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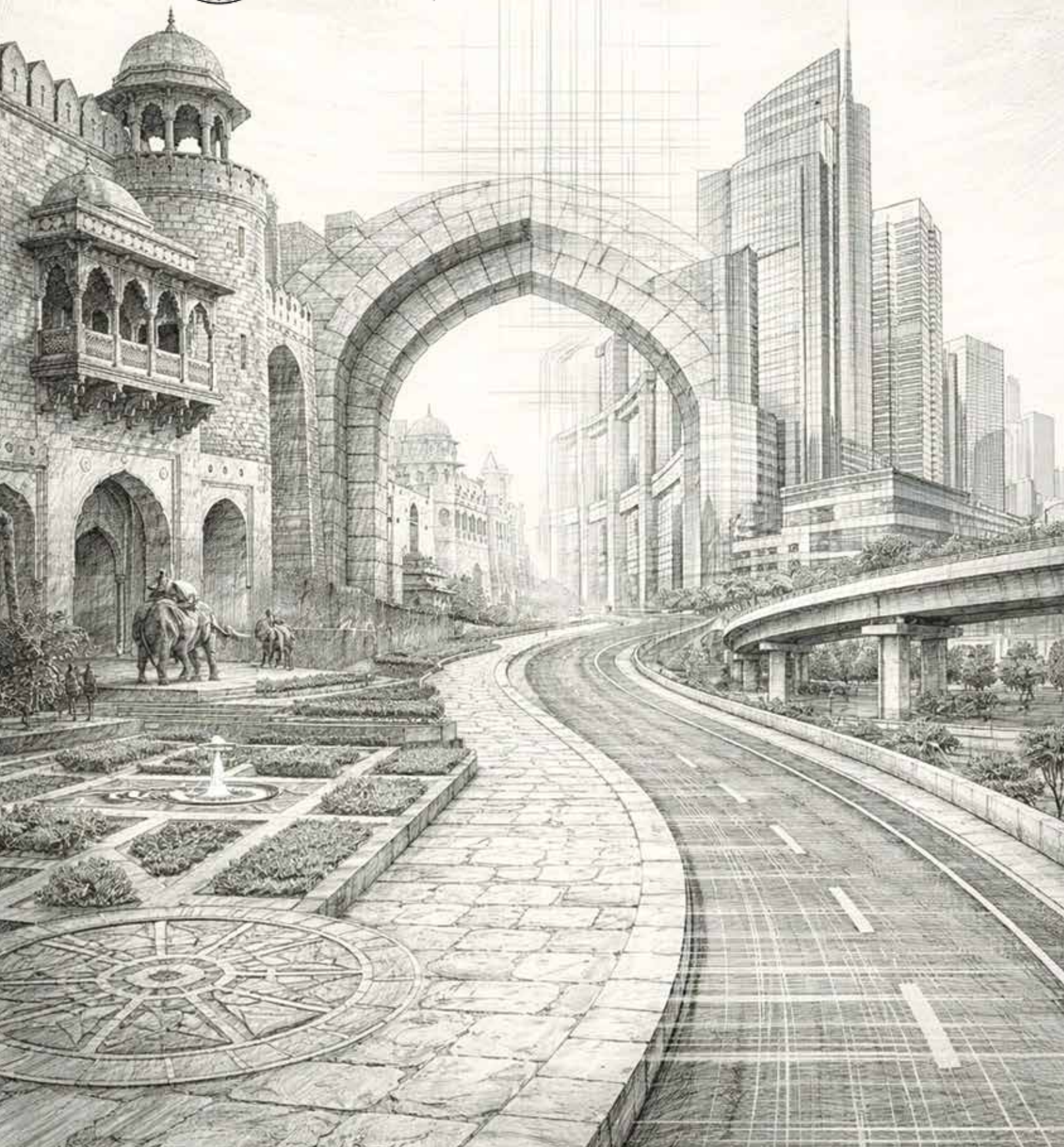

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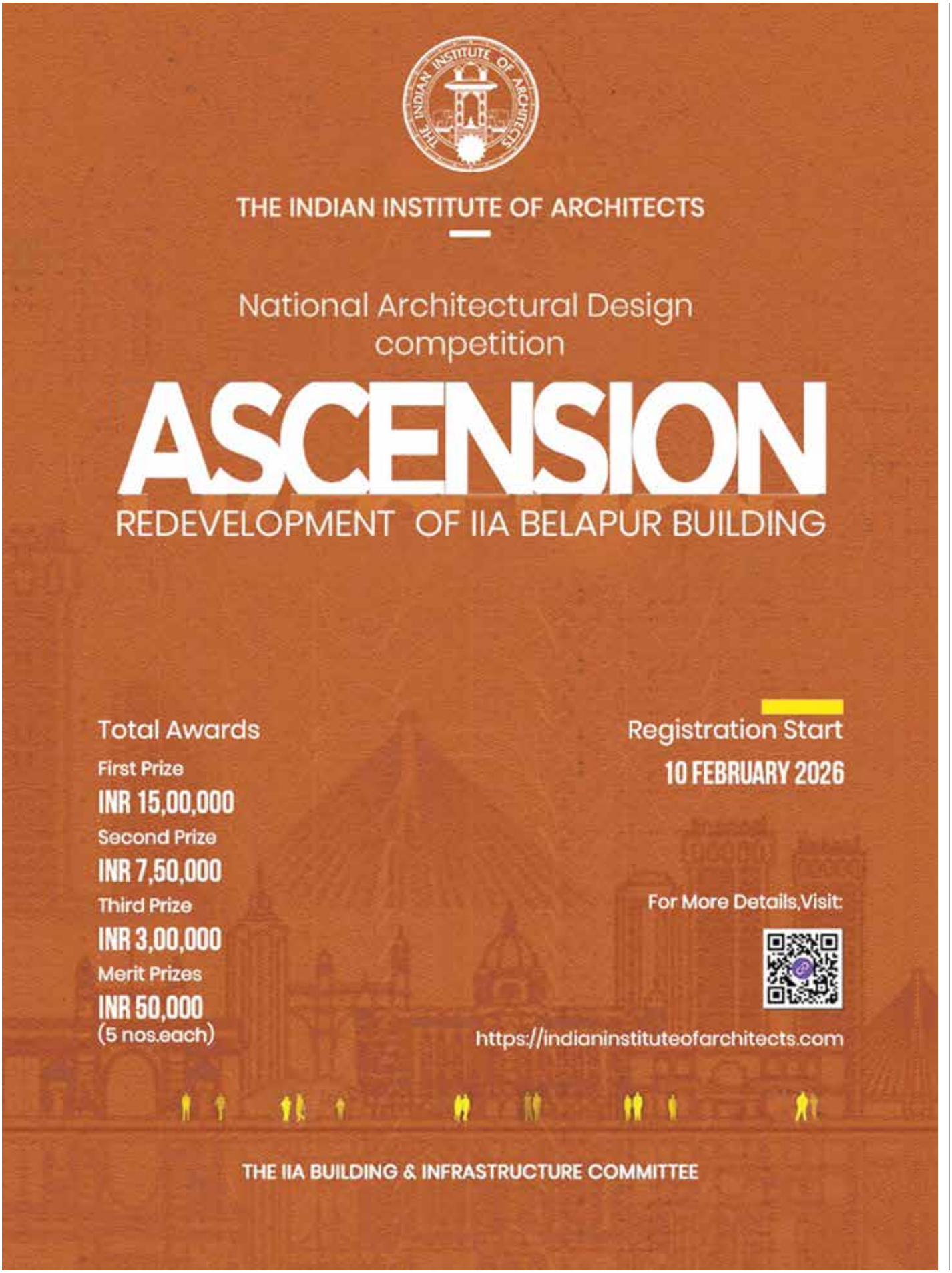
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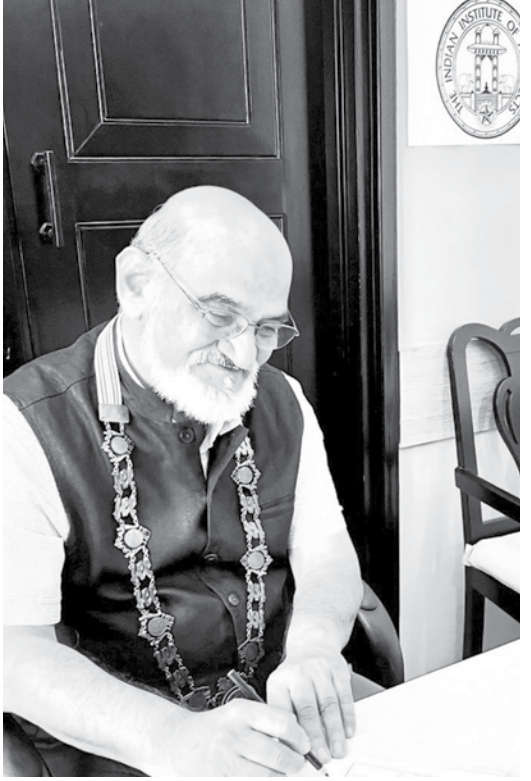
PRESIDENT'S MESSAGE



Dear Members,

As we step into the new year, I extend my warmest greetings to each one of you and wish you a year filled with professional growth, creativity, and collective progress.

I am pleased to inform you that IIAPL Season 15 will be held from 27th to 30th January 2026 and will be hosted by the IIA Kerala Chapter. I look forward to the continued enthusiasm, sportsmanship, and active participation of our members. I am confident that the host chapter, under the guidance of Ar. Jitendra Mehta, Chairperson of IIA Cultural, Sports & Event committee, will deliver a memorable and well-organized event.

I would also like to update members on the status of the Institute's election process. The election procedures for the forthcoming term are currently underway, and the Institute has already approached STQC for the required certification to ensure a transparent, secure, and robust electoral process. Upon receipt of the certification, the election schedule and related announcements will be communicated to all members at the earliest.

Transparency, accountability, and member participation remain central to our functioning, and we appreciate your patience and cooperation during this process.

Let us continue to work together to strengthen the Institute and advance the role of architects in shaping a responsible, inclusive, and sustainable built environment.

With best wishes for the year ahead,

Ar. Vilas Avachat
President
The Indian Institute of Architects

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EDITOR'S NOTE

Wishing you all a very happy new year 2026!

The beginning of a new year is traditionally a time of renewed vision and collective resolve. The January 2026 issue of *The Journal of the Indian Institute of Architects* arrives at a moment of significant opportunity for the architectural profession in India- one marked by unprecedented growth, expanding influence and deepening global engagement.

India today is witnessing exponential development across sectors- urban infrastructure, housing, transportation, healthcare, education, industry and digital ecosystems. Architects are inherent participants in this transformation, shaping not only the physical fabric of growth but also its social, cultural and environmental dimensions. The profession is increasingly called upon to respond with agility, innovation and responsibility, embracing new paradigms that integrate technology, sustainability, and inclusivity.

As these opportunities expand, the role of professional institutions becomes ever more crucial. The IIA continues to strengthen its commitment to supporting practitioners, educators and students by creating platforms for dialogue, collaboration and global exposure. In this context, the forthcoming ARCASIA and UIA Forums assume special significance. With *ARCASIA* to be hosted in India in 2026 and the *UIA Forum* scheduled to follow in 2027, Indian architects are poised to engage directly with international peers, exchange ideas and showcase the depth and diversity of architectural practice in the country.

We also take this opportunity to acknowledge recent and upcoming professional engagements. The IIAPL Golf Tournament, successfully concluded on 13 and 14 December 2025 in Ghaziabad, Uttar Pradesh, exemplified the spirit of camaraderie and collegial interaction within the fraternity. Looking ahead, the IIAPL Convention, being held from 27 to 30 January 2026 in Kochi, Kerala, promises to be a significant gathering for professional exchange, reflection, and collective visioning at the start of the year.

As we move forward into 2026, let us embrace the changing landscape with confidence and clarity. The challenges before us demand not only design excellence but leadership, collaboration, and ethical practice. With the support of institutions such as the IIA and the global outreach enabled through ARCASIA and UIA platforms, Indian architects are well positioned to contribute meaningfully to national development while engaging with the world.

Let the year ahead be one of innovation, opportunity, and purposeful growth.

Prof. Vinit Mirkar
Editor
JIIA

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COVER THEME

SANJH 2.0

(Collaboration Between IIA Punjab Chapter and ITPI Punjab Regional Chapter)

PUNJAB
A Journey from Timeless Royalty to Modernism

The cover page is not merely an artistic composition; it is a visual narrative of Punjab itself- a journey from timeless royalty to modernism. It portrays a powerful transition: from stone to steel, from fortified walls to glass skylines, from ancient pathways to engineered corridors of the future.

At the heart of this composition stands an arch- a potent symbol of Sanjh, representing the collaboration between the IIA Punjab Chapter and the Institute of Town Planners, India (ITPI) Punjab Regional Chapter. This arch becomes a threshold where time, knowledge and professional disciplines converge. It captures the very essence of SANJH 2.0: the coming together of architecture and planning as inseparable forces shaping the destiny of Punjab.

Punjab's identity has never been static. It has evolved through layers of history- from the planned grids of the Harappan settlements at Rupnagar to the fortified resilience of Patiala and Bathinda. The princely states left behind a regal imprint, where space, proportion and divinity merged into architecture that continues to inspire reverence. These were not isolated acts of construction; they were deliberate acts of vision, foresight, and cultural expression.

That same spirit of vision continues to drive modern Punjab. Ludhiana's industrial dynamism reflects an architecture of productivity and enterprise, while Mohali stands as a testament to planned urban growth where infrastructure, order and foresight create environments designed for future generations. Together, these landscapes demonstrate that progress is not the abandonment of heritage, but its thoughtful evolution.

The visual journey depicted on the cover, from heritage precincts to contemporary infrastructure, reminds us that planning provides direction, while architecture provides identity. One shapes systems; the other shapes experience. When these two disciplines work in harmony, cities become resilient, humane and globally relevant.

Today, as environmental pressures, rapid urbanization, and cultural dilution challenge our built environment, the responsibility placed upon architects and planners grows deeper. As custodians of space and form, we must ensure that Punjab's development is not only faster, but wiser; not only taller, but rooted; not only modern, but also meaningful.

SANJH 2.0, through the collective leadership of the IIA Punjab Chapter and the ITPI Punjab Regional Chapter, and curated jointly by the Chapter Chairman — Ar. Pritpal Singh Ahluwalia and Sh. Pankaj Bawa, CTP — represents this unified resolve. It is a call to integrate heritage with innovation, infrastructure with ecology, and growth with dignity, demonstrating how architects and planners together can shape a coherent, responsible, and enduring future for the state.

The arch in the composition does not divide eras. It connects them. It reminds us that the future of Punjab must rise from the strength of its past, guided by professional integrity, collective wisdom, and a shared responsibility toward society.

Ar. Manvir Ahluwalia (A-30541) practices at *M/s Walia Creative Architects*, where he is continues the firm's legacy with the design and integration of sustainable principles across a diverse range of projects. These include hospitality, healthcare, commercial, group housing and many others. He is a graduate of Chandigarh College of Architecture and a sustainability specialist, a GEM CP, IGBC AP Associate and a *KIA Building Tomorrow* awardee.
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JIIA Call
for Papers, Articles, Projects

The Journal of the Indian Institute of Architects invites original and unpublished contributions from members **ONLY** (academicians, practitioners and students) under the following FIVE categories. Submission in each category is strictly only through the respective google forms.

In order to be accepted for publication, all material sent in these categories should have the following components:

1. MS Word document file with text only. Please do not format it in anyway. The numbered captions for all the images will also be in this document.
2. Folder with all images (minimum 300 dpi), numbered according to the captions given in your text file
3. Photograph of the author/s (minimum 300 dpi).
4. Author biodata – Maximum 50 words.
5. PDF (optional)– showing the intended layout. This pdf should include text and all images, with numbered captions.

Category 1 : Articles

google form link: https://forms.gle/7pDFva1HDH4hfUyj8

Essays, interviews, articles (1500- 2500 words), book reviews (600 and 750 words), travelogues, sketches and photo-essays in the areas of architecture, planning, urbanism, pedagogy, heritage, technology, ecology, theory and criticism, visual design, practice or any other relevant subject pertaining to the built environment. (Details of the format will be available on the JIIA website).

- For a design project, please include the 'Fact File' with the following details : Project Name, Location, Plot area, Total built up, Structural consultants, Project completion. Also please give the photo captions and credits. Please ensure that the image is referred to within the text. For eg, "As seen in Figure 1…". This is essential for the layout.
- For design projects, plans and sections of the project are desirable along with the photographs.
- Book reviews should be only of books by Indian authors. please include the "Fact File" with the following details: book title, author name, publisher, year of publication, ISBN, language the book is written in, genre (technical/ fiction/ etc.), no of pages, dimensions (in cm), type (Kindle/ paperback/ hardback), available at (amazon.in/ flipkart.com/ others).
- Please send a write-up of about 200-300 words along with sketches and photo-essays.

Category 2 : Student Work

google form link: https://forms.gle/8wDCYFusLb7hWcpa6

Summaries of dissertations (2000-3000 words) at the level of B.Arch. & M.Arch., and theses at the Ph.D. level. The Guide for that work will be mentioned as the Co-author. (Format will be available on the JIIA website).

Category 3 : Contributions from Chapter Correspondents

google form link: https://forms.gle/Ru4JBLSHwaYEBTcg7

(a) *Chapter News:* This includes various interesting activities from the Centres of your Chapters (maxm. 500 words for the news from the *entire* Chapter).

(b) News of conferences by the academic institutes in your respective Chapters.

(c) *Obituaries :* Obituaries of IIA members should consist of the photograph of the departed soul, the dates of birth and death and a short 50-word note.

Category 4 : Research Papers

google form link: https://forms.gle/Z9YWQQMaw843N1eT6

Research papers (2000-5000 words) in the prescribed format. The research may be based on their ongoing or completed research. (Format is available on the JIIA website). All contributions in this category will be double blind peer-reviewed before being accepted for publication by academic experts of repute.

Category 5 : Cover Design

google form link: https://forms.gle/BSkuE5cApXdy7dX1A

Students from affiliated colleges are invited to design the cover page theme. This should be a graphic based on some aspect of Indian Knowledge Systems. The submission will include the graphic file (jpeg or corel draw); a theme note (with a title) of about 500 words explaining the concept of the graphic.

Please note that the image you send will be adjusted as per the layout requirements of the JIIA Cover.

Please note:

1. All submissions will be accepted only through google forms.
2. Submissions will **NOT** be accepted through email.
3. Any queries to be addressed to : jiiaeditorial@gmail.com.
4. When you correspond with us, please give your email id (that you regularly use) and your cell no. (preferably with WhatsApp).
5. It is compulsory to mention your IIA regn. No. Submissions will **NOT** be accepted from non-members.
6. The review process takes anywhere between 4-6 weeks. Since it may not be possible to respond to all authors who send in their work, we will definitely revert if and when your work is accepted.
7. JIIA does not charge any fees for publication of any professional or academic work.
8. It is understood that submission from an author is an original work, unpublished anywhere else, and that IIA and JIIA are in no way responsible for any matter or dispute arising out of the publication of the same.
9. All authors are requested to refer to further detailed information available on the JIIA website.

Academicians' Perception on the Status of Employability Skills in Architectural Education

The Case of Maharashtra, India

By Hemlata Chhikara, Dr. Tejwant Singh Brar, Dr. Navin Piplani and Dr. Mohammad Arif Kamal

Abstract
The purpose of this study is to understand the perception of existing architectural academicians in Maharashtra State regarding the development of employability skills. The objectives of the study were to determine which employability skills academicians believe are most significant for architecture graduates and to investigate academics' perspectives on the effectiveness of the present curriculum in teaching certain skills. To fulfill the objectives, a closed-ended questionnaire was developed using a five-point Likert scale and the responses were collected from twenty-five academicians teaching in various architecture colleges in Maharashtra. The surveys are taken through Google Forms. The data is gathered and analysed using the Statistical Package for Social Sciences (SPSS) version 26. The responses received in the survey were evaluated using descriptive analysis. According to the study's findings, academicians agreed that the current educational system falls short in developing students' employability skills in accordance with industry demands. According to the findings, employability skills are crucial for employment chances and architecture education can significantly help recent graduates develop these skills. According to academicians, behavioural, technical, self-management, teamwork, communication and development skills are the most crucial skills to improve employability.

Keywords: architectural education, academicians, fresh graduates, employability skills, Maharashtra, India.

1. Introduction

The purpose of education is to prepare people for their lives and their future needs. This can be done by transferring knowledge, skills, attitudes and experiences. Architectural Education is considered a blend of skills, experience, creativity and values that develop over time (Dua, 2014). In higher education, it is important that employability skills related to Architecture should be incorporated into the curriculum, especially as graduate attributes are becoming valued higher than degrees. Architecture education is consequently pressured to improve employability because governments, professionals and students all want to solve the skills gap and unemployment to maintain their national economies. Architectural Education remains crucial to establishing progress and social development, even though it continues to face important challenges. A good holistic architectural education, therefore, is a combination of skills, information and values. Among fresh graduates, employability skills are a significant concern. Academicians are considered to play a vital role in ensuring that graduates are employment-ready. The relationship between employability skills and employment is still debatable (Chhikara et al. 2025).

Employers increasingly depend on Architecture education institutions to provide fresh graduates with the skills necessary for entry-level positions. The role of higher education in supporting employment is seen as an ethical responsibility. Therefore, the purpose of this study is to determine how academicians perceive employability skills among Maharashtra's fresh graduates, as well as their importance, urgency and performance. Architecture being multidisciplinary, architectural education has always been a complex issue. Equipping the students to meet the complex demands of the profession, the bachelor's degree focus and curriculum structure must facilitate general education and the needs of the profession (Garg & Kamal, 2022). Education plays a fundamental role in preparing students to reframe their role in the professional environment. It is required to establish better connections with the given professional realm. Architectural Education approaches are facing difficulties, which affect the employability of recent graduates (Khodeir, 2020).

