and solid pathway and handrails on balconies, external fire-exits and stairs), use of building materials and construction methods that are structurally sound and protect users in the case of a disaster.
- Accessibility: minimum number of steps, availability of elevators for higher floor spaces, wide stairs, unlocked stairwells, doorways, and passages clears of obstructions, wide enough for the movement of strollers and wheelchairs.
- Safety and health: focusing on the quality of flooring by using materials that prevent growth of moulds and infections; safe access to drinking water, electricity, sanitation; natural ventilation and screening; adequate natural light for all public rooms; visible and attractive stairs to promote interaction and active use for vertical travelling of three floors or less.

- Design guidelines for public amenities, improving the use by street children
    - Comfort: Clarity in reading of spaces and lay-out of the building; and direct access to views of the outdoors and green spaces if possible or proximity to safe public outdoor space.
    - Multi-functionality: The most important issue of the current times is that of scarcity of spaces, therefore, efforts should be made to make multi-use of the available space. Hence, modularity and flexibility of the building to allow easy and affordable modifications; multi-generational programmes to foster interaction and shared benefits for different age groups, and hybrid programmes to increase public accessibility 24/7; should be taken into consideration.
    - Stimulation and Physical activity: Proving defined space for physical activity and play is a must for children. It can be introduced at various places like having a spacious lobby entrance to promote social interaction, designated space for playgrounds or playful space with collective amenities; secured space for parking bicycles and other such transportation; community-oriented amenities that enable gatherings and social interaction indoors and in the public space outdoors like courtyards, compounds, terraces, rooftops, etc.

2.3.2 Urban design and community planning – neighbourhood scale

A neighbourhood social infrastructure plan: To determine what innovation to the amenities can be incorporated as per the context in the existing infrastructure of public services such as health facilities, schools, etc. This fixed infrastructure can further be integrated with mobile centres to additionally increase coverage in the short term. Examples:

- Homogenous, one-stop urban centres where children can play and study, cultural and social events can be conducted, the community can come together for information and sharing opinions on issues such as health and nutrition.
- Childcare centres combined with multi-generation programmes that allow people of all ages to participate in the wellbeing of the society as a whole.
- Learning and co-working spaces for children and youth that encourage skill development along with education, to foster knowledge exchange and boost the idea of collaboration.
- Small scale industries, recycle centres and repair-cafes for promotion of handicrafts where people can learn to make, recycle, and repair products and optimise the use of resources.
- Child-led workshops on optimal usage of public amenities to co-define programmes; influence design; and enhance security, accessibility, safety, and comfort.

2.4 SCOPES AND LIMITATIONS

The life of the homeless children in Mumbai is so pathetic that with the little money they make by street-based jobs, such as rag picking, begging, porting, flower selling, newspaper selling, street vending, and shoe shining, they cannot afford one full meal a day, and most of the time they are left without food. It is this starvation that forces them into indulging in criminal activities, and the ultimate reward they get as a result is mob beatings or a jail term. Neglected children are a common sight here, where they are found in large numbers begging, hawking, playing, fighting, or just wandering.

Many children belonging to this stratum of the urban population struggle for survival out on the streets, sleeping on makeshift cardboard mattresses in areas like, CST, Bandra, Vikhroli, Kanjurmarg, Bhandup and Andheri. According to research conducted by TISS in 2013, there were about 38000 children living on the streets of the maximum city. Out of the people interviewed, one can rightly understand that these kids find it extremely difficult to make ends meet so they beg: shine shoes and steal, among other activities. These children find shelter mostly in areas around cinemas, bus stops, railway stations, bridges, etc. These children are further subjected to exploitation, abuse, and violence. They are trafficked into unfathomable prostitution rings, forced into ceaseless violence, and are often recruited into many other forms of modern slavery.

The consequences of the negligence of the plight of these children who are homeless are immeasurably devastating to the society as these children are virtually denied all the necessities of life as are needed for a child's physical and psychological growth. Without adequate training and education, street children suffer irreparable consequences of childhood experiences of bitterness, humiliation, hostility, and hatred.