2. Literature Review

The transition from academic study to professional practice has become increasingly challenging in the contemporary global economy, particularly for professions like architecture. While academic curricula have traditionally focused on design theory, history and technical skills, employability skills—a broad range of transferable abilities that increase a graduate's prospects of getting a job and succeeding in the workplace—are becoming increasingly significant. As a profession, architecture demands that students gain the knowledge and skills they need throughout their education to support architectural practice. Graduates still lack employability skills, even though architecture schools are committed to offering instruction that will equip them with abilities relevant to architectural practice (Mari & Sulaiman, 2019).

The job market, which is undergoing significant changes, calls for innovative solutions to current and future challenges. The world is changing due to scientific and technological breakthroughs, which impact the educational institutions and practices (Kamal & Saquib, 2015). Although a large number of architecture students graduate every year, many of them are either unemployed or underemployed. However, India requires skilled architects to achieve its "Made in India" objective. Employability skills are higher-order cognitive abilities and personal qualities that are needed to succeed in the profession and employers have become increasingly vocal about them in recent years (Dacre Pool & Sewell, 2007).

Employability theories and skills development models have been used to analyse the transition from college to the professional workforce. Employability covers a wide range of transferable talents, traits and personal qualities that improve a graduate's ability to find and maintain a meaningful job, rather than just subject-specific knowledge (Yorke, 2006). In the case of architecture, this calls for striking a balance between professional skills, technical proficiency and design knowledge with increasingly important employability skills such as problem-solving, communication, teamwork and flexibility.

Employability skills are more results-oriented, according to the study's literature evaluation. It also shows that graduating students' employability is a key factor in employment and a performance indicator for educational institutions (Agrawal & Dasgupta, 2018). The importance of employability and employability skills for career support has been discussed by several distinguished researchers. They suggest a substantial change in management's approach. Multitasking is linked to dissimilar employability, which increases the probability of job approachability (Parera, 2018).

The major purpose was to investigate how the learning program affected employability skills at the university level. Another of their objectives was to determine how the curriculum affected their capacity to develop the knowledge and skills required for self-marketing, as well as to assess their workforce readiness. The study was descriptive in nature, with analysis leading to the conclusions. 134 graduates were given a questionnaire to fill out to collect data. The results indicated the usefulness of this study module and increased students' confidence in future professional problems. Students were trained to self-evaluate, develop job search tactics and create self-promotional materials. It was decided that this form of university-level training was advantageous and well-received.

Kalpathy (2017) discusses higher education and employment skills. He aimed to figure out the causes of youth unemployment. The study recommended that the data be analysed by searching earlier studies in this field (Kalpathy, 2017). The skills accessible and the talents required were found to be very different. It is possible to close the identified competency set weaknesses through education, training and work experiences (Qadir & Kamal, 2022). As the country faces the challenges of the twenty-first century, the study concluded with suggestions for improving the situation.

Although skills were traditionally acquired on the job, companies now demand that graduates possess employability skills that can be learned during education, owing to the evolving nature of the job market. Based on various literature studies, the following skills are deemed essential for recent architecture graduates, either generally or particularly. These skills include –

1. Communication Skills
2. Critical Thinking Skills
3. Cognitive/Problem-Solving Skills
4. Behavioral Skills
5. Entrepreneurship Skills
6. Leadership Skills
7. Teamwork Skills
8. Social Skills
9. Technical Skills
10. Learning Skills
11. Creativity and Innovation Skills
12. Self-management and Development Skills

Through this research, an effort has been made to identify the employability skills gaps between what academia gives and what industry demands. It is also necessary to plan a methodical strategy to enhance employable skills, since this will progress the field of knowledge that colleges can utilise. For these reasons, it is crucial to enhance the employability skills of recent architecture graduates. To improve architecture students' employability, the pedagogical framework for architecture education must be analysed and restructured.

3. Research Methodology

This study included both primary and secondary data. Secondary data were gathered from various sources, including the internet, magazines, newspapers, research articles and government publications. Primary data was collected using the questionnaire method. A questionnaire was developed and responses were collected from 25 academicians and 175 graduates from the last three years in Maharashtra State. The same data was collected from 289 employers through another set of questionnaires to understand the actual scenario of the industry and the requirements of the essential employability skills of the fresh graduates to get employment in firms.

The survey questionnaire (developed for academicians, employers and fresh graduates) was used to collect the data required to meet the objectives of this study. The questionnaires contained a maximum of closed-ended questions (using a Likert 5-point scale). The questionnaire survey was divided into three categories of information. Part A regarding the demographics, which included gender, age, highest qualification and working experience, while Part B included different aspects of employability skills, issues having an impact on employability skill development and causing a gap between student skill development and employment and Part C included the effectiveness of the National Education Policy 2020.

A pilot study was conducted to pre-test the questionnaires with a respondent sample including academicians, fresh graduates and employers before finalisation. This was an important step, as the tool developed for this study for self-assessment is an innovative method to assess the skills of students. The surveys were sent to a total of 80 respondents (40 fresh graduates, 20 employers and 20 academicians) and 56 were received (29 fresh graduates, 13 employers and 14 academicians). Cronbach's alpha coefficients were obtained to assess the reliability of the scale utilised. Scores obtained were 0.871 for fresh graduates, 0.771 for employers and 0.819 for academicians. The acquired data was analysed and explained using descriptive statistics (frequency, mean and standard deviation). The entire population of the study is approximately 47000, considering employers, fresh graduates and academicians. The bottom boundary sample size is 382, as computed by the researcher using the proportionate stratified random sampling formula. As a result, the researcher selected one percent (470 respondents) of the overall population and utilised proportionate stratification to determine the sample size for each stratum.

This paper discusses the data collection and analysis results of the survey done for academicians. The research was divided into two phases. Phase one encompasses the identification of employability skills required for architecture fresh graduates, which was done using a literature review, to formulate the questionnaire required for this study. Phase II included the collection of data through a questionnaire from academicians using Google Forms.

Based on the above data analysis and review of literature, conclusions and recommendations were made. As per the Council of Architecture, there are about 471 architecture institutions in India for

recognised qualifications, out of which 112 are in Maharashtra, which is 23% of the total colleges. According to the data provided in the Perspective plan of COA, Maharashtra has the highest number of colleges in India imparting architecture education, having 103 colleges, followed by Tamil Nadu with 76 colleges. When it comes to employability, employers, academicians and fresh graduates are key stakeholders of the architecture industry. This paper aims to study the perceptions of academicians from the state of Maharashtra. The approximate population of Academicians is around 2050. Based on the proportionate stratified random sampling formula, the researcher finalised more than 1 percent (25 respondents) of the total population and used proportionate stratification for the sample size. Data was gathered and analysed using Statistical Package for Social Sciences (SPSS) version 26. Descriptive analysis was used to understand the perception of the academicians about the effectiveness of architecture education for employability. The responses received in the survey were evaluated using descriptive analysis.

4. Findings and Discussion

The findings discuss the perception of the existing academicians teaching architectural education to the students in Maharashtra in their way to employability growth. The questionnaire was developed and the responses were collected from the twenty-five academicians teaching in various architecture colleges in Maharashtra.

4.1 Effectiveness of architecture education for employability

This part of the section tries to understand the current education system and the role played by architecture education in enhancing employability skills at the institute level. The efforts were made to understand the perception of the academicians, whether the current education system helps provide the employability skills to the fresh graduates as per the industry requirements and if the knowledge gained through architectural education would be sufficient for them to start with their own practice as an Architect or survive in the profession as per the industry requirements. The responses received in the survey were evaluated using descriptive analysis.

The results of descriptive analysis (Table 1) indicate the presence of large variations in the agreement level of the faculty who participated in the survey. Also, the faculty highly agreed with the gap between academics and the profession in architecture (mean score = 4.32). This gap exists due to different reasons, such as low connection or collaboration of the institutes with the industry or professionals, due to which the colleges fail to understand the expectations of the industry. Other reasons are the teaching quality of the faculty, lack of application-based proficiency in skill development and the overall teaching and learning practices in the institutes or colleges, which play a very important role in developing the proper employability skills in the students.

Although there is a huge gap in academics and profession, the faculty highly agreed that the employability skills are necessary for securing the right career opportunities for fresh graduates (mean score = 4.12) and the academic institution here plays an important role in teaching students' employability-related skills (mean score = 4.08). The faculty also highly agreed that due to the poor performance in architectural education, there is a need for improvement to enhance employability skills for fresh graduates (mean score = 4.00) and architectural education has a vital role in finding effective employment for fresh graduates (mean 3.96). The study also found that the academicians who participated in the survey disagreed with the statement that the current educational system is effectively nurturing the employability skills of the students according to industry requirements (mean =2.72) and that the knowledge gained from the course will be adequate to start entrepreneurship in the future for fresh graduates (mean = 2.88).

The standard deviation of the responses indicates the presence of moderate variations in the responses. The skewness of the responses is found to be less than one; however, the kurtosis is around one, slightly higher and lower than one. Thus, it can be concluded that the distribution of the responses is close to the normal. The Cronbach alpha of the responses is found to be 0.84, which is greater than the minimum expected value of 0.7, indicating the presence of consistency reliability in the responses.

4.2 Skills provided at the institute/college level to improve the students' capabilities for the job market

In the survey, the academicians who participated in the study were also requested to respond to the status of different skills provided at the institute/college level to improve the students' capabilities for the job market. The effectiveness of the architecture education in enhancing the fresh graduates' employability depends on the skills acquired by them during the course. The twelve skills were included in the questionnaire to examine the perception of the faculty towards the status of these skills to

enhance the employability of the students studying architecture education, so that the fresh graduates can face the challenges and meet the expectations of the industry and professionals. In the study, the faculty teaching in different colleges and universities in the state of Maharashtra to the students of architecture were asked about the present status of skills in improving the effectiveness of architecture education for employability. The responses received in the survey were evaluated using descriptive analysis, presented in Table 2.

Table 1: Descriptive analysis- Effectiveness of architecture education for employability
Source: Authors

	Mean SD	Skewness	Kurtosis	Cronbach Alpha
The current educational system is effectively nurturing the employability skills of the students according to industry requirements	2.72 (1.021)	0.110	-0.172	0.848
Employability skills are a necessity for securing the right career opportunities for fresh graduates	4.12 (0.971)	-0.553	-1.105	
The institution plays an important role in teaching students' employability-related skills.	4.08 (0.997)	-0.720	-0.588	
Architectural education has a vital role in finding effective employment for fresh graduates	3.96 (0.735)	0.064	-1.035	
The knowledge gained from the course will be adequate to start entrepreneurship in the future for fresh graduates	2.88 (0.781)	-0.350	0.032	
Due to the poor performance in architectural education, there is a need for improvement in the enhancement of employability skills for fresh graduates	4.00 (0.764)	0.000	-1.213	
There is a gap between academics and the profession in Architecture.	4.32 (0.852)	-0.699	-1.260	

Table 2: Descriptive analysis- Skills provided at the institute/college level to improve the students' capabilities for the job market
Source: Authors

	Mean	Std. Deviation	Skewness	Kurtosis	Cronbach Alpha
Communication skills	3.480	0.872	0.066	-0.487	0.842
Critical thinking skills	2.240	0.597	-0.108	-0.282	
Cognitive/Problem-solving skills	2.200	0.816	-0.399	-1.373	
Behavioral skills	1.760	0.663	0.302	-0.612	
Entrepreneurship skills	1.600	0.645	0.606	-0.480	
Leadership skills	1.760	0.597	0.108	-0.282	
Teamwork skills	3.240	0.830	0.453	0.035	
Social skills	2.280	0.890	0.542	-0.148	
Technical skills	3.640	0.907	0.091	-0.779	
Learning skills	3.200	0.707	-0.307	-0.846	
Creativity and Innovation skills	2.800	0.645	0.202	-0.480	
Self-Management and Development	2.440	0.916	-0.338	-0.779	

The result indicates the presence of a high level of dissatisfaction among the academicians who participated in the survey towards the current status of the efforts made by the colleges in imparting the majority of the included skills to their students in architecture education. The study found that the efforts made by the colleges in imparting the behavioural skills (mean=1.760), entrepreneurship skills (mean = 1.600) and leadership skills (1.760) are very poor for their students of architecture education. The result of the descriptive analysis also reported that the faculty participated in the study also believes that the current status of the academic institutions in providing the skills namely critical thinking skills (mean= 2.240), cognitive/ problem solving skills (mean = 2.200), creativity and innovation skills (mean=2.800), self-management and development (mean=2.440) and social skills (mean=2.280) is also not satisfactory. However, in the case of certain skills such as *communication skills (mean=3.480), teamwork skills (mean=3.240), technical skills (mean=3.640) and learning skills (mean=3.200),* the faculty believes that the current status of the academic institutions in providing the skills is quite satisfactory but not very good. The standard deviation of the responses indicates the presence of moderate variations in the responses. The skewness of the responses is found to be less than one; however, the kurtosis is found to be around one, slightly higher and lower than one. Thus, it can be concluded that the distribution of the responses is near to the normal. The Cronbach alpha of the responses is found to be 0.84, which is greater than the minimum expected value of 0.7, indicating the presence of consistency reliability in the responses.

4.3 Skills necessary to enhance employability in relation to the industry requirements

In the survey, the academicians were also asked to rate the different skills that are needed to improve the employability in relation to the industry requirements, as per their perceptions. The requirements of the industry for the fresh graduates of architecture may be different and dynamic as per the market demand. There may be a gap between the skills provided by the architecture education in the colleges in enhancing the students' employability and the skills required by the industry from the fresh graduates by the professionals. To understand the viewpoints of the academicians, twelve skills were included in the questionnaire to examine the perception of the faculty towards the skills required by the industry from the fresh graduates of architecture. In the study, the faculty teaching in different colleges and universities in the state of Maharashtra to the students of architecture were asked about their perception of the different skills required to fulfill the demand of the industry. The responses received in the survey were evaluated using descriptive analysis. The result of the descriptive analysis is reported below in Table 3.

The result reported that the most expected skills from the students of architecture from the faculty perspective are communication skills (mean score = 4.48). Communication skills are the necessary skills that students must have as they need to understand the requirements of different stakeholders, such as customers, builders, suppliers, etc. Other skills which are expected from the industry include (teamwork skills = 4.44 and self-management & development = 4.44). The behavioural skills (mean score = 4.36) and technical skills (mean score = 4.36) are also the most required in students of architecture. The architects must have good technical skills and should be a team member when working in a team. The other expected skills in the students of architecture are cognitive/ problem-solving skills (mean score=4.20), critical thinking skills (mean score=4.16), creativity and innovation skills (mean =4.16) and entrepreneurship skills (mean = 4.16). The least important skills required from the industry are found to be learning skills (mean =3.96), social skills (mean = 3.80) and leadership skills (mean = 3.76). The standard deviation of the responses indicates the presence of moderate variations in the responses. The skewness as well as kurtosis of the responses are found near and less than one, indicating that the distribution of the responses is near the normal. The Cronbach alpha of the responses is found to be 0.877, which is greater than the minimum expected value of 0.7, indicating the presence of consistency reliability in the responses.

4.4 Effectiveness of the current curriculum for employment

The current curriculum adopted by the present universities and colleges is suffering from different challenges. The current curriculum is not updated frequently and the industry requirements may not be considered while upgrading the curriculum. Thus, the relevance of the current curriculum must be examined. Thus, the statements related to the effectiveness of the current curriculum for students' employment are included in the questionnaire. The responses against the statements were recorded and analysed. The result of the descriptive analysis applied to the collected responses is reported in Table 4.

Table 3: Descriptive analysis- Skills necessary to enhance employability in relation to the Industry requirements
Source: Authors

	Mean	Std. Deviation	Skewness	Kurtosis	Cronbach Alpha
Communication skills	4.48	0.823	-1.640	2.303	0.877
Critical thinking skills	4.16	0.850	-0.768	0.063	
Cognitive/Problem-solving skills	4.20	0.866	-0.837	0.033	
Behavioral skills	4.36	0.860	-1.234	0.861	
Entrepreneurship skills	4.16	0.898	-0.712	-0.429	
Leadership skills	3.76	0.597	0.108	-0.282	
Teamwork skills	4.44	0.870	-1.452	1.269	
Social skills	3.80	0.957	-0.495	-0.485	
Technical skills	4.36	0.952	-1.451	1.240	
Learning skills	3.96	0.735	-0.621	0.991	
Creativity and Innovation skills	4.16	1.028	-0.845	-0.584	
Self-Management and Development	4.44	0.768	-1.581	2.960	

Table 4: Descriptive analysis- Effectiveness of current curriculum for employment
Source: Authors

	Mean	Std. Deviation	Skewness	Kurtosis	Cronbach Alpha
Effectiveness of the Colleges/Institutions in providing career guidance to the students	2.92	0.572	-0.026	0.429	0.799
Changes in the curriculum have been updated in the last three years	2.76	0.663	-0.629	1.113	
The subject's curriculum is enough to satisfy the needs of the job market	2.76	1.052	-0.410	-0.940	

The result reported that the mean score of the statements measuring the effectiveness of the current curriculum for students' employment are found to be low (below 2.92) indicating that the current curriculum adopted by the universities and colleges for students of architecture is not effective from the perspective of student's employment and thus the fresh graduates find it difficult to get themselves employed in the industry. The study also found that the colleges/institutions are not effective in providing career guidance to the students (mean score = 2.92). Due to this, the fresh graduates are not aware of the possible opportunities they can have in the industry. The survey also points out the lack of curriculum upgradation and it shows that the current curriculum has not been updated in the last three years (mean score = 2.76) and the subject's curriculum is not enough to satisfy the needs of the job market (mean score = 2.76). The standard deviation of the responses indicates the presence of moderate variations in the responses. The skewness and kurtosis of the responses indicate that the distribution of the responses is close to normal. The Cronbach alpha of the responses is found to be 0.799, which is greater than the minimum expected value of 0.7, indicating the presence of consistency reliability in the responses.

4.5 Issues that need to be addressed at the college/ institute level

Many issues need to be resolved at the college and institution level to improve the employability of the architecture students and the quality of teaching and learning in the organisation. The eleven issues

were identified and included in the questionnaire for the survey. These issues include Multiple skill requirement as per the industry expectation, Lack of career guidance, Limited excess to use of Technology, Lack of appropriate skills, Inadequate linkages with the industry, shortage of trained teachers, flexibility in course work and its modularity, Lack of equivalence for employment, Lack of proper infrastructure, low exposure of skill development courses and employment and demand and supply fulfilment. The perception of the academicians as the respondents was examined using descriptive analysis. Table 5, shown below, indicates the results of the descriptive analysis of the responses received in the survey.

The result reported in the table indicates the importance of the different issues that need to be sorted out at the college level. The most important issue found to be resolved is the lack of appropriate skills (mean = 4.16). The college level should make efforts to enhance the skilled resources and skilled faculty members to improve the learning of the students for better employability. The college should also make efforts to improve the linkages with industries (mean = 4.16). Better industry linkages can help to improve the employability skills of the architecture students. The college also needs to increase the use of technology and the latest software for the students to help them achieve the technical skills as per the industry requirement (mean = 4.12). The institutions should also try to enhance the multiple skills requirements as per the expectations of the industry or profession (mean = 4.08). Another major drawback in the colleges and institutions is the low exposure to skill development courses (mean=3.96). The colleges should introduce or facilitate short-term skill-based courses for their students. The colleges should try to understand the need and requirements of the industry for the fresh graduates, as the survey shows that the colleges have inadequate linkages with the industry (mean = 3.88) and remove the employability gap by demand and supply matching (mean = 3.88). Further, there should be the flexibility of course design, modularity (mean = 3.72) and improvement of the equivalence for employment purposes (mean = 3.56). The low requirement is also observed in a few issues, such as shortage of trained teachers (mean = 3.40), lack of career guidance (mean =3.24) and lack of infrastructure (mean =3.04), as most of the colleges are well equipped with these. The standard deviation of the responses indicates the presence of moderate variations in the responses. The skewness and kurtosis of the responses indicate that the distribution of the responses is close to normal. The Cronbach alpha of the responses is found to be 0.904, which is greater than the minimum expected value of 0.7, indicating the presence of consistency reliability in the responses.

4.6 Reasons causing a gap between student skill development and employment

There may be many reasons creating a gap between students' skill development and employment. The six different possible reasons were figured out

Table 5: Descriptive analysis- Issues need to be addressed at the college/institute level
Source: Authors

	Mean	Std. Deviation	Skewness	Kurtosis	Cronbach Alpha
Multiple skills required	4.08	0.954	-0.796	-0.181	0.904
Lack of career guidance	3.24	1.422	-0.272	-1.196	
Use of technology	4.12	1.054	-0.722	-0.911	
Lack of appropriate skills	4.16	1.143	-1.430	1.392	
Inadequate linkages with Industries	4.16	0.898	-1.087	0.874	
Shortage of trained teachers	3.40	1.155	-0.176	-0.819	
Flexibility of course design, modularity	3.72	1.137	-0.504	-0.346	
Lack of equivalence for employment purposes	3.56	1.227	-0.665	-0.343	
Lack of Infrastructure	3.04	1.428	0.017	-1.095	
Low exposure to skill development courses	3.96	1.098	-1.145	0.973	
Employability and demand and supply matching	3.88	1.201	-0.378	-1.538	

from the existing literature and discussions with the academicians. These reasons are low industry-institute collaboration, lack of understanding of industry expectations, lack of application-based proficiency in skill development, teaching quality, partnership between educational providers, Institutional teaching and learning practices. The perception of the faculty members was recorded in the survey towards these reasons mentioned in the questionnaire. The perception of the faculty members who participated in the study was examined using descriptive analysis. Table 6, shown below, indicates the results of the descriptive analysis of the responses received in the survey.

The results of the descriptive analysis indicated that the respondents provided the highest agreement to the lack of application-based proficiency in skill development (mean = 4.16) as the most effective reason for the gap between student skill development and employment. Another most important reason is found to be a lack in understanding of Industry expectations (mean = 4.12) and a lack of industry-institute collaboration (mean = 4.08). The other reasons causing a gap between student skill development and employment, with a moderate level of agreement among the respondents, are found to be the lack of partnership between educational providers (mean = 3.68) and Institutional teaching and learning practices (mean = 3.36). The reason causing a gap between student skill development and employment with the lowest mean is found to be teaching quality (mean = 3.20). The standard deviation of the responses against the statements expressing the reason for creating the gap between student skill development and employment indicates the presence of moderate variations in the responses. The skewness and kurtosis of the responses indicate that the distribution of the responses is close to the normal. The Cronbach alpha of the responses is found to be 0.851, which is greater than the minimum expected value of 0.7, indicating the presence of consistency reliability in the responses.

4.7 Effectiveness of National Education Policy 2020

The government of India introduced a new education policy, "*National Education Policy 2020*", which focuses more on skills-based education. The policy can be effective for the students of architecture. The statements indicating the effectiveness of the *National Education Policy 2020* were included in the questionnaire and the perceptions of the academicians were collected in the survey towards the effectiveness of the new policy mentioned in the questionnaire. The perception of the faculty members who participated in the study was examined using descriptive analysis. Table 7, shown below, indicates the results of the descriptive analysis of the responses received in the survey.

The result of the descriptive analysis indicates that although the faculty members are found to have moderate awareness about the National Education Policy (NEP) 2020 (mean = 3.28), they believe that there will be a substantial improvement in the quality and career opportunities of fresh graduates after the implementation of NEP in Architecture Education (mean =4.52).

Table 6: Descriptive analysis- Reasons causing a gap between student skill development and employment
Source: Authors

	Mean	SD	Skewness	Kurtosis	Cronbach Alpha
Low Industry- Institute collaboration	4.08	1.038	-0.657	-0.913	0.851
Lack of understanding of the Industry expectation	4.12	1.236	-1.542	1.652	
Lack of application-based proficiency in skill development	4.16	1.248	-1.587	1.705	
Teaching quality	3.20	1.155	0.106	-0.212	
Partnership between educational providers	3.68	1.108	-0.297	-1.201	
Institutional teaching and learning practices	3.36	1.221	-0.169	-0.605	

Table 7: Descriptive Analysis- Effectiveness of the National Education Policy-2020
Source: Authors

	Mean	SD	Skewness	Kurtosis
Awareness about the National Education Policy (NEP) 2020	3.28	0.678	0.461	0.656
There will be a substantial improvement in the quality and career opportunities of fresh graduates after the implementation of NEP in Architecture Education	4.52	0.653	-1.055	0.130

5. Conclusions

This paper discussed Academicians' perceptions of critical deficiencies in fresh graduates' employability skill sets. The study's findings demonstrated that academicians agree that the current educational system is not fully effective in nurturing the employability skills of the students as per industry requirements. The findings indicated that there is a lot of importance placed on employability skills for the right career opportunities and architecture education can play a vital role in improving the employability skills of fresh graduates. The most important skills to enhance employability, as per the academicians, are communication skills, teamwork skills, self-management and Development skills, behavioural skills and technical skills. These skills should be included in the curriculum. Professionals should be part of the Board of Studies for the architectural program. The Board of Studies (BOS), which is established to determine the curriculum of architecture programs, should require practical involvement since the curriculum of architectural programs must take industry needs into account. The chosen professional must be one who is performing well, utilising technology and modernised procedures and being up to date with their practices and procedures in many industries and academia. The programmes should be introduced and made compulsory from the first year onwards. Through industry-academia exchange programs, faculty can gain the necessary industrial exposure and students can learn from professionals in the field. Through clear connections between the curriculum and employability, this study tries to emphasise the significance of matching academic values with employability. Implementing the strategies mentioned earlier in a technical education system can raise the standard of the curriculum and teaching methods, which will increase the employability of the graduates.

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RESEARCH PAPER

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Urban Integration of Gaothans

A Comparative Analysis of Mapping Development along High-Speed Road Corridors in Maharashtra

By Nitesh Avhad and Roshani Bodhale

Abstract

As agrarian areas undergo urbanisation, they face challenges of integration into emerging urban environments, often leading to the neglect of original town centres and traditional *gaothans*. This paper discusses the importance of creating a policy framework to protect these valuable parts of our *gaothans*. It shows how places with cultural significance are not just about the past but also help enrich and enhance local growth. Despite the obvious economic benefits of new industrial areas and transportation routes, they can sometimes overshadow and even harm old town centers and rural regions. To prevent this dilution, we need a regulatory framework that considers both development and preservation. This means understanding how people live, work and value their surroundings. This involves studying the various experiences of different *gaothans* that have involved the local community in decision-making. This research study explores the relationship between rapid urbanisation, infrastructure development and the preservation of traditional rural settlements through case studies of two urban *gaothans* in Maharashtra, India. It also proposes a regulatory framework for the prospective development of the Gonde node near the town of Sinnar, Maharashtra. A simplified methodology is formulated to analyse the livelihoods, character and systems of rural settlements. This is done through mapping neighbourhoods, conducting physical surveys and interviews to understand changes that have been made over time. The study emphasises the need to strike a balance between modernisation and the preservation of traditional *gaothans* in planning considerations. It concludes that by working together and considering the past, towns can grow in a way that retains their unique character alive for generations to come.

Keywords: *Gaothan*, community, urbanisation, infrastructure development, regulatory framework

1. Introduction

The Government of India's ambitious infrastructure projects underscore its commitment to modernising the nation's transportation and connectivity systems, improving urban amenities and stimulating economic growth. Key initiatives include the development of highways, tunnels, railways, bridges, iconic projects and industrial corridors, all designed to enhance the quality of life for citizens and promote regional economic activity. Among these, expressways have become essential lifelines, facilitating connectivity and driving development.

The development of Indian expressways began in the early 2000s with the Golden Quadrilateral project, a transformative initiative aimed at linking four major cities, Delhi, Mumbai, Chennai and Kolkata, through a high-speed road network. This project set the stage for a new era of connectivity, significantly boosting trade, mobility and economic growth. The success of

the Golden Quadrilateral demonstrated the power of expressways to reshape transportation patterns, prompting further expansion of the network across the country. Today, India boasts some remarkable expressways, but they still account for only about 2% of the total road network while carrying around 40% of the traffic (Lal, 2016).

The development of expressways has had a profound impact on the cities and towns located along their routes, spurring rapid urban growth and economic development. These corridors, often built alongside high-speed rail or highways, play a critical role in transforming the economic, employment and spatial dynamics of surrounding regions, further highlighting their importance as catalysts for both urbanisation and regional development. Listed below are some advantages of these high-speed corridors.

a. They enhance connectivity, driving economic growth and fostering regional development.
b. Expressways with multiple lanes carry long-distance traffic, thus reducing congestion on regular roads.
c. Well-connected expressways promote tourism and enable tourists to travel easily to various tourist spots, thereby also boosting the tourism sector.
d. They promote the development of supplementary infrastructure such as bridges, tunnels and interchanges.
e. By enhancing the movement of people, goods and services, expressways contribute to the country's overall economic growth and development.

Maharashtra has proposed an ambitious plan to develop a 4000+ km expressway network to enhance its EXIM (export and import) infrastructure. The expressway network, shown in Figure 1, is expected to further integrate the state into the national and international trade framework. However, the integration of agrarian areas into such urbanised environments can lead to the neglect of traditional town centers or *gaothans*, which often lose their cultural identity in the face of rapid urbanisation.

Two villages in Raigad district of Maharashtra, Vichumbe and Bamandongri, provide valuable case studies for understanding this transformation. Vichumbe is a proposed interchange along the Mumbai-Pune Expressway, while Bamandongri has developed along the Mumbai Trans-Harbour Link road, as shown in Figure 2. This research aims to analyse the development models of these two villages, exploring how their growth along high-

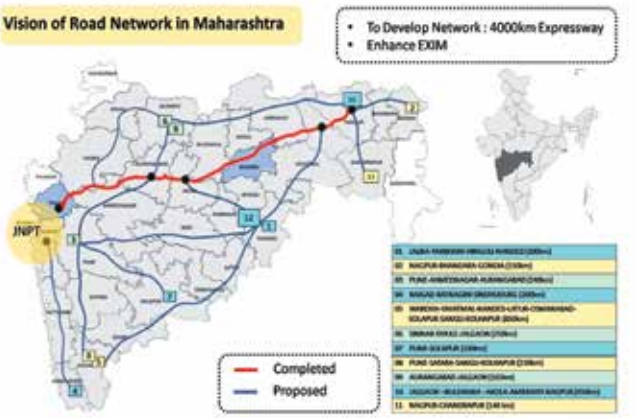

Figure 1: Expressway network in Maharashtra
Source: Authors

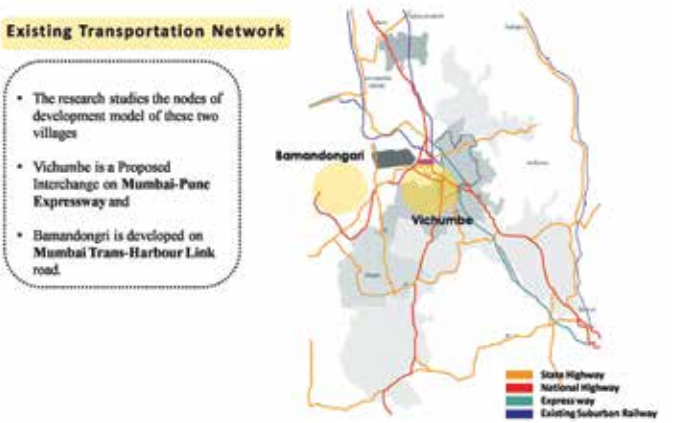

Figure 2: Existing Transportation network of Vichumbe and Bamandongari village
Source: Authors

speed corridors can serve as a successful prototype for rural-urban integration. The study will examine different planning models, historical planning tools and the timeline of infrastructure development. It will also identify the agencies involved in these projects and the policies implemented to manage infrastructure development in rural settlements and *gaothans*. By understanding these elements, the research aims to contribute to creating more balanced and sustainable development frameworks for rural communities impacted by high-speed corridors.

1.1 Aim

The study aims to develop a regulatory framework that integrates urbanisation with the preservation of cultural and historical values in traditional rural settlements, using case studies from Maharashtra, India.

1.2 Objectives

a. To study and assess the actual and potential impacts of existing and new technologies on existing *goathans*/rural settlements

b. To encourage and coordinate with multiple local actors to ensure proper planning with the people in the near future

c. Preparation of a practical model and planning guidelines for the development of centralised villages.

d. Analysis of the present scenario through the primary survey (Issues identification)

e. Review of the Development Control Regulations and Building Bye-laws.

f. Heritage significance and maintenance.

2. Literature Review

Bankar & Pale (2022) analysed the impact of the Maharashtra Samruddhi Expressway, highlighting its potential role in accelerating regional development in the economically backward regions of Marathwada and Vidarbha. Their study suggests that the expressway is a significant infrastructure intervention that can enhance economic activity, improve connectivity and stimulate growth across multiple sectors in the state of Maharashtra. The authors emphasise that large-scale transportation infrastructure, such as the Samruddhi Mahamarg, can act as a catalyst for balanced regional development by facilitating trade, investment and market access.

In addition to transportation infrastructure, several state-led development initiatives are currently being implemented in underdeveloped regions of Maharashtra. Projects such as the Project on Climate Resilient Agriculture (PoCRA) (Agriculture Department, 2024), the State of Maharashtra's Agriculture and Rural Transformation (SMART) and the Maharashtra Agribusiness Network (MagNet) aim to strengthen agricultural resilience, improve rural livelihoods and enhance agribusiness value chains. When integrated with physical infrastructure such as highways and rural road networks, these initiatives are expected to significantly contribute to socio-economic development in areas surrounding the Samruddhi Expressway in the coming years.

Bhople and Deshpande (2022) examined government initiatives focused on rural infrastructure development and highlighted emerging investment opportunities for building rural India. Their study underscores the importance of adopting a participatory approach in planning and utilising rural infrastructure, ensuring that local communities actively engage in and benefit from development processes. The authors argue that clearly defined objectives, transparency and community participation are essential for achieving sustainable and inclusive rural development outcomes.

Further contributing to participatory planning approaches (Rao et.al, 2022) explored the application of a Participatory Geographic Information System (PGIS) framework for sustainable rural development planning. Conducted by the Centre for Geo-Informatics Applications in Rural Development (CIGA-RD), their case study of Taju village in Maharashtra demonstrates the effectiveness of integrating GIS-based spatial analysis with Participatory Rural Appraisal (PRA) techniques. The study highlights how the convergence of local knowledge with technical datasets, including land use, soil and water resources, can support community-owned development plans. The findings indicate that participatory geospatial tools enhance resource management, promote sustainable livelihoods and improve overall quality of life while ensuring context-specific and locally relevant planning.

3. Research Methodology

Conventional models for village settlement development often fail due to inadequately framed research briefs that rely predominantly on top-down data collection methods, including aerial surveys, census data and municipal records. While these methods are effective in documenting quantifiable parameters such as land use, transportation networks, demographic and economic indicators and formal built form, they remain limited in capturing the everyday lived realities of rural settlements. Such methodologies adopt a predefined survey structure that privileges standardised formats, often excluding information that does not conform to these categories. As a result, critical intangible aspects, including informal social networks, home-based economic activities, multi-use spaces, temporally varying spatial practices and culturally embedded patterns of use, are overlooked. These elements are fundamental in shaping community identity and spatial meaning. To address these limitations, the present study adopts a hybrid methodological framework that integrates spatial, social and participatory approaches (Figure 3). The framework enables the mapping of intangible socio-spatial dynamics alongside conventional "hard data," allowing for a more holistic understanding of village settlements.

3.1 Primary and Secondary Data Collection

Primary data plays a crucial role in documenting the present physical, social and economic conditions of *gaothans*, as well as capturing the perceptions, needs

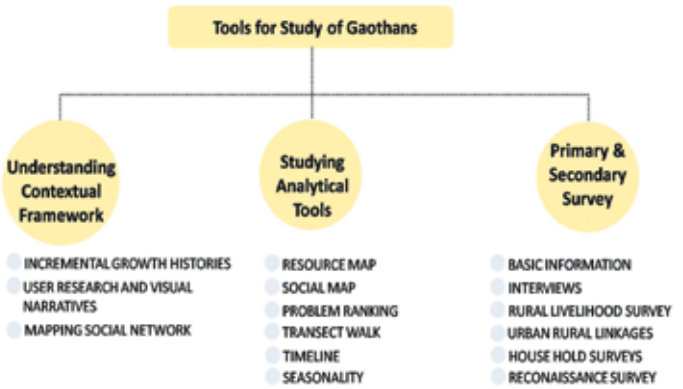

Figure 3: Research Methodology
Source: Authors

and aspirations of the local community. It reflects real-time ground realities that may not be recorded in official documents. Secondary data, on the other hand, provides a broader historical, legal and policy-based framework, helping to understand long-term changes, planning regulations and development proposals affecting *gaothans*. When used together, primary and secondary data complement each other, resulting in a holistic, reliable and well-informed analysis that supports sensitive, inclusive and sustainable planning interventions.

3.2 Spatial and Socio-Cultural Mapping Approaches

3.2.1 Incremental growth histories

This method incorporates time and change as essential dimensions of spatial analysis. Incremental growth histories document how inhabitants adapt, modify and expand their built environments in response to evolving social, economic, environmental and familial conditions. By mapping incremental construction and spatial transformations, this approach:

- reveals the agency and autonomy of residents in shaping their environments
- demonstrates the accumulation of social and economic capital through self-built processes
- identifies contextual triggers—such as livelihood shifts, environmental pressures, or
- demographic change—that prompts spatial modification
- acknowledges local systems of knowledge and informal modes of decision-making
- embedded within settlement evolution

This method situates the built environment as a living, adaptive system rather than a static artifact (Turner, 1977).

3.2.2 User Research and Visual Narratives

User research through visual narratives enables an understanding of how residents perceive and assign meaning to their built environment, often in contrast to external or expert interpretations. Visual material that may appear striking or significant to an outsider may hold entirely different connotations for a resident. In this study, curated image slideshows were used as prompts during focus group discussions to elicit responses regarding everyday spaces and activities. Participant comments and images were organised using a simple analytical grid under thematic categories. This process helped:

- Capture perceptual and experiential dimensions of space
- Identify recurring spatial patterns and relationships
- Understand how different spaces operate relationally within the settlement

The visual narratives further informed directions for ethnographic inquiry and spatial mapping, supporting deeper analysis of rural settlement dynamics and future development possibilities (Whyte, 1980).

3.2.3 Mapping Social Networks

This approach examines the spatial manifestation of social networks within the village. Key nodes of interaction—religious places, communal spaces and informal gathering areas—were identified and mapped. These spaces function not only as sites of ritual but also as centers of:

- Social interaction
- Leisure and recreation
- Information exchange

The spatial clustering of such social nodes reveals that amenities emerge organically from social practices rather than through formal zoning. Consequently, an amenity is understood not merely as an institutional function (e.g., a school or health center) but as a socially embedded space integral to everyday life (Hillier & Hanson, 1984).

3.3 Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal is a scientifically proven methodology to understand village dynamics, identify and analyse problems within a village system and design their solutions. The approach seeks to incorporate the knowledge and perspectives of rural communities into the planning and management of development projects and programs. PRA works

on the philosophy of handing over the stick, giving control to the people. Various tools are employed in PRA activities. Resource maps, social maps, transect walks, timelines, seasonality and problem ranking are standard PRA instruments defined by Chambers (1994) and later FAO, World Bank and UNDP manuals.

3.3.1. The Resource Map

Resource mapping identified all naturally occurring and locally available resources within the village boundary. Conducted collaboratively with villagers, this exercise enhanced both local and external understanding of resource distribution and availability. In several instances, the activity revealed under-recognised or undervalued resources, prompting community reflection.

3.3.2. The Social Map

Social mapping helps reveal the village's social structure and economic centers by documenting key features such as households, schools, Anganwadi centers, PDS outlets, shops and flour mills. The map is color-coded to differentiate households based on their primary occupations, whether they are engaged in agriculture, agricultural labor, or are landless. It also highlights households affected by child malnutrition, allowing for analysis of any spatial patterns associated with this issue. Conducted alongside the resource map, social mapping visually represents the distribution of different social groups, such as men, women, children, landowners, the landless and the literate versus illiterate. This tool offers a clear picture of the community's social fabric.

3.3.3. Transect Walk

A Transect Walk involves walking across the village from one end to the other to observe and document various environmental and community features. It offers valuable insights into the village's layout, characteristics and the interaction between different spaces.

3.3.4. Timeline

The timeline exercise aims to gather insights into historical and recurring events in the village, such as floods, droughts and key socio-economic developments. The activity helps trace the village's progress and development over time.

3.3.5. Seasonality

Seasonality analysis explored cyclical patterns of:

- Agricultural activities
- Income and expenditure
- Festivals and rituals
- Health and disease trends
- Climatic variations

Information was gathered informally through conversations and later systematised, ensuring a non-intrusive data collection process.

3.3.6. Problem Ranking

Problem Ranking helps identify key challenges faced by villagers, including issues with sanitation, water, waste disposal and infrastructure. The exercise captures residents' preferences and priorities, contributing to a better understanding of their needs.

3.3.7. Household Surveys

Household surveys complemented participatory methods by generating detailed socio-economic data. Sampling was carefully designed after preliminary village profiling. Data obtained from the Gram Panchayat, including lists of people above/below the poverty line, were used to stratify households based on ration card type, occupation, landholding status and caste.

Representative samples from each category were included. Survey data were entered directly into Excel for analysis. The questionnaire covered basic demographics, health, education and livelihoods. Importantly, the survey instrument remained iterative questions that were revised as new issues emerged during fieldwork. For example, kidney stone prevalence, initially omitted, was added after its repeated identification in the early survey.

4. Data Analysis and Findings

Vichumbe and Bamandongri are two villages in Maharashtra that are currently undergoing significant transformation due to large-scale urban and regional development initiatives, due to their location along the high-speed corridor. Both villages fall within the Raigad District and Panvel Taluka and are influenced by planned urban expansion led by the City and Industrial Development Corporation of Maharashtra (CIDCO). While they share a common administrative context, the development models applied to each village differ substantially in terms of land acquisition, planning mechanisms, infrastructure provision and integration with surrounding urban areas. This section presents a detailed analysis of Vichumbe and Bamandongri, highlighting their socio-economic characteristics, planning frameworks and development trajectories.

4.1 Study of Vichumbe Village

Vichumbe village is situated in Panvel Taluka of Raigad District, Maharashtra (Figures 4a & 4b). It is

located approximately 5 kilometers from the Panvel sub-district headquarters and about 69 kilometers from Alibag, the district headquarters. Due to its proximity to Panvel city, Vichumbe has increasingly come under the influence of urban growth and infrastructure expansion. Since 2009, Vichumbe has functioned as an independent gram panchayat, providing local self-governance through an elected sarpanch and village council.