To survive, every homeless kid must work very hard, in spite of which, they are threatened with various forms of violence. Many a times these children develop physical complications due to their hazardous nature of work and unhygienic living conditions. As a result, they become indifferent to the social norms and values. On top of that street children are at risk from HIV/AIDS because they are vulnerable to sexual abuse, early sexual initiation, and injecting drugs. To be effective on a larger front, smaller issues like HIV prevention must be targeted as an understanding of their psychosocial situation is directly related to the contexts in which these children live their lives.

Getting rid of the social stigma associated with these homeless children is necessary for the development of the society on the larger front. In the current times, several local and international humanitarian organizations are getting involved, and it has been recommended that establishment of workshop/literacy centers for these underprivileged children are necessary. At present, the city does not bear a single efficient centre for the street children that address the above-mentioned problems. Street children are a specialized group and hence it is needed for them to be treated with patience targeting many aspects like the psycho−social, mental, physical, economic, and cultural parameters. Such accommodations are very hard to find in the existing urban landscape and obviously are not given much thought about. It is therefore essential that this specific class of the society be considered by planners and designers at urban level. The target should be towards these unwanted and indifferently looked groups of the society.

2.5 CONCLUSION

The homeless population in the study area are seemingly economically poor and socially backward. Their life can be upgraded and changed for good if the following recommendations are undertaken by the policy makers:

1. As most of them are children of the migrants through 'rural push', their influx can be checked by creating various employment opportunities in rural areas where they come from.
2. The government should make provisions for night shelters, sanitation and housing facilities by incorporating them in the planning at the urban level.
3. Measures should be adopted to provide basic facilities to the slums where the street children are found in majority to make it more habitable.
4. Slums located in areas which are unhygienic and congested and where proportionate distribution of space is not feasible and where adequate monitoring of the kids becomes impossible, they should be rehabilitated and resettled.
5. There should be a study done of spaces in the city where, existing spaces like vacant land, areas under bridges and terraces above public toilets which can be used for providing temporary shelters to the homeless kids should be mapped. Further, through government schemes shelters should be built at these spots where these kids would stay and any miscreants could be checked for any illegal activity leading to the abuse of these kids.

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Shaping the Urban Energy Landscape through Regional Planning: Case Studies from Vancouver and Copenhagen

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Abstract. This research paper examines the role of regional planning in shaping the urban energy landscape. With the growth of urban areas and the corresponding increase in energy consumption, designing sustainable energy strategies for cities has become crucial. Regional planning, which involves designing and managing the physical, economic, and social development of a region, can play a crucial role in achieving this goal. This paper discusses the complex and multifaceted issues involved in the urban energy landscape, the importance of regional planning, and presents case studies from Vancouver and Copenhagen to demonstrate successful implementation. Overall, this paper highlights the critical role that regional planning plays in promoting sustainable energy practices in urban areas.

Keywords: Urban energy landscape, regional planning, sustainable energy, renewable energy sources, urbanization.

1. Introduction

Urbanization is one of the most significant global trends of the 21st century. Cities are becoming larger and more numerous, which means that they are also consuming more energy. As a result, there is a growing need to develop sustainable energy strategies for urban areas. Regional planning plays a crucial role in this process, as it can help to shape the energy landscape of urban areas. This research paper will examine the role of regional planning in shaping the urban energy landscape.

The world is becoming increasingly urbanized, with cities accounting for more than half of the global population. This trend towards urbanization is expected to continue, which means that cities will consume even more energy in the future. As a result, there is a growing need to develop sustainable energy strategies for urban areas. The urban energy landscape is a complex issue that involves a range of stakeholders and factors, including energy providers, urban planners, policymakers, and the public. Regional planning can play a crucial role in shaping the energy landscape of urban areas. By identifying areas of high energy demand and developing strategies to meet that demand through renewable energy sources, regional planning can help to promote sustainable energy practices in urban areas. This research paper will examine the role of regional planning in shaping the urban energy landscape, with a focus on case studies from Vancouver and Copenhagen. These case studies will demonstrate how regional planning can be successfully implemented to promote sustainable energy practices in urban areas.

For example, regional planning can help identify areas of high energy demand in urban areas, such as commercial and industrial areas, and develop strategies to meet that demand through renewable energy sources. This may involve the installation of solar panels on buildings, the development of wind energy projects, or the implementation of district heating and cooling systems. Regional planning can also promote energy efficiency by identifying ways to reduce energy consumption in buildings and transportation. This may involve the implementation of building codes that require energy-efficient designs and materials, or the development of public transportation systems that reduce reliance on individual vehicles. Through these strategies, regional planning can play a crucial role in shaping the energy landscape of urban areas and promoting sustainable energy practices.

1.1 Problem Statement

The urban energy landscape is a complex issue that requires a holistic approach to address. As urbanization continues to grow and energy consumption increases, there is an urgent need to develop sustainable energy strategies for urban areas. The energy landscape of cities involves a range of stakeholders, including energy providers, urban planners, policymakers, and the public. Furthermore, the energy landscape is influenced by a range of factors, such as population growth, economic development, and technological innovation. Despite the importance of developing sustainable energy strategies, there are still significant challenges that must be addressed. For example, many urban areas still rely heavily on fossil fuels, and there is often a lack of political will to invest in renewable energy sources. Therefore, the problem statement is: How can regional planning effectively shape the urban energy

landscape to promote sustainable energy practices, and what are the barriers and challenges to achieving this goal?

1.2 Background

The energy landscape of urban areas is complex and multifaceted. It involves a wide range of stakeholders, including energy providers, urban planners, policymakers, and the public. At the same time, the energy landscape is also influenced by a range of factors, such as population growth, economic development, and technological innovation. As a result, designing sustainable energy strategies for urban areas requires a holistic approach that takes into account a range of factors and stakeholders.

2. Definitions

2.1 Urban Energy Landscape

The energy landscape of urban areas refers to the complex web of energy sources, infrastructure, and consumption patterns in cities. This includes everything from electricity generation to transportation fuels, and it is influenced by a range of factors such as population density, economic activity, and urban planning.

2.2 Regional Planning

Regional planning refers to the process of designing and managing the physical, economic, and social development of a region. It involves identifying and addressing the needs and priorities of the region, and developing strategies to promote sustainable development.

2.3 Sustainable Energy

Sustainable energy refers to energy sources that are renewable, environmentally friendly, and economically viable over the long term. This includes sources such as solar, wind, hydro, and geothermal energy, as well as energy efficiency measures and conservation practices.

2.4 Renewable Energy Sources

Renewable energy sources are sources of energy that are replenished naturally and do not deplete over time. Examples include solar, wind, hydro, and geothermal energy.

2.5 Fossil Fuels

Fossil fuels are non-renewable sources of energy that are derived from the remains of dead plants and animals. Examples include coal, oil, and natural gas.

2.6 District Heating and Cooling Systems

District heating and cooling systems are centralized systems that provide heating and cooling services to multiple buildings within a defined area. They typically involve the use of a central plant that generates heat or cold, which is then distributed through a network of pipes to individual buildings

3. Regional Planning

Regional planning is directly related to this paper as it plays a crucial role in shaping the urban energy landscape. Regional planning involves designing and managing the physical, economic, and social development of a region, and it can help to identify areas of high energy demand in urban areas and develop strategies to meet that demand through renewable energy sources. It involves a range of stakeholders, including local government officials, community groups, and private sector actors. The goal of regional planning is to promote sustainable development that balances economic growth with environmental protection and social equity.

Regional planning can also promote energy efficiency by identifying ways to reduce energy consumption in buildings and transportation. By implementing renewable energy sources and energy efficiency measures, regional planning can contribute to reducing greenhouse gas emissions and addressing climate change. Moreover, regional planning can address social and economic issues related to energy, such as energy affordability and access. Therefore, regional planning is essential for promoting sustainable energy practices in urban areas and achieving a sustainable and resilient energy future.