The village has a total geographical area of 119 hectares with a population of approximately 6,332. The population composition includes 3,512 males and 2,820 females, indicating a relatively balanced gender distribution. Vichumbe consists of nearly 1,624 households, reflecting a moderately dense rural settlement pattern transitioning toward suburban characteristics. Literacy levels in the village are relatively high, with an overall literacy rate of 76.69 percent. Male literacy stands at 80.67 percent, while female literacy is recorded at 71.74 percent, suggesting a gradual improvement in educational access and awareness, though gender disparities persist.

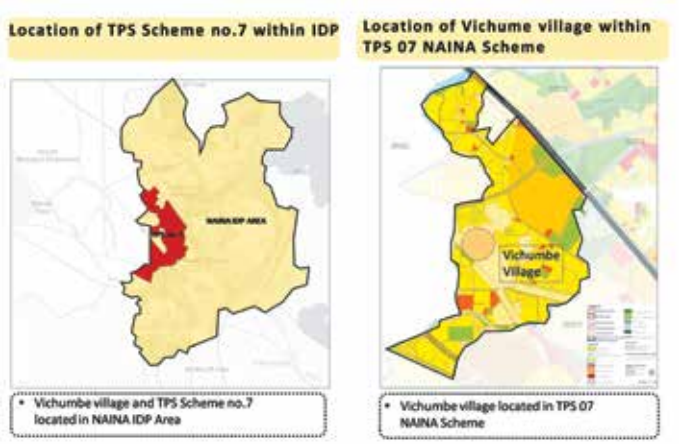

Figure 4a: Location of Vichumbe village within TPS 07 NAINA Scheme
Source: Authors

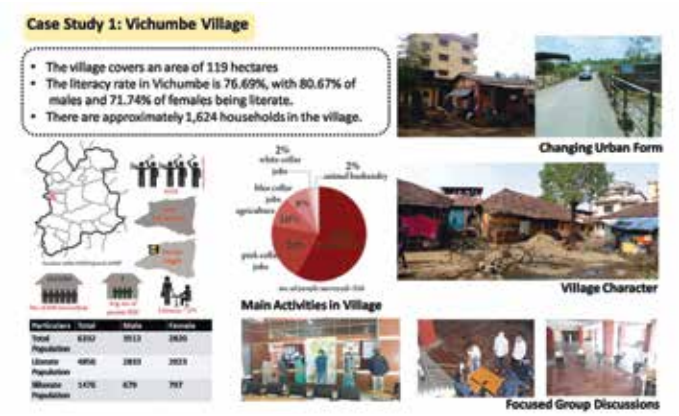

Figure 4b: Case study Vichumbe village
Source: Compiled by Authors

Administratively and politically, Vichumbe falls under the Panvel Assembly Constituency and the Maval Parliamentary Constituency as of 2019. Panvel city, located within a short distance, serves as the primary urban center for employment, trade, education, healthcare and other economic activities for the residents of Vichumbe (Villageinfo.in, n.d.).

4.1.1. Vichumbe under the NAINA Development Framework

Vichumbe is a part of CIDCO's ambitious Smart City initiative known as the NAINA (Navi Mumbai Airport Influenced Notified Area) project. NAINA is envisioned as a planned urban region surrounding the upcoming Navi Mumbai International Airport, aimed to accommodate future population growth through structured development rather than unplanned urban sprawl. The inclusion of Vichumbe within the NAINA boundary has significantly altered its development potential and land-use dynamics.

One of the major infrastructure proposals affecting Vichumbe is the construction of a new interchange near the village along the Mumbai–Pune Expressway. This interchange is intended to improve regional accessibility, enhance connectivity to NAINA and stimulate real estate and economic development in the surrounding areas. Improved road connectivity is expected to integrate Vichumbe more effectively with Panvel, Navi Mumbai and the Mumbai Metropolitan Region (MMR).

A distinctive feature of the NAINA project is its voluntary land pooling scheme, which represents a departure from traditional land acquisition models. Under this model, landowners voluntarily contribute their land for development. The pooled land is reconstituted into larger, planned plots, allowing for systematic infrastructure provision and efficient land use. According to the scheme, landowners surrender 25 percent of their land for infrastructure development, including roads, utilities and public amenities and an additional 15 percent is allocated to the planning authority's land bank. The remaining 60 percent of land is returned to the landowners with enhanced development rights in the form of increased Floor Space Index (FSI) (CIDCO).

This land development model aims to ensure equitable distribution of benefits among landowners while reducing resistance to development. It also helps in securing financing for infrastructure, as CIDCO focuses on city-level and peripheral infrastructure, while the landowners themselves develop internal infrastructure within individual layouts.

The planning of Vichumbe and the surrounding NAINA areas is guided by various government resolutions, development control regulations and planning standards that have been adapted to local needs. Key principles underlying the development framework include encouragement of land aggregation, equitable land redistribution, financial sustainability and the provision of inclusive housing. The objective is to balance rapid urbanisation with social equity and long-term viability.

In summary, Vichumbe's transformation under the NAINA project reflects a participatory and flexible planning approach. The focus is on improved connectivity, innovative land management, adherence to planning guidelines and strategic principles that aim to guide sustainable urban growth.

4.2 Study of Bamandongri Village, Ulwe

Bamandongri is a historic village located within Ulwe, on the eastern side of Mumbai, in Maharashtra. Unlike Vichumbe, which is transitioning from a rural to a suburban settlement, Bamandongri has long existed as a traditional coastal village with a strong cultural and occupational identity. Despite the rapid urbanisation taking place in its surroundings, Bamandongri has managed to retain elements of its rural character and social structure.

The village is well connected to Panvel through Maharashtra State Transport (ST) bus services, which have historically served as a crucial mode of transport for residents commuting for employment, education and trade. This connectivity has played an important role in integrating Bamandongri with nearby urban centers while still allowing it to function as a distinct settlement.

The local economy of Bamandongri has traditionally been based on agriculture and fishing. Paddy cultivation remains the primary agricultural activity, supported by the region's fertile soil and monsoon-dependent farming practices. Fishing continues to be a significant livelihood due to the presence of nearby creeks and coastal waters. The community predominantly belongs to the Hindu Agri caste, which has deep historical ties to agriculture and coastal occupations.

Social and cultural life in Bamandongri revolves around key community institutions, including a Hanuman temple that functions as both a religious and social gathering space and a primary school that caters to the educational needs of local children. These institutions play a vital role in maintaining social cohesion amid ongoing urban transformation.

4.2.1. Urban Development Context of Ulwe and Bamandongri

Ulwe, the larger planning node encompassing Bamandongri, is undergoing rapid development under the direct management of CIDCO. The village is now surrounded by planned sectors such as Sector 6, Sector 9, Sector 18 and Sector 19 (Figures 5a & 5b). Indicating its incorporation into a formally planned urban grid. There are also proposals to include Ulwe within the jurisdiction of the Panvel Municipal Corporation, which would enhance governance capacity, service delivery and urban management.

A key driver of development in the region is the Ulwe International Node, which includes the proposed Navi Mumbai International Airport. This node spans over 300 hectares, much of which comprises ecologically sensitive mangrove areas. The presence of the Ulwe and Ghadi rivers further emphasises the importance of environmentally responsive planning. Consequently, development in the area is planned as a mixed-use model that integrates residential, commercial and industrial functions while prioritising sustainability.

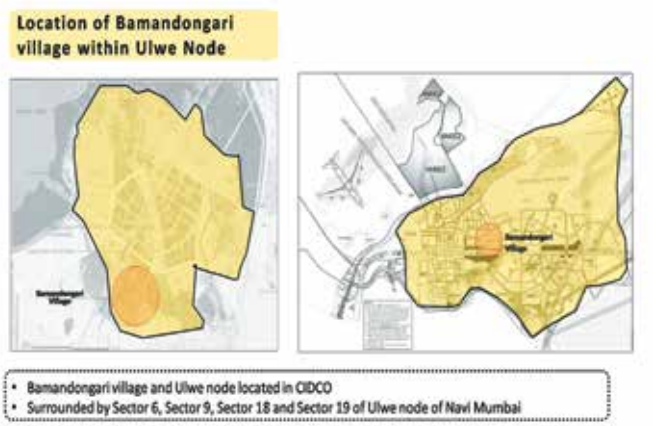

Figure 5a: Location of Bamandongari village within Ulwe node
Source: Authors

Figure 5b: Case Study Bamandongari village
Source: Compiled by Authors

Infrastructure planning in Ulwe emphasises multimodal connectivity and public transport. The area is well connected by road networks, located close to the Navi Mumbai Metro corridor and strategically positioned near the proposed international airport. A strong focus is placed on public transport to reduce dependence on private vehicles, thereby minimising congestion and environmental impact.

Residential and commercial developments in Ulwe offer a range of housing options, including affordable, mid-range and high-end residences. Commercial and retail spaces are planned alongside residential zones to ensure access to daily amenities and promote walkable neighborhoods. Green spaces, parks and recreational areas are integral components of the plan, supported by sustainable features such as rainwater harvesting, energy-efficient buildings and environmentally sensitive landscaping.

Provisions are also being made for social infrastructure, including schools, healthcare facilities, community centers and sports amenities, to support the growing population. Designated commercial and industrial zones are expected to generate employment opportunities and stimulate regional economic growth, contributing to long-term economic diversification while attempting to preserve the cultural identity of villages like Bamandongri.

The CIDCO-led development models in Ulwe and the NAINA region represent comprehensive and forward-looking approaches to urban planning in rapidly growing metropolitan areas. These models emphasise planned infrastructure, diversified land use, sustainability and connectivity, aiming to create self-sufficient urban environments that can accommodate future growth while improving quality of life.

4.3 Comparison of Development Models: Bamandongri and Vichumbe

The development approach in Vichumbe differs significantly from that of Bamandongri. In Vichumbe, as per the sanctioned Integrated Development Plan (IDP), a 200-meter radius around the gaothan area is designated as a suburban village zone with an FSI of 1.0. The remaining land, which falls largely under residential and mixed-use zones, is permitted an FSI of 0.50. Within TPS-07, four locations have been designated as urban village zones. This designation was largely influenced by landowners, who demanded protection of their land values due to the advantageous location and future development potential.

As a result, land parcels with more than 50 percent area falling within urban village zones experienced an increase in original plot value during redistribution, as reflected in Form 1 of the valuation statement. This adjustment ensured that the net financial demand from such landowners became zero, while maintaining the principle of returning 40 percent of the original plot area as final plots.

In contrast, the Navi Mumbai project, including areas like Bamandongri, follows a model of 100 percent land acquisition, as all land is required for public purposes and is acquired by the government. CIDCO is responsible for providing infrastructure up to the plot level in Navi Mum bai. However, in the NAINA region, ownership largely remains with landowners except for land reserved under the Development Plan (DP) and IDP-I. CIDCO's role in NAINA is limited to city-level and peripheral infrastructure, while landowners develop internal infrastructure within layouts.

Overall, while CIDCO's planning vision influences both Bamandongri and Vichumbe, their development models reflect different planning philosophies—one based on full acquisition and centralised infrastructure provision and the other on participatory land pooling and shared development responsibility. Together, these models provide valuable insights into managing urban growth around traditional *gaothans* while balancing development, equity and sustainability.

5. Results and Discussion

Based on the studies in the Bamandongari and Vichumbe villages and the primary and secondary methods of data Collection. These are some important parameters in which the sites along high-speed corridors could be studied (Figure 6), which are as follows:

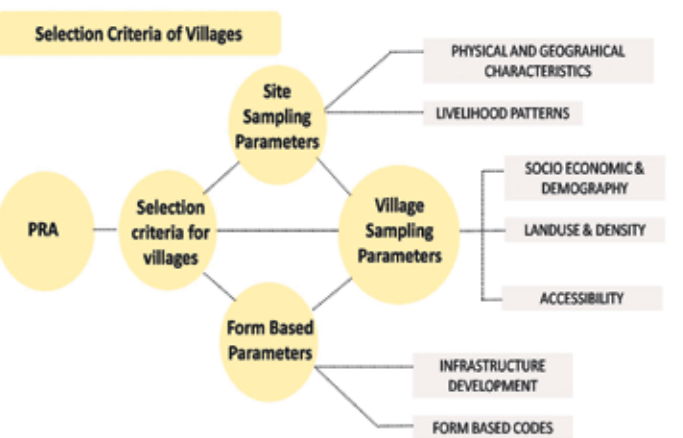

Figure 6: Selection criteria for villages
Source: Authors

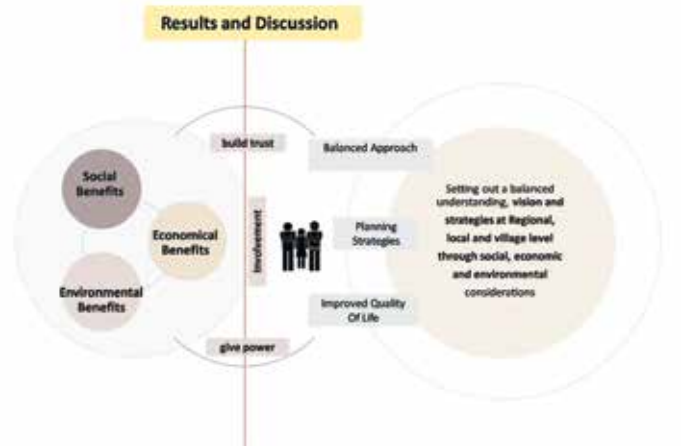

Figure7: Results and discussions
Source: Authors

a. Site Sampling parameters

b. Form-based parameters

c. Village Sampling parameters

d. Participatory Rural Appraisal

This finding can further be applied to the Gonde Node along Samruddhi Mahamarg connecting Nagpur and Mumbai with a length of 701 km. The Gonde Node near Sinnar Industrial area is the Samruddhi corridor proposed nodal city located 30km east of Nashik City in Maharashtra. The Nagpur-Mumbai Expressway will pass directly through 10 key districts and indirectly connect 14 districts via feeder roads, covering 24 Talukas and 392 villages (Maharashtra State Road Development Corporation Ltd., 2024). To accommodate the workforce of the industrial city, whose unique selling point is its focus on agro-based industries, a new city has been planned around it. This new city spans five villages historically engaged in agriculture and animal husbandry.

Speculative real estate development has led to fragmented growth around these villages, introducing an alien physical character to the rural landscape. This trend threatens both the socioeconomic fabric of the villages and the physical coherence of the area.

Studies conducted in Vichumbe and Bamandongri aim to demonstrate the potential for mapping detailed layouts of a site and its surroundings, offering solutions through contemporary urban design methodologies that are both significant and relevant to rural settlements and their urban extensions. For this purpose, the site study is divided into three levels, as illustrated in Fig 7., with each level focusing on the social, economic and environmental aspects of the region.

a. Regional Level

b Village level

c. Local level

The study also analyses the transects between rural and urban areas by examining their proximity to ecological features, industrial zones and highways. It focuses on key aspects such as agriculture, agro-industries, livestock, social infrastructure, traditional industries, affordable housing and commercial development, which can be further detailed as follows.

a. Study of Transect between rural and ecology-proximity to hills, natural resources away from direct impact, which includes agriculture, agro industries, livestock, food processing, social infrastructure and rural housing.

b. Study of Transect between urban and rural-proximity to industrial area entry point, which includes Workers housing, Rural/traditional industries, Social Amenities, Institute, Commerce and Services.

c. Study of Transect between urban and rural-proximity to highway, which includes affordable housing for industrial workers, commercial node, traditional industries, urban agriculture, public place, transit node and social infrastructure.

The study also contributes to the development of urban design strategies that can be applied to such sites.

6. Conclusion and Recommendations

The rapid urbanisation occurring across India, particularly in expanding rural areas along high-speed corridors, presents an exciting opportunity to reshape the future of these communities. However, this transformation also comes with challenges, as the integration of traditional *gaothans* into urban spaces results in shifts in housing, land use and occupational patterns. While agricultural lands are often converted for industrial or residential purposes, the introduction of new social infrastructure, such as schools, healthcare facilities and commercial centers, provides a much-needed boost to the local economy and quality of life. This blend of urban growth and rural tradition has the potential to create dynamic, thriving communities that retain their cultural heritage while embracing modern progress.

Traditionally, development models have relied heavily on top-down methods like aerial surveys and census data, which focus primarily on tangible, measurable

aspects of rural life. While these approaches are valuable for documenting changes in infrastructure and demographics, they often miss the subtler, yet equally important, elements that define the daily experiences of rural communities. The intricate social networks, local economic activities and informal spaces that shape life in these settlements cannot be captured by quantitative data alone. To overcome this limitation, new methodologies that blend both quantitative and qualitative data are essential.

By incorporating approaches like Incremental Growth Histories, User Research, Visual Narratives and Social Network Mapping, we gain a deeper understanding of how these communities evolve. These methodologies provide insights into how residents adapt their built environments over time and how their social structures evolve alongside urbanisation. Incremental Growth Histories, for example, document the gradual transformation of rural spaces, revealing the autonomy of residents and their capacity to shape their surroundings in response to changing economic and social conditions. Visual narratives allow us to capture how people perceive and interact with their environment, shedding light on the emotional and cultural connections that bind individuals to their spaces. Social network mapping, on the other hand, highlights the importance of social hubs—such as temples, community centers and open spaces—demonstrating the continued role of these places as critical nodes for social interaction and community cohesion.

One of the most effective tools for managing these transitions is Participatory Rural Appraisal (PRA). PRA actively involves residents in the planning process, allowing them to contribute their knowledge and perspectives on the changes occurring in their villages. Tools like Resource Maps, Social Maps and Problem Ranking provide a holistic view of village dynamics, offering insights into both physical and social aspects of rural life. By engaging the community in this way, PRA ensures that development strategies are more inclusive, context-specific and responsive to local needs. This collaborative approach fosters a sense of ownership and empowerment, ensuring that urbanisation benefits everyone, not just a select few.

The key to managing rural-urban transitions lies in combining both quantitative data and the lived experiences of rural populations. Urbanisation is not just about building new roads or residential areas; it is about creating spaces that honor the culture, history and values of rural communities. As such, development strategies should focus on preserving and enhancing the unique identity of these *gaothans* while also embracing the opportunities that urban growth brings. By adopting participatory planning, integrating alternative methodologies and fostering a positive, inclusive approach to urbanisation, we can create sustainable, vibrant urban environments that meet the needs of both new and existing residents.

In conclusion, the integration of rural areas into urban environments, if done thoughtfully and inclusively, holds immense potential. It offers a chance to create more resilient, equitable and culturally rich communities that blend the best of both worlds—modern infrastructure and traditional rural values. With the right regulatory frameworks, community engagement and a focus on sustainable development, rural-urban transitions can not only be managed but can thrive, enriching both urban and rural lives for generations to come.

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RESEARCH PAPER

Perception Study on Women's Safety in Tourist Places

A Case Study of Upper Lake, Bhopal

By Dr. Supriya Vyas, Dr. Neha Pranav Kolhe, Dr. Jagdish Singh and Madhumanti Das

Abstract
Safety and security are fundamental to ensuring positive tourist experiences, particularly for women. Prioritising women's safety in tourism enables them to travel with freedom, confidence and enriched experiences. The study assesses women's safety by examining the various infrastructure-based parameters at Upper Lake, Bhopal, Madhya Pradesh. In this study, five parameters are selected to assess women's safety, including toilets, street lights, footpaths, CCTV and signage. Therefore, an observation-based primary survey was conducted. It also took into account the perception of women. The study analyses the accessible infrastructure required for women. The study focuses on the women's perception regarding safety at tourist places and addresses various problems and issues related to it. These findings reveal the level of availability, accessibility and the gap in infrastructure, tourist behavior, etc. at the selected location. After identifying the issues, specific interventions are proposed. This study emphasises the importance of gender-sensitive planning, the need for improved infrastructure and awareness to foster inclusive and sustainable tourism.

Keywords: *Safety and security, women, perception, tourism*

1. Introduction

1.1 Background

Tourism plays a crucial role in promoting cultural exchange, economic growth and social development. Though the safety and security of tourists, particularly women, is a vital concern that directly influences the inclusivity and sustainability of tourist places. In Bhopal, the Upper Lake is a renowned tourist location for leisure, attracting a large number of tourists. Unique challenges related to women's safety, particularly concerning the availability and accessibility of supportive infrastructure and other critical factors, should be carefully considered in planning. This study aims to explore the perceptions of women tourists regarding their safety in and around the Upper Lake area, aiming to identify the factors influencing their sense of security and the gaps that need to be addressed. By assessing these perceptions, the research contributes to the broader discourse on gender-sensitive planning and the creation of safer, more welcoming tourist environments. Women tourists are highly sensitive to the safety infrastructure quality when visiting new places. Women, as temporary users of those spaces, face inimitable vulnerabilities related to their physical security and freedom of movement (Amir et al., 2015). The tourism industry has professed that the fear of crime and harassment disproportionately affects women travelers. Women's safety in tourist places is not only a physical issue but is also deeply entangled with psychological comfort, cultural norms and social behavior. A tourist place must prioritise safety as a key component of its tourism strategy to thrive consciously. This is mainly important in countries like India, where public infrastructure often lacks gender sensitivity. Safety refers to minimising risks, while security refers to protection from intentional threats (Blokland &

Reniers, 2019). Both are significant for ensuring enjoyable and uninterrupted travel experiences. A Barcelona study highlights that physical and social factors shape perceptions. Perceived safety strongly influences women's use of green spaces, influencing their mobility and well-being (Gargiulo et al., 2020).