3.1 Advantages of Regional planning

Regional planning offers several advantages for shaping the urban energy landscape and promoting sustainable energy practices:

- Comprehensive Approach: Regional planning takes a holistic approach to development, considering multiple factors such as land use, transportation, and energy. This allows for a comprehensive approach to energy planning, which can help to identify opportunities for renewable energy sources and energy efficiency measures that would otherwise be missed.
- Collaboration: Regional planning involves collaboration between various stakeholders, including policymakers, energy providers, and the public. This collaboration can help to build support for sustainable energy practices, identify barriers to implementation, and develop solutions that work for all parties involved.
- Long-Term Planning: Regional planning takes a long-term perspective, which is critical for addressing the challenges of climate change and

energy security. By identifying and implementing sustainable energy practices, regional planning can help to reduce greenhouse gas emissions and mitigate the impacts of climate change.

- Efficiency and Cost Savings: Regional planning can promote energy efficiency measures, such as building codes and transportation systems, that can reduce energy consumption and save money for individuals and businesses.
- Resilience: Regional planning can help to build resilience to the impacts of climate change and energy shocks, such as power outages or price spikes. By diversifying energy sources and promoting decentralized energy systems, regional planning can help to reduce the vulnerability of urban areas to these risks.

Overall, regional planning is an important tool for shaping the urban energy landscape and promoting sustainable energy practices. It can help to build a more resilient, affordable, and sustainable energy future for urban areas.

3.2 Determination of Regional planning

Regional planning is typically determined through a collaborative process that involves a range of stakeholders, including policymakers, urban planners, energy providers, and the public. The process typically involves several stages, including:

Assessment: The first step in regional planning is to assess the current state of the region and identify key energy-related issues and challenges. This assessment may involve analyzing energy consumption patterns, greenhouse gas emissions, and energy infrastructure.

Goal Setting: Once the assessment is complete, the next step is to set goals and objectives for the region. These goals may include increasing the use of renewable energy sources, reducing greenhouse gas emissions, and improving energy efficiency.

Strategy Development: With the goals and objectives in place, the next step is to develop strategies for achieving them. This may involve identifying opportunities for renewable energy development, promoting energy efficiency measures, and developing policies and regulations to support sustainable energy practices.

Implementation: Once the strategies are developed, the next step is to implement them. This may involve working with energy providers to develop new renewable energy projects, promoting energy-efficient building codes and transportation systems, and providing incentives to encourage the adoption of sustainable energy practices.

Monitoring and Evaluation: Finally, the regional planning process involves monitoring and evaluating the effectiveness of the strategies implemented. This may involve tracking energy consumption, greenhouse gas emissions, and other indicators of progress, and making adjustments as needed to ensure that the region is on track to meet its goals.

Overall, regional planning is a collaborative process that involves assessing the needs and priorities of the region, setting goals and objectives, developing strategies, implementing those strategies, and monitoring progress towards achieving those goals. The process is iterative and ongoing, as the energy landscape of urban areas is constantly evolving.

3.3 Benefits of Regional planning

Regional planning offers several benefits for shaping the urban energy landscape and promoting sustainable energy practices:

Improved Energy Efficiency: Regional planning can promote energy-efficient buildings and transportation systems, reducing energy consumption and saving money for individuals and businesses.

Increased Renewable Energy Use: Regional planning can help to identify opportunities for renewable energy development and promote the use of clean energy sources such as solar, wind, and geothermal power.

Reduced Greenhouse Gas Emissions: By promoting renewable energy sources and energy efficiency measures, regional planning can help to reduce greenhouse gas emissions and address climate change.

Enhanced Energy Security: Regional planning can promote decentralized energy systems, reducing reliance on centralized power grids and increasing energy security.

Economic Development: Regional planning can promote the development of new industries and job opportunities in the renewable energy sector.

Social and Environmental Benefits: By reducing pollution and improving energy access and affordability, regional planning can have significant social and environmental benefits for urban areas.

Resilience: Regional planning can help to build resilience to the impacts of climate change and energy shocks, such as power outages or price spikes.