1.2 Need for women's safety

In any tourist place, if one considers a stretch of a road along it, if there is an inadequate number of street lights or poor visibility, CCTV cameras are not present, or in an inappropriate position, there are many incidents with no records of early or late. Besides, accessible infrastructure is required for different age groups of people for women's safety. In different tourist places, there is a lack of accessible infrastructure that can be used to analyse and assess women's safety in various tourist places. Travel motivations are highlighted as genuine needs that lead travellers to visit and meet those needs (Tasci & Ko, 2017). The need for women's safety in tourist places is urgent and multi-dimensional. Women often experience crimes of a sexual nature and perceive a higher level of risk in public spaces, which limits their freedom of movement (Brown & Osman, 2017). Inadequate public infrastructure, such as poorly lit paths, broken sidewalks, a lack of seating and limited surveillance systems, exacerbates this sense of insecurity. In urban India, especially in tourist places, safety concerns restrict women's ability to explore, engage in leisure and fully participate in travel opportunities. Women's safety is essential not only from a rights-based perspective but also for sustainable tourism development. Unsafe destinations deter female tourists, reduce the overall tourism economy and harm the global image of the destination. Therefore, creating safe and inclusive spaces for women directly benefits the tourism sector by attracting more diverse visitors and fostering a culture of openness and equality.

2. Review of Literature

In India, a separate study depicted how a tourism organisation addresses women's safety by mitigating safety-related concerns and enhancing women's travel motivation, offering a practical framework for implementation (Chhajer et al., 2022). Various parameters have been used to assess women's safety in urban environments. Well-lit corridors were identified as a vital factor in a city-level study involving two European cities (Painter, 1996). In the case of Lleida, researchers analysed emotional responses to public spaces, focusing on emotional valence (anger, fear, sadness), emotional intensity (arousal), dominance and the level of self-control over emotion to appraise perceived safety (Paül I Agustí et al., 2022). Meanwhile, India's growing tourism sector is driven by increasing incomes and government initiatives, though challenges related to infrastructure, healthcare and other areas call for collaborative efforts to ensure the sector's sustainable development (Basak et al., n.d.). Additionally, another study conducted in India examines the experiences of foreign solo female travelers, highlighting that safety concerns are not limited to high-risk destinations but are embedded in daily life. It also questions whether solo female travel challenges traditional gender power structures, noting how women have come to internalise a persistent sense of "unsafety" (Thomas and Mura, 2019). Amir et al. (2015) conducted a detailed study on international women travelers' perceptions of safety in Kuala Lumpur. Their findings revealed that 99% of respondents felt very safe walking in the city during daytime hours. However, this perception significantly dropped to only 15% during nighttime, indicating that time of day plays a crucial role in shaping women's safety perceptions. The study highlighted that road traffic, pick-pocketing and snatch thefts were the primary concerns. Importantly, it emphasised that visible safety mechanisms such as CCTV installations and effective urban management strategies positively influenced women's feelings of security. (Yadav & Kumari, 2024) emphasised the importance of incorporating gender-sensitive planning into pedestrian mobility in Kanpur city. Their study used Net Promoter Score (NPS) to quantify safety perceptions based on pedestrian infrastructure quality. They identified critical gaps in lighting at sidewalks and underpasses, as well as the absence of street furniture at bus stops. Their visual analysis confirmed that poorly lit, neglected and infrastructure-deficient areas significantly eroded women's sense of safety. Their proposed three-step framework emphasised the importance of integrating pedestrian needs, especially for women, into mainstream urban planning. One study examined how age and gender influence risk perception in space tourism and its findings also apply to terrestrial urban contexts. They emphasised that younger women and elderly individuals often perceive risks differently, necessitating inclusive safety designs (Kim et al., 2025). Similarly, one study depicts technology-driven solutions to improve women's safety in urban India, emphasising mobile safety apps and real-time monitoring as potential game changers (Kaur et al., 2022). Another study emphasised the importance of incorporating safety as an organisational purpose within the tourism industry to encourage women to travel confidently. Their work aligns with the broader need to institutionalise safety as an integral aspect

of tourism planning and management (Chhajer et al., 2022). The reviewed literature consistently depicts that women's safety in tourist places is influenced by physical infrastructure, urban design, social norms, technological interventions and institutional accountability. Studies across diverse geographic contexts agree that without gender-sensitive planning, safety gaps will continue to limit the participation of women in tourism.

3. Methodology

This study employed a mixed-method approach that combined primary field observations with a structured questionnaire survey focused on women's safety parameters at Upper Lake, Bhopal. Primary data was gathered through structured questionnaires using Likert-scale-based responses from women tourists. Additionally, in-depth interviews and field observations were conducted to assess key factors affecting their sense of security. The study also determines the distribution of various parameters along the main stretch of the lake.

3.1 Study Area: Upper Lake, Bhopal

Upper Lake is a leisure tourism site known for boating and scenic views, the largest man-made lake in India. Upper Lake, commonly known as Bada Talab (Bhojtal), is one of the largest artificial lakes in India and a significant part of Bhopal's landscape and heritage (Figures 1 and 4). It is believed to have been constructed in the eleventh century during the rule of King Bhoj. The lake serves as a major source of drinking water for the city and upholds various recreational activities and is surrounded by Verdant landscape. Upper Lake is a well-visited tourist place. It presents boating, scenic views and a peaceful environment, making it a preferred spot for locals, domestic tourists and occasional foreign tourists.

Figure 1: Upper Lake
Source: Authors

Figure 2: Primary Survey at Upper Lake
Source: Authors

Figure 3: Primary Survey at Upper Lake
Source: Authors

Figure 4: Upper Lake (nighttime)
Source: Authors

Although its beauty and significance are key concerns, ensuring safety and accessibility, especially for women, is a key concern. The field surveys included various zones of the lakefront, such as the MPT Boat Club entrance, walking tracks along the lake, seating areas near viewing points and less frequently visited stretches that become relatively isolated during nighttime hours (Figures 2 and 3).

3.2 Survey Details

A detailed questionnaire was developed to assess several safety-related parameters systematically in 101 tourists. These parameters included the availability, accessibility and hygiene of toilets. The street lighting was assessed based on the number of lights, the adequacy of illumination and whether the lights were functional. The footpaths were evaluated based on their overall condition, height, width and the presence or absence of obstructions. The CCTV coverage was assessed by evaluating the number of cameras, their locations and their functional status. The visibility of certain stretches was carefully examined to identify blind spots and stretches with limited lighting. Signage was assessed to evaluate the visibility, clarity and accessibility of safety-related information for women tourists. Each parameter was assessed on a five-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree" to assess women's satisfaction with infrastructure elements.

3.3 Data Collection

Primary data was collected through field surveys conducted to capture time-based variations in infrastructure functionality and safety perceptions (Figures 2 and 3). Visual documentation was undertaken using GPS-enabled cameras to provide photographic evidence supporting observational assessments. Interviews were conducted with women tourists to understand their experiences, safety concerns and infrastructure-related suggestions.

The infrastructure-based parameters were assessed using a systematic checklist to ensure that they were consistently evaluated throughout the field survey. Photographs of the infrastructure-based parameters were taken to collect the observational data. Interviews with tourists provided qualitative insights into the various aspects of women's safety perceptions.

4. Results and Analysis

This section represents an analysis of the socio-behavioral characteristics of women visitors at Upper Lake, Bhopal, with a focus on understanding patterns of use and their implications for perceived safety in tourist spaces. Along with visitor characteristics such as type of tourists, frequency of visit and main purpose of visiting, this section also evaluates the condition and adequacy of infrastructure, including toilets, street lighting, footpaths, CCTV surveillance and signage to assess their role in shaping women's safety perceptions. By integrating usage patterns with infrastructure assessment, the discussion highlights how both social dynamics and the quality of the built environment collectively influence women's sense of security, comfort and accessibility in this major tourist space of Bhopal.

The primary purpose of visiting Upper Lake is overwhelmingly leisure and recreation, accounting for the vast majority of respondents, while visiting relatives and friends and other purposes constitute only a marginal share (Figure 1). This dominance of leisure-oriented visits emphasises the role of Upper Lake as an important public recreational space for women. An even smaller share of visitors reported fitness-related activities as their main purpose, reflecting minimal use of the tourist place for health or exercise-oriented activities. Since leisure activities are often associated with longer stays, evening visits and relaxed movement patterns, the findings underline the importance of adequate lighting, surveillance and gender-sensitive planning of public spaces. Ensuring safety in such leisure-focused environments is crucial, as women's perception of safety directly influences their willingness to use and enjoy public tourist spaces like Upper Lake.

The analysis of tourist type at Upper Lake, Bhopal, reveals a strong dominance of local tourists, who constitute more than four-fifths of the total respondents, while domestic tourists form a relatively smaller share (Figure 2). This indicates that Upper Lake primarily functions as a local recreational space rather than a major destination for out-of-state tourists. From a women's safety perspective, the predominance of local visitors suggests frequent and familiar usage of the space by nearby residents, which can contribute to a sense of social familiarity and informal visits. However, it also underscores the need for consistent safety measures, as regular local use implies repeated exposure of women to the same environment across different times of the day.

Infrastructure Conditions

The quality of basic infrastructure significantly influences tourists' safety and experience. Facilities such as toilets, street lights, CCTV, footpaths and signage play a vital role in ensuring accessibility, hygiene and security, especially for women tourists. An assessment of these infrastructural elements helps identify existing gaps and supports planning interventions to enhance the safety and overall functionality of the lakefront area.

The results show that a large majority of respondents agree that toilet facilities at the site are easily accessible, indicating satisfactory spatial availability for women tourists (Table 1). Perceptions of

cleanliness and hygiene are also largely positive, with over two-thirds agreeing, though a notable proportion remains neutral. This neutrality suggests scope for improvement in maintenance standards to strengthen women's comfort and confidence while using public sanitation facilities. The toilets were partially inaccessible to elderly tourists. Sometimes, women reported hesitancy in using the available facilities due to poor hygiene and inadequate signage.

The majority of respondents agreed that signages are readable and appropriately placed, indicating generally good visibility and accessibility for tourists (Table 2). However, nearly one-fourth of respondents disagreed, suggesting gaps in placement consistency and clarity that may affect ease of navigation, particularly for first-time visitors.

The street lighting was highly uneven. Several lights were non-functional, especially in the less active areas and the level of illumination was grossly insufficient to ensure visibility after dark, except in the boat club area. The streetlights were spaced irregularly and, in some stretches, large gaps created unsafe zones where visibility was significantly compromised (Table 3).

The findings indicate a mixed perception of footpath conditions, with about half of the respondents agreeing that footpaths are safe and accessible for women (Table 4). However, a substantial proportion (around 40–45%) disagreed, highlighting significant concerns regarding maintenance, obstructions and overall walkability in the tourist area. Footpaths across the site were in poor condition. Damaged sections with broken tiles and uneven surfaces were frequently observed. These conditions posed safety hazards for all visitors but were especially concerning for elderly women and individuals with mobility issues (Figure 1).

The findings indicate that a majority of respondents perceive the presence of CCTV surveillance as adequate for ensuring safety, with nearly three-fourths agreeing and the smallest proportion strongly agreeing (Table 5). However, perceptions differ regarding the strategic placement of CCTV cameras, with a substantial share of respondents' expressing disagreement, indicating concerns about coverage and visibility. This suggests that while CCTV infrastructure exists at the site, its effectiveness in enhancing women's safety is limited by appropriate

Table 1: Parameter- Toilet
Source: Authors

Toilet	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The toilet is easily accessible for tourists in this place	0.00%	79.21%	8.91%	9.90%	1.98%
The washroom/ toilet facilities are related to cleanliness and hygiene	0.00%	70.30%	20.79%	6.93%	1.98%

Table 2: Parameter- Signages
Source: Authors

Signages	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Signages are easily accessible and readable for all.	1.98%	62.38%	10.89%	23.76%	0.99%
The signages are placed in an appropriate and visible location.	1.98%	63.37%	10.89%	23.76%	0.00%

Table 3: Parameter- Street light
Source: Authors

Street Light	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Street Lights are present at tourist places	9.90%	77.23%	12.87%	0.00%	0.00%
Street Lights are well- maintained and adequate, ensuring good visibility and safety during the evening	1.98%	43.56%	22.77%	30.69%	0.99%

Table 4: Parameter- Footpath
Source: Authors

Footpath	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The footpaths are well-maintained and safe for women of different age groups to walk on in this tourist place	2.97%	46.53%	9.90%	39.60%	0.99%
The footpath is accessible and unobstructed and it is easy to use for people of all different age groups	3.96%	49.50%	0.99%	44.55%	0.99%

Table 5: Security- CCTV
Source: Authors

Security	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
There is more need for adequate CCTV surveillance to ensure safety	0.99%	73.27%	9.90%	15.84%	0.00%
CCTV cameras are placed in strategic locations for safety concerns	0.99%	40.59%	3.96%	46.53%	7.92%

placement rather than mere availability. CCTV coverage was limited and concentrated primarily in the boat club area, failing to cover blind spot areas. Most of the women expressed that the absence of CCTV surveillance and street lights made them feel vulnerable. Various assessments confirmed the presence of multiple blind spots along the lakefront and insufficient lighting.

5. Discussion

The findings from the case study, Upper Lake, Bhopal, depict a clear understanding of women's perceptions of safety and security in the tourist environment. The infrastructural inadequacies, such as insufficient street lighting, broken footpaths, limited surveillance coverage and insufficient signage, not only compromise the physical safety of women tourists but also deeply impact their psychological well-being (Figure 1). Women reported avoiding isolated areas, altering their travel times to daylight hours and preferring to visit the lake in groups rather than alone. Women overwhelmingly expressed that they felt safer in areas with steady pedestrian activity and better infrastructure. It indicates that enhancing pedestrian flows and maintaining vibrant public spaces can inherently improve safety perceptions. The absence of adequate CCTV coverage was a critical safety gap identified in the study. Although some cameras were present, their coverage was limited, leaving large stretches of the lakefront unsupervised. Women took into account that visible, functional surveillance infrastructure would significantly enhance their confidence in visiting the site, particularly during the evening and night hours. This finding validates the argument made by Kaur et al. (2022) regarding the transformative role of technology in creating safer urban spaces. The lack of hygienic and accessible public toilets is another vital concern. Many women stated discomfort due to the poor maintenance of existing facilities, with some choosing to shorten their visits or avoid certain areas altogether. The presence of clean, accessible toilets is not only a basic amenity but a critical factor influencing women's comfort and their willingness to spend extended periods at tourist sites. The study further signifies that women's perceptions of safety are shaped by both tangible infrastructure and intangible social cues.

6. Conclusion and Recommendations

This study provides valuable insights into the multifaceted interaction between infrastructure, perception and women's safety in the tourist place, Upper Lake, Bhopal. The findings underscore the critical need for comprehensive interventions that prioritise the various dimensions of safety planning. The key conclusion is that women's safety in tourist spaces cannot be achieved through isolated improvements. Instead, a holistic, gender-sensitive approach is required that addresses the requirements. Based on the field observations and women's feedback, the following recommendations are proposed-

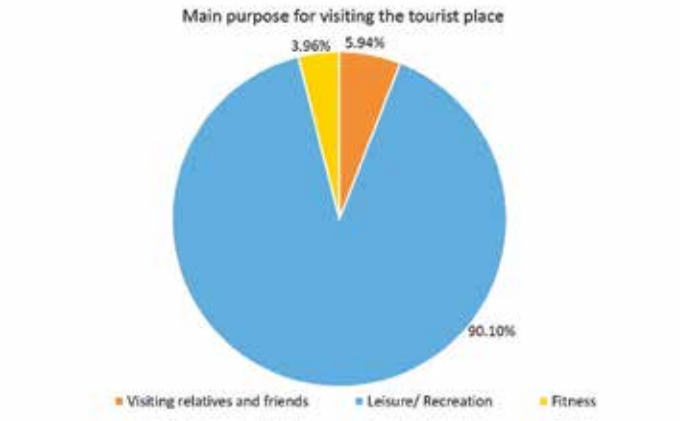

Figure 5: The main purpose of visiting the tourist place
Source: Authors

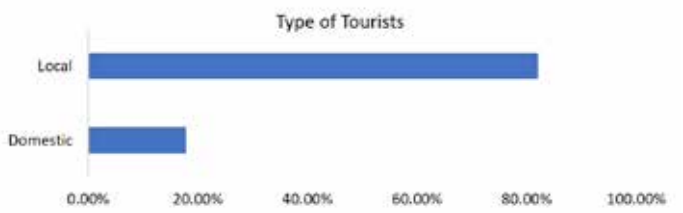

Figure 6: Type of Tourists
Source: Authors

Figure 7: Various Parameters and their present condition
Source: Authors

Infrastructure Improvements

Additional streetlights should be installed at regular intervals throughout the lakefront to eliminate dark zones and improve visibility, particularly in non-active corridors. Timely maintenance of footpaths, including repairing broken tiles and widening narrow sections, should be prioritised to ensure safe pedestrian movement. Signages are essential to enhance wayfinding, raise safety awareness and ensure better accessibility for women visitors.

The existing CCTV network should be expanded to cover isolated areas and blind spots comprehensively. Cameras must be regularly monitored and maintained to ensure functionality. The presence of uniformed police or community safety officers should be visibly increased, especially during the evening hours, to create a suppressive effect and reassure visitors. Signage should be strategically placed throughout the site, clearly indicating contact numbers and nearby emergency assistance points.

Public toilets must be increased in number, made fully accessible and maintained to high standards of hygiene. Regular cleaning schedules and public accountability mechanisms should be enforced to ensure sustained quality.

Community Engagement and Awareness

Safety is not solely the responsibility of infrastructure providers; community involvement is essential. Awareness campaigns promoting safety etiquette, encouraging reporting of incidents and highlighting the availability of support services should be conducted regularly. Local vendors, boat operators and other stakeholders should be trained in basic safety protocols and gender-sensitive practices.

Gender-Sensitive Planning and Continuous Monitoring

Tourism authorities should integrate gender-sensitive safety assessments into their regular planning cycles. Regular audits using Net Promoter Scores, perception surveys and visual analyses, as demonstrated by (Yadav & Kumari, 2024), should be institutionalised to track improvements and identify new safety gaps.

By adopting these recommendations, Upper Lake, Bhopal, can transform into a safer, more inclusive and more attractive tourist place for women tourists. Such improvements would not only enhance the local tourism economy but also serve as a model for other tourist sites seeking to foster equitable, sustainable and gender-sensitive environments. Ultimately, prioritising women's safety is integral to the broader vision of inclusive urban development and sustainable tourism.

Acknowledgment

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Interaction Spaces for the Girl Child

Case of Suncity Township, Gurugram

By Aruna Bhardwaj, Dr. Suruchi Modi and Dr. Tejwant Brar

ABSTRACT

Urban settings influence children's development. Owing to their academic, sports, cultural and medical resources, they offer children many opportunities. Research emphasises the need for local environments that enable children to move independently, play and connect with peers and the wider community. However, in a developing country like India, rapid urbanisation has created a gap in recognising children's specific needs, including those related to age, gender, ethnicity and culture. Primary research on middle childhood and gender behaviour in planned residential communities in India remains scarce. Although these urban neighbourhoods provide safe and comfortable living environments with access to experiential learning institutions, professional sports centres and childcare facilities, they often isolate children from general public settings. Girls and boys have different physical, emotional and social needs as they enter pre-adolescence and adolescence. This study focuses on the streets and public spaces inhabited by the girl child in Suncity Township, Gurugram. It examines how the built environment affects children's social interactions through a review of academic literature and ethnographic and quantitative primary research, including key informant interviews and spatial exploration of the neighbourhood, with particular attention to growing girls.

KEYWORDS: Gender, Child-Friendly, Urban, UNICEF, Spaces

1. INTRODUCTION

1.1 Children and Urban Neighbourhoods

The urban environment is an accepted reality of our times and it is a significant indicator of the development and progress of any nation. UN World Urbanisation Prospects 2018 points to the rapid increase of the world's urban population, reporting a rise from 751 million in 1950 to 4.2 billion in 2018. Home to 1.43 billion people, India reflects this trend. With populations of 19, 15 and 14 million for Mumbai, Delhi and Kolkata respectively (Igini, 2022), the urban environment is critical for India's growth and prosperity. Gurugram, as part of the National Capital Region of Delhi and one of the fastest growing cities of India, is an important city from the perspective of children, who at 31% of this urban population are key stakeholders in this narrative. It becomes imperative to create an urbanity that addresses children's developmental needs. Today's contemporary habitat unfortunately lacks human scale (UNICEF, 2018) within its structure and form. Amid this situation, studies targeting specifically the girl child in urban spaces are sparse. Global studies identify young women under the age of 24 as the highest risk group for mental health issues (Women's Mental Health Facts, n.d.), while a study from the University of Manchester found that 73% of 10–19-year-olds who identified as having self-harmed at least once were girls.

According to cognitive development theory, relationships are vital and social contact serves as the crucible for children's cognitive growth. Growing up within communities allows for a prolonged period of robust social engagement. Piaget proposed a developmental theory based on the "constructivist" perspective of development. He stated in his work: "In order to know objects, the subject must act upon them and, therefore, transform them" (Piaget, 1952). Social interactions, particularly with family, friends or peers, neighbours and the community at large, are essential for children's cognitive development. Lev Vygotsky, an influential

thinker in developmental psychology, emphasised that the mind develops through social processes, introducing the concept of the "zone of proximal development" (ZPD) (Vygotsky, Luria & Cole, 1978). This zone represents the gap between what a child can do independently and what they can achieve with guidance from more experienced individuals. According to Vygotsky, learning begins socially; through interactions, children acquire new ways of thinking which they gradually internalise with support, driving their cognitive growth. Favourable and supportive environments lead to improved outcomes spanning health, educational attainment and overall well-being for children.

This research hypothesises that planned residential areas, which are the basic module of contemporary urbanisation and where children spend the maximum time when not in school, play an integral role in the wellbeing of children in general and in addressing issues specific to the female gender. A deeper study of the spatial construct of the neighbourhood through observation and documentation of its built and unbuilt spaces, overlapped with an understanding of children's activities, highlights that girls are missing from the streets and open spaces of the neighbourhood, which translates into weak social linkages. Hence, it is paramount that spaces which ideally should provide scope for children's interactions with their peers and the community at large in a planned residential area require further inspection for their child-friendly aspects, overlapping this analysis with the lens of the growing needs of young girls.

2. LITERATURE REVIEW

Arup's study, Cities Alive—Designing for Urban Childhood, contends that two ideas are essential for the comprehension and development of a more child-friendly urban environment: "daily freedoms" and "children's infrastructure". The idea of daily freedoms includes the ability to participate in social activities, engage in leisure and travel alone. Play is a natural, voluntary and spontaneous human learning drive and a basic human right, established in the UN Convention on the Rights of the Child (UNHCR, 2018; United Nations Human Rights, 2017). It also affects our capacity to experience mental and physical well-being as we age (Kahn, Wright & Nursten, 1980).

Independent mobility is the term used to describe the ability of youngsters to traverse a neighbourhood or sector of a city without adult supervision. This translates into 'daily freedoms' and becomes a key aspect enabling children to socialise and become confident human beings. The age and gender of children, the existence of traffic crossings, the closeness, selection and accessibility of activities and the safety perceptions of both children and adults are all variables that influence independent mobility (Shaw et al., 2015).

Children's infrastructure identifies the network of places, natural spaces and activities that form the foundation of a child-friendly urban space. Additionally, the streets and open spaces near dwellings, which generally comprise around 25% of urban areas, act as key children's infrastructure (Hassen N & Kaufman P, 2015). The potential for these venues to promote social connectedness and daily freedoms for children of both genders is substantial. This approach goes beyond the building of playgrounds and instead emphasises the creation of multifunctional public spaces that are enjoyed by people of all ages in tandem.

Mental health studies on psychological distress among school children and adolescents in India found that over one-third of female participants (35.1%) had little hope for the future, while 6.9% reported feeling low, depressed or hopeless (Balamurugan, Sevak, Gurung & Vijayarani, 2024). Statistics point to inappropriate facilities available to women globally. Gender studies acknowledge the differential safety perception and reality of urban space. Why Loiter? (Phadke, Khan & Ranade, 2017) explores the exclusions and negotiations that women from different classes and communities still face in urban public spaces across India. The belief that public space becomes even more risky as daylight fades is ingrained in children, specifically the girl child, from a young age. Studies on children in urban space in India are scarce and studies specifically addressing girls in public spaces in India are virtually non-existent.

3. METHODOLOGY

Studies on children require a multidisciplinary approach relying on both qualitative and quantitative methodologies to adequately comprehend the intricacies of children's lives in the modern urban environment (Christensen, 2003). An ideal reference to identify the characteristics of a neighbourhood that facilitate peer and community social interaction during childhood is *Urban Scales of Childhood* (Fig. 1), delineated in UNICEF's *Shaping Urbanisation for Children* (UNICEF, 2018). This chart illustrates the range that children can travel from their residence to access infrastructure that addresses their needs based on their age. Proximity range is a key factor in fostering 'daily freedoms', while the 'typology of places' points to ideal 'children's infrastructure' within the urban neighbourhood.

Overlaying the perspective of young girls, three key aspects identified in the project *Urban Minded* (Henning Larsen, 2023) are taken as the basis for assessing the neighbourhood.

'Safety feeling': Safety is a serious matter. Providing girls (and their guardians) with safe ways to move around will increase their sense of freedom to explore and improve their perception of safety.

'Stimulation': Journeys need to be sensorially stimulating, replete with colours, textures, scents and sounds.

'Sense of identity': An important aspect is familiarity generated by ease of proximity to varied spaces and places. Additionally, it also arises from a sense of ownership through the discovery of multiple experiences that the urban environment affords to the needs of pre-adolescent and adolescent girls.

In 1915 sociologists Robert E. Park and Ernest W. Burgess introduced the concept of the neighbourhood as an ecological unit in their influential work, The City. This further evolved into the Neighbourhood Unit Concept (NUC) by Clarence A. Perry, defined as a residential area of 160 acres housing 5000 to 9000 persons. In addition to the houses, he proposed that the NUC include the necessary recreational, educational and sociocultural infrastructure, as well as sufficient amenities for its residents within an 800- to 1000-metre walking radius. Even now, India's contemporary urban planning practices are based on the concept of modular neighbourhood units (Meenakshi, 2011). Hence, for its alignment with the broader residential planning norms prevalent in India, Suncity Township, Gurugram, with an initial planned population of 18,000 persons, was identified as an ideal case study.

An ethnographic approach was used to observe, document and analyse children's behaviour. As the township was partly developed by developers and partly by plot owners, it has witnessed major building activity since its inception (Fig. 3). Though this research is limited in its capacity to capture the rapidly changing spatial dynamics, the authors have tried to document the fairly true state of Suncity Township. A participant survey, through focus group discussions and a simple questionnaire, was conducted with 35 children to understand their behaviour in the usage and occupation of places in the neighbourhood. The study limits itself by focusing on middle childhood, 6 to 12 years of age, as this is identified as the 'Concrete Operational' stage of child development studies by Piaget (Piaget & Inhelder, The Psychology of the Child, 1969). It is during this period that a child first experiences a certain level of autonomy and is able to clearly self-express, explore and develop a separate, non-dependent identity. Nevertheless, for a better understanding of the trajectory of middle childhood among girls, the authors also had discussions with girls in the age group of 12 to 14 years, as they could articulate issues they experienced when they were a few years younger.

The physical form and structure of the neighbourhood are documented and analysed on the basis of the two key ideas, 'daily freedoms' and the identification and usage of 'children's infrastructure' (Arup's Foresight, Research and Innovation; Integrated City Planning Teams, 2017). Additionally, as per the Urban Scales (Figure 1) (UNICEF, 2018), children aged 6 to 12 years ideally have ease of walking and cycling access varying from 200/400 m to 600/1200 m. For assessing 'daily freedoms', the distance of the various social infrastructure, such as the community centre and marketplace, is measured from 13 locations termed as POIs (Points of Interest) in Suncity Township. This, overlapped with issues of gender study (Figure 2), acts as the framework and method for this research.

3.1 Site – Gurugram, Suncity Township

Suncity Township was launched in 1999 as a licensed colony with all necessary facilities. According to the prevalent norms specified in URDPFI, a typical residential area housing 10,000 to 15,000 persons should have community facilities such as tot lots, parks, convenience stores, playschools, primary

Figure 1 : Basic of Accessibility : Urban Scales of Childhood
Source: UNICEF Publications, May 2018

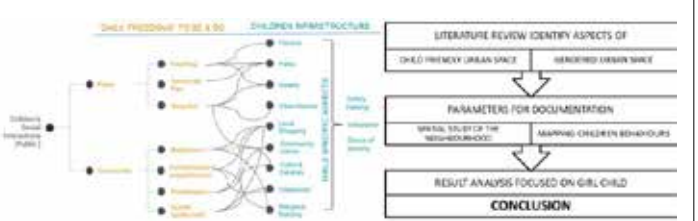


Figure 2 : Theoretical Framework and Method of Research
Source : Authors

schools and a senior secondary school, along with other health and recreational social infrastructure.

For this research, Suncity Township, a planned residential area of 141.322 acres located in Sector 54, Gurugram and accessed from Golf Course Road, was identified (Table 1 & Figure 3). It has plotted development, group housing, commercial and community amenities plus educational and medical infrastructure (TCPO, n.d.). It was proposed for 100 persons per acre (PPA) in 1999, which was subsequently revised to 250 PPA in 2019.

i) Roads and Street Network — The township has two collector roads that start at the entries, one formal main entry and the other informal entry from Golf Course Road, which is a 60 m arterial city road in Gurugram. The 24-metre collector road starting at the formal entry is the spine, adjacent to which the Commercial Centre (Vipul Plaza), Community Centre, local shopping area (Suncity Market) and the Senior Secondary School are located (Figure 3). This road also has the largest sized plots A and B flanking it.

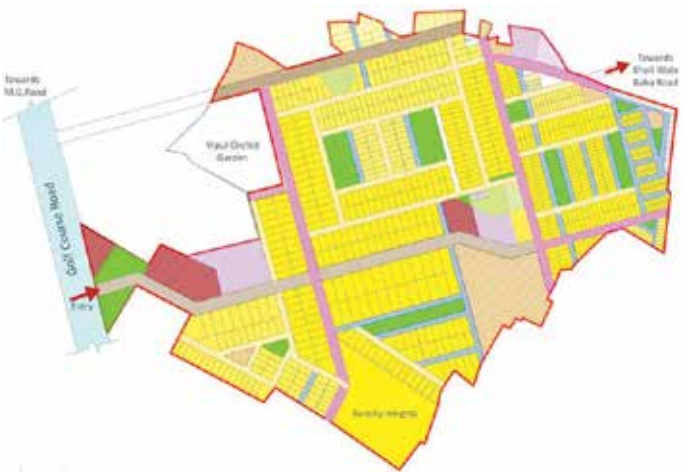


Figure 3: Landuse Distribution : Suncity
Source : Authors

Table 1: Land Use Distribution- Suncity Township
Source : TCPO Haryana

Landuse	Area		Total
	Acre	Sq mt	%
Residential	59.07	239044	41.79
Commercial	5.44	220145	3.85
Social Infrastructure	11.6	46944	8.21
Utility	1.2	4856	0.85
Green Areas	8.8	35612	6.23
Roads	49.05	19851	34.71
Group Housing	6.168	24961	4.36
Total Area	141.32	571946	100.00

The second collector road essentially provides access to the upmarket high-rise apartments, La Lagune and Vipul Orchid Garden and continues into Suncity Township arranged with plots of Blocks 'C' and 'B'. Both roads abruptly end, one in a dead end and the main spine reducing to 18 m ROW and 12 m ROW streets. The dispensary and the (unbuilt) religious building sites are accessed by 18 m collector roads. The rest of the residential plots, tot lots, parks and playschools are accessed by 12 m and 10 m ROW streets.

ii) Children's Infrastructure - Figure 4 identifies the location of infrastructure that children use. As already specified, educational institutions are not considered in the study. Suncity Township has one Local Shopping Centre (LSC) and a commercial complex, Vipul Plaza, with shops on its ground floor and offices on its upper floor, at the entrance to the township. The land covered by both is 22,014.9 sq m (Table 2). Suncity Market (LSC) is considered relevant for investigation as it is centrally located.

The township has a number of tot lots, 700–1200 sq m in size, along with four neighbourhood parks of 4000 sq m to 5000 sq m. The nature of the parks, the community centre and the local shopping area, Suncity Market, is explored further. The primary aspect for the occupation of a place is accessibility. Children of different ages have varied ranges of access depending on the distance of their destination from their residence. An interesting phenomenon noticed in the children's infrastructure (Fig. 4) is the presence of 'temporary sports parks' that are specifically designated by the residents themselves for playing sports such as soccer, cricket and badminton.

4. RESULTS

Suncity has plots of sizes varying from 54 to 810 sq

Figure 4: Identified Children's Infrastructure in Suncity Township
Source : Authors

Table 2: Location legend for "Children's Infrastructure"
Source : Survey by Authors

LEGEND FOR CHILDREN INFRASTRUCTURE		
Number	**Name**	**Location Attribute**
EDUCATION INSTITUTIONS		
1	Suncity School Primary to Sc.Sec.	Main Suncity Road (24M ROW)
2	Govt. Primary School	La Lagune Road (24M ROW)
3, 4 & 5	Play Schools	Local Streets (12 M ROW)
DESIGNATED PARKS & TOT-LOTS		
TEMPORARY SPORTS PARKS & GROUNDS		
6	Sports Parks	Local Streets (12 M ROW)
7	Badminton Courts	Sub-Collector (18 M ROW)
8	Lawn Tennis & Cricket	Sub-Collector (18 M ROW)
SOCIAL INFRASTRUCTURE		
9	Suncity Market	Main Suncity Road (24M ROW)
10	Dispensary	Sub-Collector (18 M ROW)
11	Community Centre	Main Suncity Road (24M ROW)

m (A to G Blocks), accessed through a hierarchical road network of varied right-of-way (ROW) widths. However, with a high number of automobiles travelling on the roads combined with those parked on the sides, no space is left for either adults or children to walk or pause without the risk of being in the path of a moving vehicle. In combination, the prevalent lifestyle and an urban culture that actively promotes privacy over social interaction translate into spatial silos and hard boundaries that alienate children from the public spaces of the neighbourhood.

4.1 Analysing "Daily Freedoms"; Accessibility and Spatial Nature of Roads and Streets

The roads and streets in Suncity Township do not encourage residents to linger or pause. The residential (floor typology) design of the township, in a bid to cater for adequate personal car parking space, uses the front portion of the plot in addition to the area of the sidewalk to provide designated parking. Plots of sizes varying from 54 to 810 sq m ("A" to "F" Blocks) have three or more cars parked in front of them. This creates both a physical and visual obstruction between the street and the open area or lawn of the plot.

The boundary wall, four to eight feet high, further segregates the private space from the public space in a bid to maintain privacy, resulting in a street alienated from humans and occupied by cars (Figure 5 & 6). Children, being smaller human beings, experience this alienation even more acutely as they stay disconnected, hidden behind boundary walls or balcony parapets, from the first public social space,

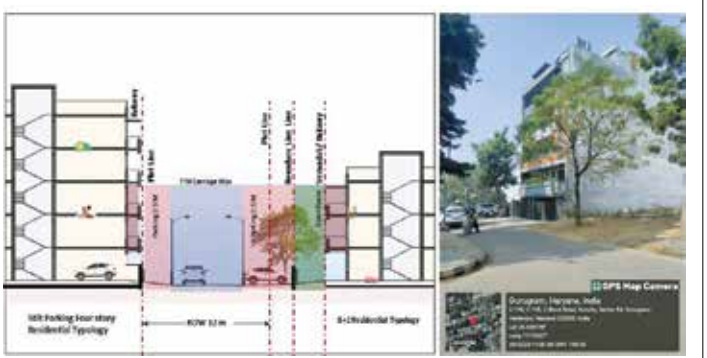


Figure 5: Block E and F Typology
Source : Authors

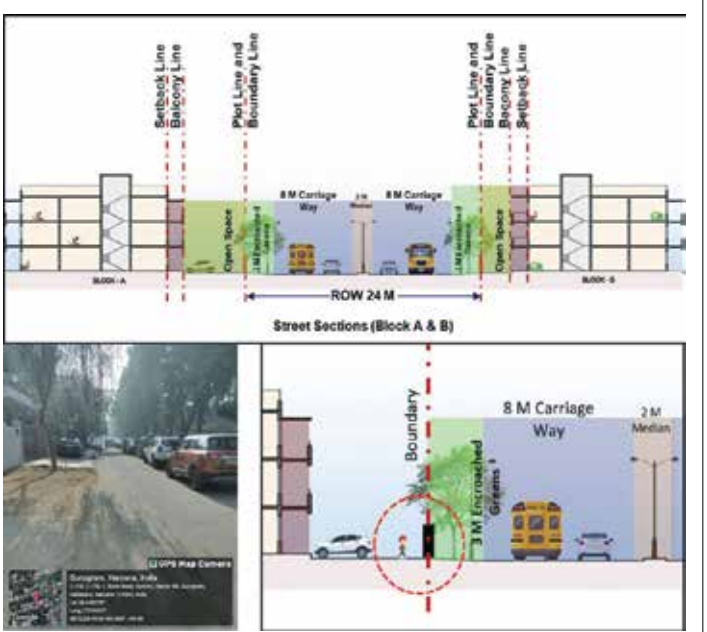


Figure 6: Street Section Main Collector Road (24 M ROW) showing plot and road/street edge relationship
Source : Authors

the residential street, which is right outside their home. Revised norms sanctioning stilt parking on the ground floor with a residential unit on each floor again do not foster a street-to-residence connection. Entry gates to the plots remain closed in a bid for better security and narrow balconies do not translate into active spaces for play or hanging out for children. This results in a residential street flanked by houses with dead façades without human presence, which adds to the sense of an empty, lonely street.

The main access road of 24 m ROW (Fig. 6) in Suncity Township has a segregated wide carriageway that can accommodate buses and a higher number of vehicles. However, during non-rush hours, the wide road encourages speeding despite the presence of a number of speed breakers. Walking pavements are illegally occupied as extended green areas by the residents of the larger plots such as Blocks 'A' (810 sq m) and 'B' (420 sq m) on either side of the main road. These plots have high boundary walls and gates that disconnect the street both physically and visually from the inside, specifically for children (Figure 6).

For the 'G' Block plots (54 sq m), unauthorised construction covers the front and back setbacks and residence entrances open directly onto the street. These plots flank 9–10 m ROW streets and also have parallel parking on both sides. This leaves a narrow carriageway of approximately 4 to 5 m that has to accommodate both people and vehicles passing through (Figure 7). High dwelling unit (DU) density ensures the streets are never empty of vehicles, making them risky to occupy, especially for children to play, meet and connect. The constant construction activity and low maintenance of these roads further add to the risk factor.

4.2 Analysing "Children's Infrastructure": Accessibility and Spatial Nature of Community Facilities

Out of the two commercial areas, Suncity Market, which is centrally located and the Suncity Community Centre are analysed as key children's infrastructures. For children, the local commercial space near their residence is a crucial threshold to the experience of the city at large. The distance to Suncity Market from their residence is key in measuring ease of access.

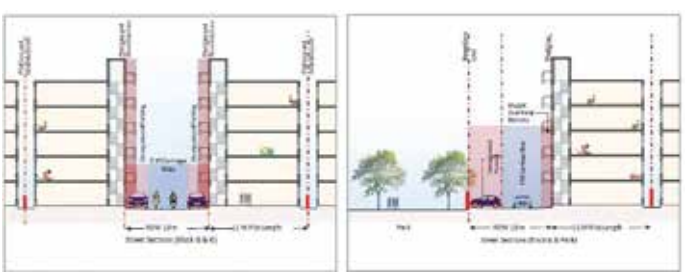


Figure 7: Block 'G' 65 sq. yard plot and street sections 9/10 M ROW
Source : Authors

The distance from selected POIs to Suncity Market (Table 3) shows that more than 50% of the children's routes are in the 400 to 600 m range. This falls outside the UNICEF-recommended walking range of 200 to 400 m for children aged 6 to 12 years (Figure 8). Additionally, Suncity Market is accessed only from the 24 m ROW main collector road, making it mandatory for children to cross high-speed traffic in the evenings. The boundary wall on the periphery of the premises, combined with the C-shaped form of the physical built structure, translates into distinct active and inactive zones.

The community centre, 2.00 acres in area, is a key piece of children's infrastructure that provides space for social interactions with the community during festivals. Accessibility (Table 4 & Figure 9) of the community centre is measured by the distance and ease with which children can independently reach its premises. Table 4 lists the distances from the identified POIs and the type of road crossed during the journey. The results (Figure 9) show that two

Table 3: Distances (m) POI to Suncity Market and different streets crossed during the route
Source : Survey by Authors

Point of Interest	Distance of POI to Suncity Market (M)	Different ROWs of streets that were accessed			
		10 M	12 M	18 M	24 M
POI 1	683				
POI 2	680				
POI 3	592				
POI 4	350				
POI 5	300				
POI 6	605				
POI 7	530				
POI 8	500				
POI 9	605				
POI 10	660				
POI 11	480				
POI 12	598				
POI 13	455				
POI 14	370				
POI 15	588				
		Within 400 M Range			
		Outside 400 M Range			
		Slow Traffic			
		Fast Traffic			

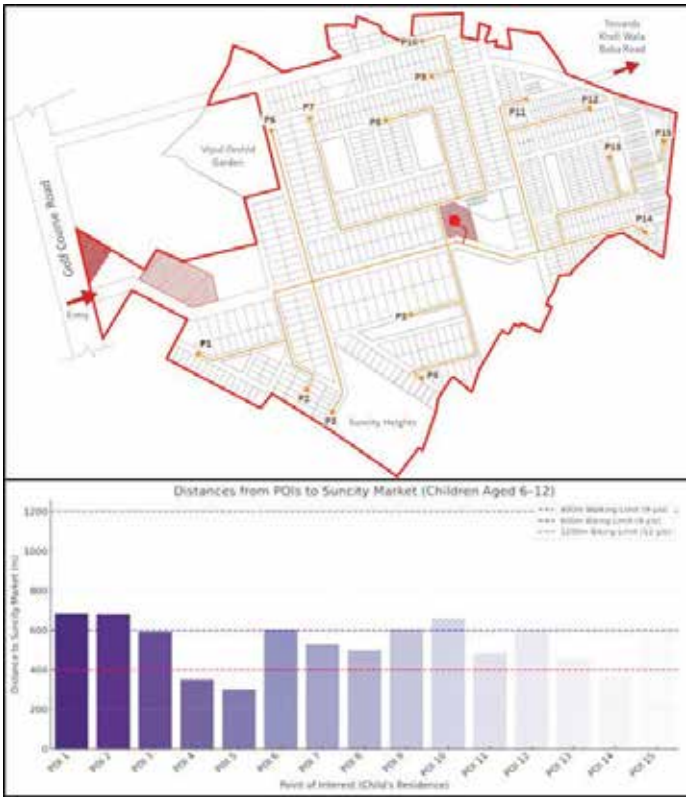
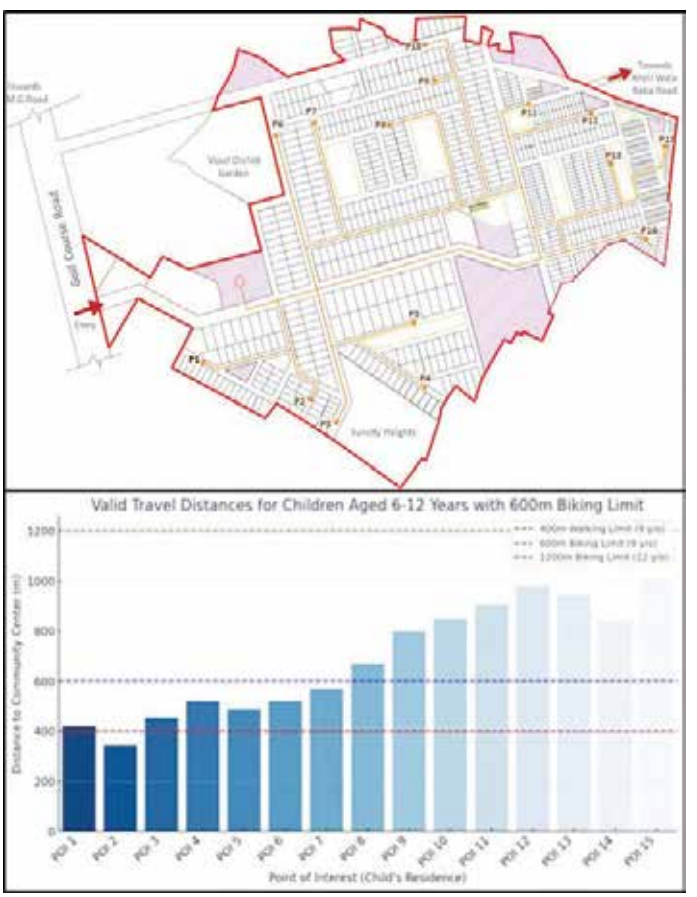


Figure 8: Analysis of travel distances from different POIs w.r.t age-based range for independent mobility (Suncity Market)
Source : Authors



Analysis of travel distances from different POIs w.r.t age-based range for independent mobility (Community Centre)
Source : Authors

Table 4: Distances (m) POI to Community Centre and different streets crossed during the route
Source : Survey by Authors

Point of Interest	Distances (m) POI to Community Centre	Different ROW of streets that were accessed in meters			
		10	12	18	24
POI 1	420				
POI 2	345				
POI 3	455				
POI 4	520				
POI 5	490				
POI 6	520				
POI 7	570				
POI 8	670				
POI 9	800				
POI 10	850				
POI 11	905				
POI 12	980				
POI 13	945				
POI 14	840				
POI 15	1005				
		Within 400 M Range			
		Outside 400 M Range			
		Slow Traffic			
		Fast Traffic			

out of fifteen are within the recommended range of approximately 400 m for 6–12-year-olds, while eight are greater than 600 m for cycling. The location of the centre, closer to the entrance and accessed only from the main collector 24 m ROW roads, prioritises access for non-residents.