Overall, regional planning can help to build a more sustainable, resilient, and equitable energy future for urban areas, promoting economic, social, and environmental benefits for communities.

4. Case Study

Certainly, here are two case studies from Vancouver and Copenhagen that illustrate how regional planning can shape the urban energy landscape:

4.1 Vancouver's Renewable City Strategy

Vancouver's Renewable City Strategy is an ambitious plan to transition the city to 100% renewable energy by 2050. The plan, developed in 2015, includes a range of initiatives and targets aimed at reducing greenhouse gas emissions,

promoting energy efficiency, and increasing the use of renewable energy sources.

Some of the key initiatives included in the Renewable City Strategy are:

Building Energy Retrofit Program: This program offers incentives and support for building owners to improve energy efficiency and reduce greenhouse gas emissions.

Renewable Energy Programs: The city is promoting the development of renewable energy projects, such as solar and wind power, through a range of initiatives, including community-owned renewable energy projects and partnerships with the private sector.

Electric Vehicle Charging Infrastructure: The city is investing in electric vehicle charging infrastructure to promote the adoption of electric vehicles and reduce emissions from transportation.

Image 1: Electric Vehicle Charging Infrastructure

Zero Emissions Building Plan: The plan requires all new buildings to be designed and built to achieve zero emissions by 2030.

The Renewable City Strategy is an excellent example of regional planning in action, demonstrating how a comprehensive, collaborative approach can shape the urban energy landscape and promote sustainable energy practices.

4.2 Copenhagen's Climate Plan

Copenhagen's Climate Plan is a comprehensive strategy for reducing the city's greenhouse gas emissions and transitioning to a low-carbon economy. The plan, developed in 2009, includes a range of initiatives aimed at promoting energy efficiency, increasing the use of renewable energy sources, and reducing emissions from transportation.

Some of the key initiatives included in the Copenhagen Climate Plan are:

Energy-efficient Buildings: The plan promotes energy-efficient building standards and supports the retrofitting of existing buildings to improve energy efficiency.

District Heating: The city has developed a district heating system that uses waste heat from power plants and industry to heat buildings, reducing the need for fossil fuel-based heating systems.

Cycling Infrastructure: The city has invested in cycling infrastructure, including dedicated bike lanes and bike-share programs, to promote cycling as a sustainable mode of transportation.

Image 2: Cycling Infrastructure

Renewable Energy: The city is promoting the development of renewable energy projects, including wind and solar power, and has set a goal of becoming carbon-neutral by 2025.

Image 3: Renewable Energy: Solar Panels

The Copenhagen Climate Plan demonstrates how regional planning can shape the urban energy landscape and promote sustainable energy practices, while also creating economic opportunities and improving quality of life for residents.

5. Conclusion

The urban energy landscape is a complex and multifaceted issue that requires a holistic approach. Regional planning can play a crucial role in shaping the energy landscape of urban areas. By identifying areas of high energy demand and developing strategies to meet that demand through renewable energy sources, regional planning can help to promote sustainable energy practices in urban areas. Through case studies, we have seen how regional planning has been implemented successfully in Vancouver and Copenhagen. As the world becomes increasingly urbanized, regional planning will play an ever more critical role in shaping the urban energy landscape.

In conclusion, regional planning plays a crucial role in shaping the urban energy landscape and promoting sustainable energy practices. As demonstrated by the case studies from Vancouver and Copenhagen, a comprehensive, collaborative approach can drive significant progress towards reducing greenhouse gas emissions, increasing

energy efficiency, and promoting renewable energy development.

Through regional planning, cities can identify opportunities for renewable energy development, promote energy efficiency measures, and reduce greenhouse gas emissions, while also creating economic opportunities and improving quality of life for residents. Furthermore, regional planning can build resilience to the impacts of climate change and energy shocks, creating more sustainable, resilient, and equitable urban areas.

As the world continues to grapple with the challenges of climate change and energy transition, regional planning will be an essential tool for promoting sustainable energy practices and shaping the urban energy landscape.

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