4.3 Parks

Children's development depends on the size and type of green spaces. Studies show that children's physical and mental development is positively correlated with exposure to natural blue and green environments (Elmira et al., 2014). Suncity uses only 6% of its land for parks and tot lots. There are five neighbourhood parks in Suncity — two parks of 5500 sq m, one of 4500 sq m and two of 3500 sq m. Figure 15 shows that the parks are 200–400 metres apart,

meeting middle childhood accessibility criteria. Children from Blocks 'B', 'C' and 'D' can easily reach the central park (POIs 6, 7 and 8), while children from Blocks 'G' and 'E' have to cover a distance of over 500 metres (Table 5 & Figure 10).

The characteristics of the park have a pull factor for children. To study this aspect, Ashok Vatika, a 5500 sq m centrally located park, was studied. It is a well-kept park and has walking paths, mounds, a pond and kiosks. It is surrounded by a boundary wall with a formal, well-designed entrance at one end and a smaller gate at the other end (Figure 10). It has a 300 sq m children's play area with swings, climbing bars and open gym equipment for adults. A signpost at the park entrance advises people to use the park with 'utmost responsibility and care'. Large-format sports are prohibited and children of all ages are directed to use the dispensary grounds or the sports park (Fig. 10). Children under 7 or 8 years old and their parents or caregivers frequent the park for an hour or so in the mornings and evenings, depending on the season. At other times, the park is devoid of children. However, elderly residents and young adults utilise the park to socially interact, walk and exercise at various times during the day.

Routes from various POIs & images of 'Ashok Vatika' Park showing landscape designed for adults
Source : Authors

Table 5: Distances (m) POI to Ashok Vatika and different streets crossed during the route
Source : Survey by Authors

POINT OF INTEREST	DISTANCE (meters)	DIFFERENT STREETS CROSSED			
		9/10 M	12 M	18 M	24 M
POI 1	710				
POI 2	680				
POI 3	590				
POI 4	360				
POI 5	460				
POI 6	350				
POI 7	300				
POI 8	50				
POI 9	280				
POI 10	310				
POI 11	300				
POI 12	370				
POI 13	450				
POI 14	500				
POI 15	480				

4.4 Interaction with Parents and Children

Parents of school-aged children highlighted the issue of unsafe streets and felt that the security of the township was inadequate. They were fearful of the porous boundaries between the township and the adjacent Aravalli forest. Parents expressed no difference in their attitudes towards the girl child and generally perceived the neighbourhood as unsafe.

The authors observed children aged 6 to 9 or 10 years, of both genders, playing in the parks, on the swings and with each other. Boys aged 6 years and above went to play cricket and football at the dispensary ground and the sports park. Sometimes one or two girls joined them to play. Most children would not go to the local shopping market unaccompanied. Boys enjoyed more freedom as they approached the age of 9 or 10 years and were allowed to stay out after dark to play. However, many also stated that they preferred online games.

Girls played in the parks close to their houses, but they had to inform their parents about their whereabouts in case they were delayed. A group of three girls aged 14 years shared that earlier all of them used to attend basketball and skating classes at the dispensary grounds. However, since these were cancelled during the COVID pandemic, they now connect with each other in person twice or thrice a week, usually walking around Suncity, as there is no place for them to sit. Sometimes they went to the park to use the swings and chat but found sitting on benches at the marketplace very awkward.

5. DISCUSSION

5.1 Safety Feeling

Sociological studies indicate that negative attitudes regarding gender ideas stem from enduring misogyny and societal patriarchal conditioning, leading to subtle

limits imposed on pre-adolescent and adolescent girls (Shameer & Aisha, 2021). This research observes that young girls are subject to subtle restrictions due to social conditioning and safety issues rooted in the physical construct of the neighbourhood. Factors at the individual, family, peer and societal levels, along with community engagement, influence gender attitudes (Patel et al., 2021). Discussions with parents revealed an egalitarian attitude towards gender roles concerning their children. In contrast, conversations with children indicated a more biased perspective, particularly affecting girls. Over 50% of the girls indicated that they were never alone in their own homes.

The majority of residents use automobiles to go to local shops, eateries and the community centre located just outside Suncity Township. Thoughts from elders influence children's behaviour (Vygotsky, 1978) and as children grow older they prefer to travel similarly. Children growing up in such surroundings organically align with these subtle markers and move indoors. The empty streets at any given time of the day reflect the absence of both adults and children. Fewer individuals present on the streets invariably implies a higher risk perception from the perspective of girls, thus implying a low 'safety feeling'.

5.2 Stimulation

The form and structure of the plotted residential neighbourhood promote segregation of the private built and unbuilt from the public built and unbuilt through its affinity for hard boundaries. Fences, boundary walls and high gates define the protected from the unprotected, the safe from the unsafe. All streets have a similar experience due to the absence of any unique nodes or neighbourhood-scale landmarks. All the above factors accentuate the monotony of the streets, as they offer neither places nor exciting destinations that can engage children, specifically girls. This lack of 'stimulation' acts as a push factor for both genders to avoid remaining outside in the neighbourhood.

Social media addiction can lead to children becoming too disengaged to socially interact with their peers offline (Wahyuni, Putri, Widiyastuti, Siburian & Saputra, 2023). Comfortable homes, combined with access to a digital unmonitored space, today provide children with the excitement that growing years crave.

Even though parks are key to the children's infrastructure of the neighbourhood, it was observed that despite their easy accessibility in terms of distance from residences, older children use the parks sparingly. Children were prevented from playing structured sports games in the neighbourhood parks. As there is only one designated (temporary) sports park for all children and all types of sports, children identified the unavailability of adequate space as a detrimental factor. Additionally, these designated play areas are often taken over by young boisterous boys and thus pre-adolescent girls are subtly pushed out of this critical open space.

5.3 Sense of Identity

The spatial characteristics of neighbourhood public spaces as destinations, along with the experience of travel from home, are crucial in attracting children (Save the Children | How Harmful Gender Norms Create an Unequal World for Children, n.d.). The local shopping market and community centre are the only two places to visit within Suncity Township. Research acknowledges that if children are given opportunities to engage with their peers, people in their neighbourhood and the natural environment, they are better equipped to develop a sense of identity in relation to the world they live in.

One of the most significant consequences of inadequate 'children's infrastructure' in terms of variety and quality is compounded by the absence of 'daily freedoms' and the loss of a 'sense of identity'. This research points to the fact that growing girls do not have enough places to go in the neighbourhood or spaces that they can comfortably occupy. Until the age of 9 or 10 years, children of both genders did not frequent the public places of Suncity Township, such as the community centre and local shopping market, without adult supervision (Fig. 13a & b). Distance to these facilities was a crucial aspect and even though the actual time taken to walk is not more than 5 to 10 minutes for adults, it was outside the comfort range of many children in the neighbourhood. Additionally, in this age of automobile dependency (Mackett, 2002), contemporary urban children in general are conditioned to being driven from point A to point B from a young age. The neighbourhood environment that fosters children's engagement, particularly that of young girls, was lacking.

6. Conclusion

This research indicates that children of both genders have a limited ability to move independently and occupy varied spaces within urban neighbourhoods (Lee et al., 2015). The neighbourhood streets do not act either as places of socialising or facilitate daily freedoms, particularly for young girls. Fear of stranger danger and harassment discourages growing girls from using the limited residential

public spaces freely, reducing opportunities for social interaction. Contemporary yet contextual urban cultures need to be studied further from the perspective of young children, specifically growing girls in both economically weaker and affluent neighbourhoods. While boys may still experience some level of freedom, girls, especially as they approach pre-adolescence, face an unconscious yet systematic restriction of movement. Further research needs to be undertaken to redevelop building norms that enhance a gender-equitable environment for growing children.

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STUDENT WORK

A Case in Atoning Compulsive Indulgence

Reconciling Redemption Amidst the Hyper-Consumerist Culture of Mumbai

By Ar. Kaankshi Shah and Ar. Saurabh Mhatre

1. Introduction

In the rapidly evolving world, the concept of addiction has extended beyond traditional notions of substance abuse to encompass it metaphorically as a form of over utilisation in society. This modern addiction, often referred to as 'consumerism,' manifests itself as an insatiable desire for material and service acquisition, leading individuals into a vicious cycle of over-consumption.

Consumerism, once a mere economic concept driven by an ever-accelerating cycle of production and consumption, has evolved into a phenomenon that shapes perceptions, interactions and the construct of our environment. Furthermore, it has evolved into a new dimension of 'hyper-consumerism'. Hyper-consumerism represents itself as an intensified and an over compulsive form of consumption, which translates the pursuits of material possessions transcends mere desire and transforms it into a cultural obsession (Rifkin, 2000).

In this context, waste becomes a potent narrative tool that possesses the ability to stimulate critical contemplation which holds a mirror to society, revealing its contradictions, hypocrisies and the unintended consequences of unchecked consumption. It provides a scope to offer a journey through the consumerist mindset, inviting the consumers to confront the wastefulness of their choices in an interactive and thought-provoking manner, by immersing in a world of exaggerated waste and excess, thereby triggering a deeper awareness of the consequences of consumerism, prompting reflection and potentially inspiring change in behavior towards a more conscious consumption (Koolhaas, 2001).

1.1. Need to address the quantum of waste generated as an outcome of Hyper-Consumerism

The dominant conspicuous consumption and relentless hyper -consumerism has led the shift between desire and disposability that has reached an unprecedented crescendo. The allure of opulent lifestyles, driven by a ceaseless pursuit of novelty and excess, has become a hallmark of modern society. However, beneath the surface glamour lies a mounting underbelly of waste - a symbol of the rampant materialism that sustains this consumerist frenzy (Koolhaas, 2006).

The escalating consumerism has precipitated a pervasive waste crisis due to insatiable produce and demand, fostering a throwaway culture that strains the environment and resources. This culture has given birth to an environment fraught with the depletion of resources, the accumulation of waste and the perpetuation of a throwaway culture. Mounting discarded products, packaging and obsolete tech create a multifaceted challenge, underscoring the urgent need for re-evaluating consumption patterns. It is imperative to pause and reflect upon the consequences of our insatiable material desires (Koolhaas, 2001).

1.2. Need for an urban realm in a metropolitan city

A city like Mumbai - a bustling metropolis with a blend of tradition and modernity along with its opulent built environment acts as a prime epicenter of commerce, culture and community which has become emblematic of this phenomenon (Figure 1). The dual identity of the city - as a consumerism hub and a waste generation is driven by its economic vigor, diversity, infrastructural limitations and

Figure 1: Concern for the City

societal aspirations that remain as a critical challenge for the city (Rifkin, 2000).

The relentless pursuit of commodities and the ephemeral joys they promise has given birth to a paradoxical reality - the exponential growth of waste, a byproduct of this fervent culture has reached staggering proportions. This dichotomy contends that waste is not merely a byproduct of consumption but a potent form of commentary on the culture that generates it. It has ignited conversations and serves as an allegory to shape cities that balance the pursuit of economic prosperity with the creation of inclusive, sustainable and meaningful environments (Koolhaas, 2006). This offers an experimental model that can be introduced in the urban realm to speculate the intervention which acts as a public interface to re-envision the isolated system as an innovation process and experience for the city.

2. Shift to Hyper – consumerism

Consumerism is a trend emphasising on customer interests and encourages excessive consumption beyond means, often influenced by persuasive marketing. It originated in the 18th century, when non-essential spending became a lifestyle choice. Economically, consumer spending remains central to the global economy while impacting the social status of modern society (Wilmerding, 2012). The global economy has transitioned from industrial capitalism to a culture centric model, which delves into this shift to monetise not only products but also intangible experiences. Psychological and sociological forces have confined and transformed marketable products into a culture of commercialised experiences (Rifkin, 2000).

This evolution has created venues that sell curated real-life experiences, functioning as communication platforms, that replicate cultural elements for entertainment, with consumption playing as a supporting role (Rifkin, 2000). The growth of cyberspace commerce has revolutionised interactions and is an alternative to the traditional market due to its convenience, global accessibility, product information and interactive purchasing options (Wilmerding, 2012). Online purchase mirrors trends like internet banking that reduces the psychological barrier of parting with money which makes spending less impactful. The integration of social media blurs the social interaction and consumerism which amplify exposure and pressure to acquire with one-click reducing time between desire and acquisition; increasing impulsive consumption. Further, algorithm driven recommendations intensify this by creating a sense of personalised shopping which motivates to acquire neglected products leading to a conspicuous consumption (Ananth, 2019). Overall, technological advancements and evolving consumer behaviors have fostered an unsustainable pattern marked by excessive and often unnecessary consumption, a culture of hyper - consumerism.

2.1 Uncurbed Consumption

The era of conspicuous consumption has brought a parallel surge in waste generation. What was once an afterthought has become a major byproduct of consumerism, overshadowing its benefits. In India, evolving consumption patterns and rapid economic growth are expected to raise urban municipal solid waste to 165 million tonnes by 2030. Many landfill sites have already exceeded capacity and the 20-meter height limit, occupying over 10,000 hectares of urban land. Public unawareness of the scale and urgency of this issue remains a major concern.

According to the Ministry of Environment, as the world's third largest economy, India produces approximately 62 million tons of waste each year, with an average annual growth rate of 4%. Currently, India generates 70 million metric tons of municipal solid waste, of which only 15% is recycled, while the remaining portion is disposed of in landfills and oceans, negatively impacting both human beings and marine life while causing environmental harm (Rathi, 2022).

Mumbai exemplifies this crisis - having reached the anticipated level of waste generation for 2030 a decade ahead of schedule (Figure 2). The city generates about 6500 metric tonnes of waste out

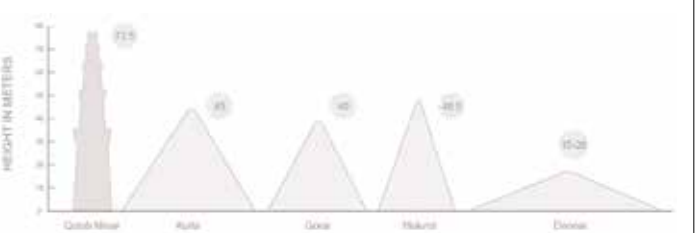

Figure 2: Trash Towers of Mumbai

of which 80% ends up in landfills (Rathi, 2022). This alarms the city that it will need to deal with its waste within the city limits. This distancing of waste from everyday urban life has created a physical and mental disconnect, reducing public awareness and weakening practices of segregation and responsible disposal. The gap between consumption and disposability highlights the need for stronger social consciousness and a more effective circular economy (Waste and Consumerism, 2020).

2.2 Quantum of Waste

Waste is treated as any material or product produced for the market for which the producer has no further use in terms of the purpose of production, transformation or consumption and of which there is a desire to dispose of. This is generated in every process from extraction to production to every intermediate and final product and so the consumption of these where the residuals recycled or reused at the place of generation are excluded (Hawken, 1999).

The global waste management problem is escalating with the demands for goods and services that generate waste before, during and after their use, requiring extensive collection, transport and treatment efforts. The current economic system prioritises consumption over recycling or reusing, resulting in a linear process turning raw materials into short lived products that become waste after use instead of valuable resources.

- **Disposability and Planned Obsolescence:** In the marketing model, product management - its presentation, features and lifecycle stages drive competitiveness and profitability, that aims to meet consumer needs. Yet, intentional quality reduction encourages repeated purchases which opposes sustainability and worsening environmental concerns (Aladeojebi, 2013).

  Manufacturers often design products with limited functional lives and involving costly replacements or embedding mechanisms that shorten product's functionality, a practice that persists today (Bright, 1949). Limited repair design aims to inflate repair costs, compelling consumers to choose new products (Eaton, 2009). Product aging also occurs through need creation, as manufacturers introduce newer, more advanced models that prompt customers to replace still functional models. The replacement of items driven by changing trends highlights product aging resulting not from consumption but from the generation of fresh needs. Immediate gratification further fuels this cycle, as delayed consumption diminishes their desire (Sielska, 2019). Durability doesn't always correlate with utility; limited functional design leads consumers to buy more affordable, highly functional yet less durable products - reinforcing a throwaway culture.

- **Composition of waste:** Globally, food waste is the largest component of municipal solid waste at 44%, followed by dry recyclables - plastic, paper, cardboard, metal and glass - at 38% (Silpa Kaza, 2018). The share of recyclables varies significantly, from 16% in low-income countries to 50% in high-income ones. Per-capita waste generation continues to rise, with paper and paperboard forming the largest share at 23.1%. Plastic waste reached 35.7 million tons, increasing by 4.3 million tons in eight years, largely from packaging and durable goods (Agency, 2022). The impact of the textile industry can be seen in Figure 3.

  As per the Un-Plastic Collective (UPC) study, in India, annual plastic waste generation stands at 9.46 million tonnes, 40% of which goes uncollected, alongside two million tonnes of e-waste. Despite this, significant revenue opportunities exist. India imported $81 billion worth of paper waste and pulp in 2020, yet only 20% of domestic paper waste is recycled, with most ending up in landfills (Rathi, 2022).

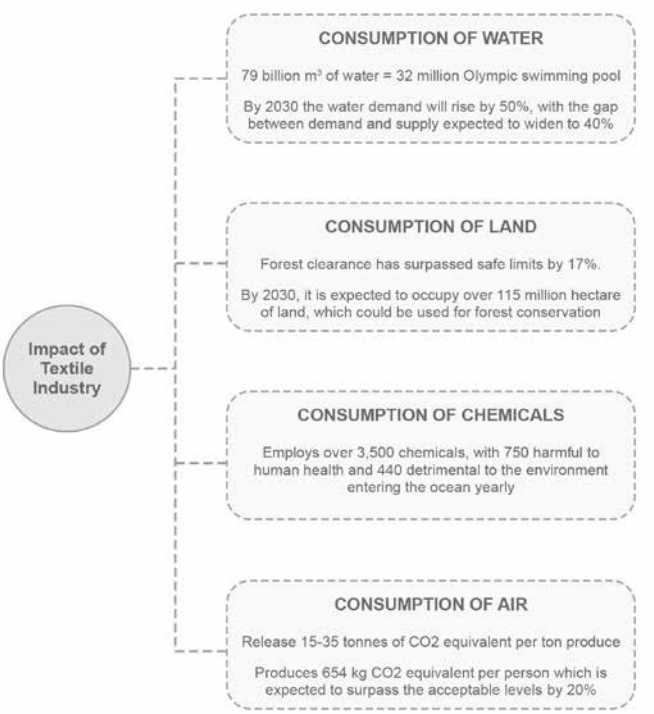

Figure 3: Impact of Textile industry

- **Waste Management:** Currently, most waste in Mumbai is transported directly to landfills, creating economic and environmental stress. The Municipal Corporation of Greater Mumbai (MCGM) collects and transports about 90% of the city's waste to dumping grounds each day (Mumbai, 2021). The ISWM (Integrated Solid Waste Management) hierarchy ranks waste management strategies according to their environmental benefits:
    1. Source reduction and reuse: Minimising waste generation during design, production, packaging, use and reuse of products.
    2. Recycling: Recovering material through segregation, collection and reprocessing into new products.
    3. Waste-to-energy: Recovering energy from waste when material recovery is not viable.
    4. Disposal: Landfilling only the residual inert waste in sanitary, engineered sites (India, 2016).

Mumbai's waste system relies on both formal and informal sectors working in parallel. While urban local bodies manage primary collection and transport - collecting 90% of total waste - efficient collection does not translate to effective segregation. Only 25% of waste is segregated at source, leaving 75% unsegregated waste to end up in landfills (Allianz, 2017). This lack of segregation poses serious environmental and social challenges.

The informal sector, comprising around 15,000 rag pickers and scrap dealers, plays a crucial role by recycling nearly 80% of recyclable material, yet remains largely unrecognised by formal systems. A substantial gap persists between waste generation and resource recovery. For instance, recycling one tonne of paper saves 17 trees, 2.5 barrels of oil, 4100 kWh of electricity, 4 m^3 of landfill space and 31,780 liters of water, highlighting the environmental cost of overconsumption and hyper-consumerism. With 25% of India's waste consisting of recyclable dry materials, inadequate collection and processing infrastructure cause most of it to end up in landfills. Effective sorting and recycling could transform this waste into a significant source of revenue (Rathi, 2022).

3. Aims and Objectives

The aim of this study is to understand the architectural interventions that would be an allegory to the quantum of waste generated as an outcome of hyper-consumerism and re-shaping consumers for a conscious consumption. Accordingly, the following objectives have been formulated.

- To study the symbiotic relationship between consumerism and waste generation with the pursuit of material excess inevitably leads to the creation of waste.
- To study the potential of a material to be transformed, shifting the focus from mindless consumption to thoughtful acquisition.
- To demonstrate architectural interventions to transform the normative narrative of consumerism, inciting dialogue, reflection and change in the realm of consumer culture and waste.

4. Methodology

To accomplish the study's objective, various research methods will be employed to gather and analyse the essential data for this study. A systematic approach is adopted to gather information and derive solutions for the problems and issues related to the topic. By employing these methods, it was aimed to provide a comprehensive basis for the study's analysis:

- Literature review of programs and processes to help evolve the architectural program.
- Architectural case studies which have attempted to achieve the objective of shifting consumerism and change in the realm of consumer and throwaway culture.
- Surveys and interviews of:
    - Experts to study how the program can be addressed.
    - Users and assisting staff to understand the issues and resources that maybe deployed for the stated purpose.

5. Literature Review

The shift in methodology represents a significant and transformative change in the approach towards resource utilisation. This shift is driven by resource scarcity and a desire for more sustainable and innovative practices in production and consumption. The process of converting waste materials into reusable materials, thereby diverting them from landfills or incineration. It involves re-manufacturing materials to create new products and by creatively transforming discarded or lower value materials into products of higher value or quality. Unlike breaking materials down to their base components rather to maintain or enhance the original material's integrity while giving it a new purpose, proactively facilitate

conservation, energy efficiency and reduce waste with consumer awareness (Stearns, 2006). This can be effectively translated by the means of re-using, re-cycling and up-cycling.

5.1. Sustainable waste management - as a reformative tool

The growing urban population has increased the demand for sustainable waste management. This involves integration of various systems to create user friendly spaces while considering citizens' needs and environmental factors. It highlights the need to design recycling and waste collection spaces as public tools that connect architecture and waste management.

Currently, these facilities lack social aspects but can expand their functions to engage communities and instill a sense of purpose. Placing them strategically within cities promotes community engagement and sends a message that waste management can coexist with other activities. The enhancement functions aim to educate and raise awareness among citizens and communities without overshadowing the core purpose of waste management.

The traditional resource use is linear: materials are sourced, used and discarded, leading to environmental issues. The "take - make - use - dispose" model results in carbon emissions, overflowing landfills, excessive water use and ecosystem pollution. Alternative material sourcing and usage methods are vital with improvement in the existing supply chain, including reusable products and return programs. However, there is a lack of a transformation plan (Stearns, 2006).

5.2. Circular Consumption - as an ideology

Circular economy focuses on maximising resource utilisation and transforming the end product once considered waste into valuable resources. This is achieved by prolonging the lifespan of materials, generating new products from their previous forms or innovating to utilise production by-products. The approach of 'cradle- to- cradle', signifying that materials continually return to their origin for reuse. This transition not only promotes economic growth but also minimises waste, improves resource efficiency, addresses emerging resource scarcity issues and reduces environmental impacts linked to production and consumption. Establishing a circular economy in construction, where buildings embody cradle-to-cradle principles and employ waste-to-product materials, is a challenging yet crucial endeavor. To embrace this approach, construction must focus on adaptable design to prolong building lifespans, leverage technology to repurpose spaces and promote a cradle-to-cradle mindset throughout the industry. This entails reshaping the projects from initiation, design, construction, operation and repurposing.

5.3. Hedonistic Sustainability- as a consumerist behavior

Hedonism meaning "pleasure" or "will," encompasses a range of theories that emphasise the significance of pleasure. Psychological or motivational hedonism posits that human behavior is driven by a fundamental desire to maximise pleasure and minimise pain. Hedonism is closely tied to sustainability, which encompasses social concerns while prioritising enjoyment and fun. There is a need to design infrastructure to promote happiness and well-being among their users. In alignment with sustainability principles, hedonism takes shape in projects that do not harm the planet, it is about embracing a life of enjoyment.

6. Architectural Case Studies

The architectural case studies demonstrate that sustainability can be seamlessly integrated into architectural design, creating a visually stunning and environmentally responsible commercial space. By prioritising recycled and upcycled materials, embracing energy efficient solutions and fostering community engagement. They stand as a premise to the potential for sustainable architecture to shape a more environmentally conscious future in the retail sector. This offers a backdrop to build a narrative of sustainable consumerist society. Table 1 highlights key aspects derived from these studies, forming a foundation for defining spatial needs, functional layouts and capacity planning for the proposed building program.

7. Design Description: A case in atoning compulsive indulgence

The project is an experimental urban morphology to reconcile redemption amidst the hyper-consumerist culture. It is a model to speculate the intervention which, in turn develops an allegory between the consumerist mindset and the transformative behavior. This is to act as a public interface to re-envision the isolated systems as an innovation process with an experience for the city, highlighting the irony of the society.

7.1. Design Concept

Everyday routines express people's aspirations for social status, maturity and sexual identity. Whether individual, familial or communal, they

Table 1: Key aspects derived from Architectural Case Studies
Source: Author

Various practical, quantitative and qualitative aspects from case studies		
Sr. No.	**Architectural Case Studies**	**Aspects from each Case Studies**
1	Community Green Station, Hongkong	Transformation of an underutilised space to a communal gathering space along with sustainable design as an integral part of the local culture and a solution to the landfills reaching their maximum capacity. It being an integral part of the local culture and a solution to the landfills. Further to serve as a hub for community promoting the significance of recycling.
2	Sunset Park Material Recovery Facility, New York	The design is informed by its function as a recycling center, emphasising reuse principles throughout its construction. This center serves as an educational hub for both students and the public, providing opportunities to observe and learn about the recycling process.
3	Infiniti Mall, Mumbai	A public place for entertainment and retail hub for individuals of all ages to seek amenities conveniently housed under one roof with a vision to transforming the city's consumerism experience.

follow precise sequences of actions and often use symbolic artefacts. In modern society, consumerism functions as a powerful ritual system, filling the void left by declining traditional values by creating new symbols and routines performed regularly. When rituals become tied to the use or purchase of specific products, they evolve into consumer rituals. Supermarkets and shopping malls can thus be seen as contemporary 'temples', embodying a new symbolic order.

Secular rituals, such as a sports fan painting their face with team colours, illustrate how subtle the line is between consumer habits and consumer rituals. These rituals are not new, advertisers have long used them to connect emotionally with consumers. Consumption rituals are organised, recurring events within a social or cultural context, involving significant use of products and services. Ritual scripts outline the expected sequence of actions and roles, while ritual artefacts hold symbolic or sacred meaning distinct from ordinary consumption. The narrative forms the basis of the thesis which weaves a satirical narrative between the hyper-consumerist labyrinth juxtaposed with the redemptive power of recycling and upcycling (Figure 4).

7.2. Site Plan

The site is located in Worli, Mumbai, with a multi-modal connectivity located in a mixed used context allowing an interaction of varied users with the building typology which enhanced the fabric of the

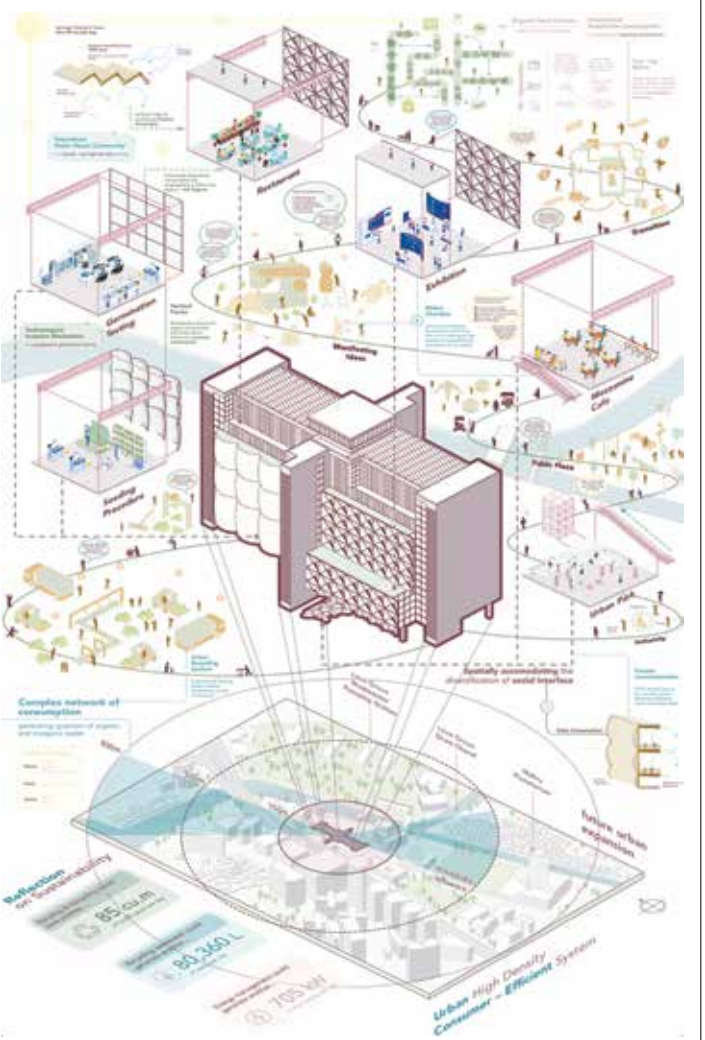

Figure 4: Components of the design

context. It is situated in a symbolic reflection of consumerism, being an epitome of consumption, yet the existing facility is not well maintained and thereby remains inaccessible to a lot of users (symbolic representation of the structure itself being a waste). Along with sharing its boundary with a waste water treatment plant it continues the satire of waste. The lack of functionality in a very active neighborhood offers a challenge to activate the space in the existing form and potential to develop a modified function as a new model of recreation (Figure 5).

7.3. Design Core

The design is a public intervention which hosts events in a commercial hub to break away from the monotony in the context. It acts as a public square which encourages people to flow in and sink in with the data to the collection centers to give away the items which are waste for them and travel through the center core which transports the actual waste to their desired location. The journey of the actual waste is pushed into the lower ground as the irony of society with segregation stations as per material operated by people (heros of the system - waste managers) and robots depending on various criteria which is then transported via the core at the respective level. At the designated level it undergoes

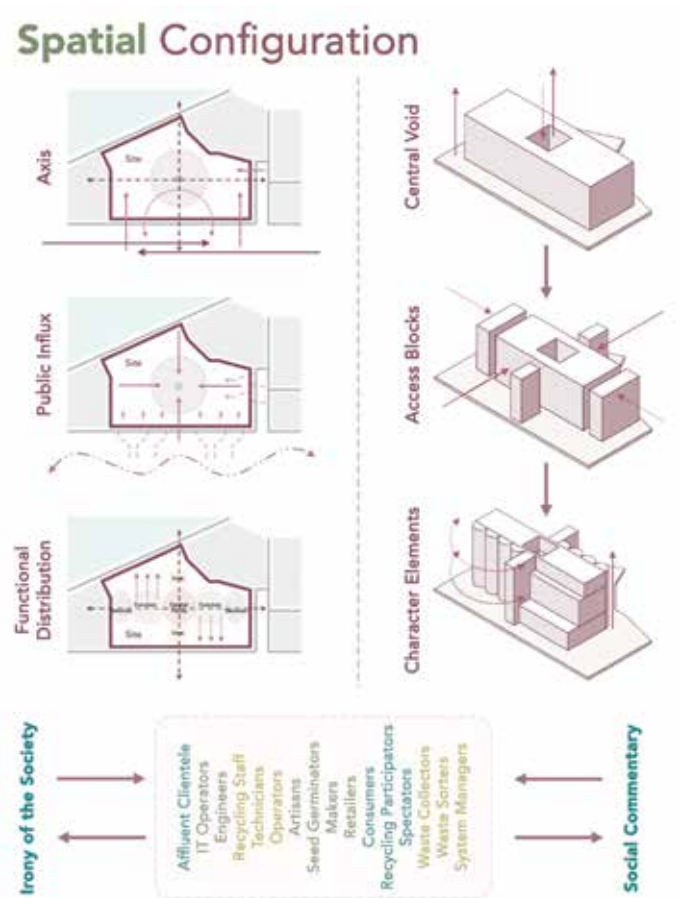

Figure 5: Spatial Configuration

the recycling process via the movement of conveyor belts and the retractable loading and unloading platforms facilitated with gantries to directly load it back to the basement. This incoming and outgoing movement makes the entire structure a live machine (Figure 6).

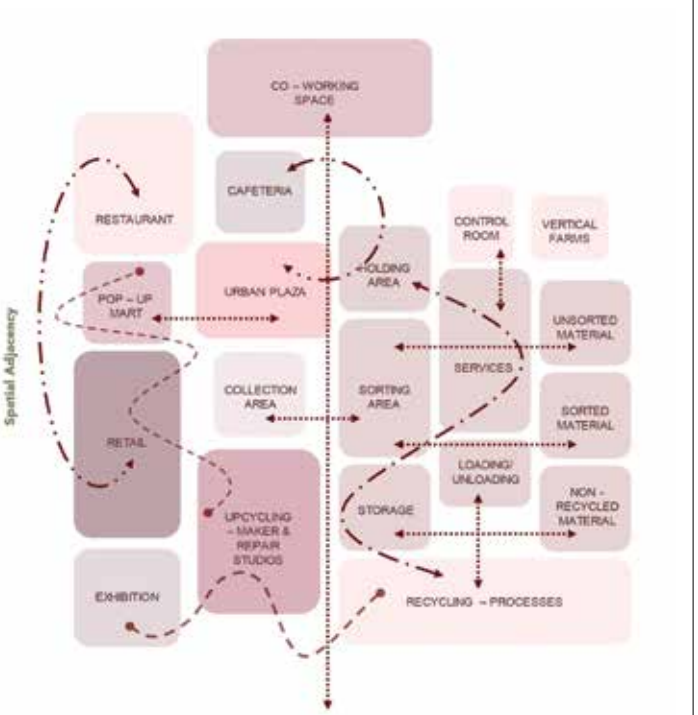

Figure 6: Spatial Adjacency

In the live machine people interact with the interactive systems of the process – upcycling. Participating in the upcycling process with the artisans and purchasing more cautiously with the rewards earned by depositing their waste for recycling. Beyond the products they suffice their aspirations with the pop-up marts, in addition to the ideal of purchasing wisely people are innate with the modern idea to eat healthy, the vertical farms offer this opportunity and the building even grows healthy for people in a city like Mumbai. The same produce is consumed in the roof top restaurant which assures the consumerist mindset to consume healthy which serves as a revenue generation for the system.

Yet the biggest consumption stays at the top is data, the entire building and the system runs on data, which is in connection with the context of a commercial hub that intensely consumes data. This encourages the introduction of a data center in the building to allow a variety of people to not just entertain but to learn, earn and keep the building alive. This data is reciprocated on the façade which acts as a billboard to the building and the biggest representation to consumption of data (Figure 7).

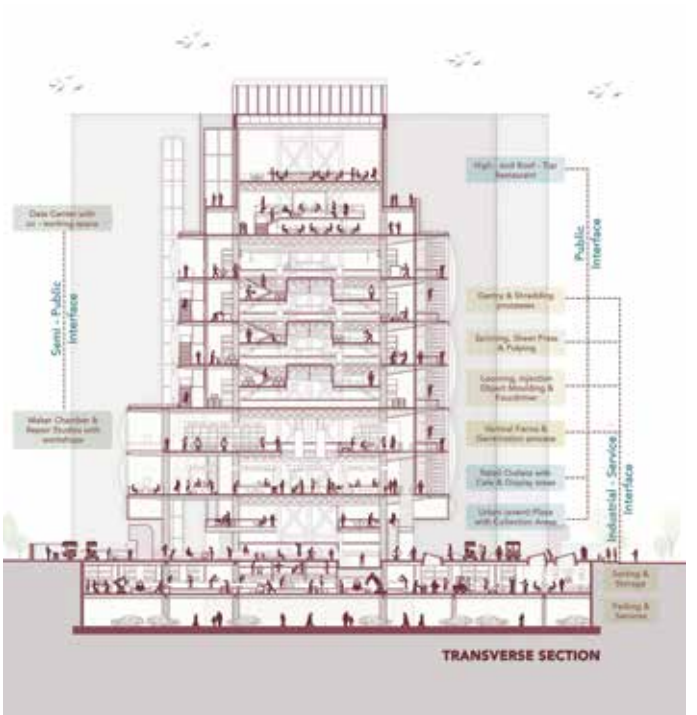

Figure 7: Sectional satire

7.4. Floor Plans and Sections

Illustrated through the series of drawings, showcasing distinct functions that methodologically flow as a synchronised process of the specific method of recycling, represents the building as a live machine. The section represents the irony of society that the elite, the culprit of the system stays on the top and the working class who are the heroes of the system are shoved away. The sectional programmatic distribution is the true reflection and the harsh reality of the society which is so represented by the users (Figure 8).

7.5. Construction System

The construction system is in combination with steel girders and gantries ensuring the structure to equip itself with the industrial mechanisms yet with the familiarity of a mall. The sense of identity with familiarity has been incorporated as the ETFE façade used as a digital data consumption medium continues with the trend of consumption. The steel northern light truss system has an interplay of light with an interplay of light in the restaurant for the elite.

7.6. Sustainable System

The structures in Mumbai tend to gain excessive heat which increases demands for cooling, to tackle these various methods were incorporated. Shading devices (fins) were introduced at locations where users spend longer hours like the restaurant and the data center area. The central spine acts as a solar chimney

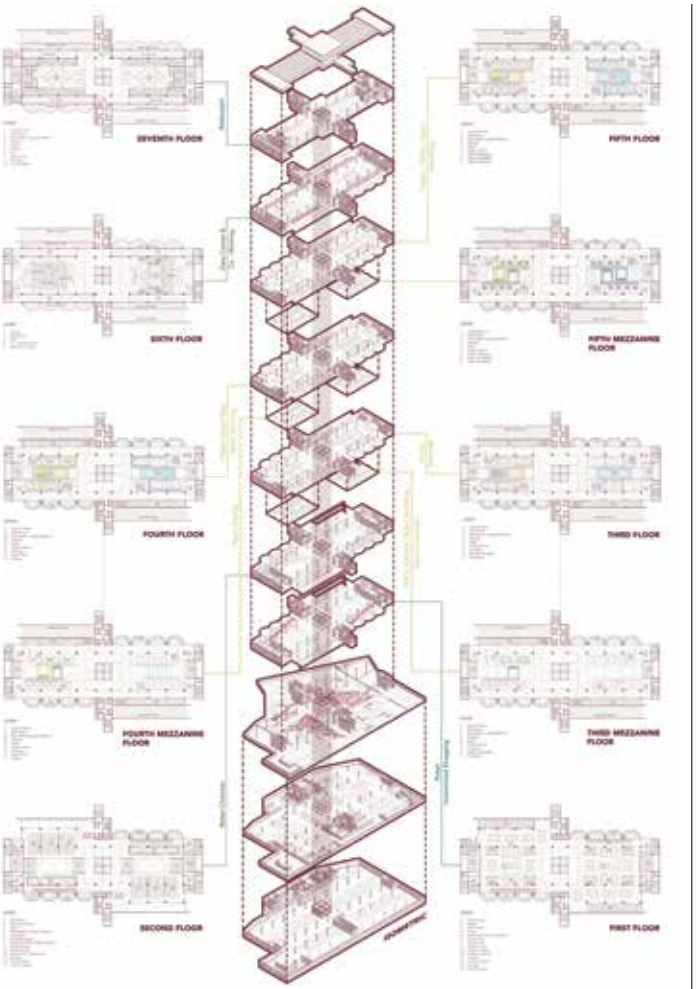

Figure 8: Floor Plans

which works on the principle of stack effect which encourages natural ventilation and maintaining temperature within the building. The façade is of ETFE with an air gap used as an insulator which reduces heat gain yet allows diffused light. Along with it being introduced with vertical farms further reduces heat transmission deep within the building. Green roofs have been introduced at intermediate levels along with northern light truss (with solar panels) which facilitates energy generation (Figure 9).

8. Design Overviews and Conclusions

The design entangles the consumer in the cycle of the multifaceted and pervasive nature of hyper - consumerism in contemporary society presents an underscore the profound impact beyond account to encompass broader societal and ecological consequences. The built environment plays an important role in establishing an allegory in the context and among the people thereby enabling and empowering its users. It keeps up with the trend-based concerns with the upcycling centers and along with the pace of the mechanisms of the city and

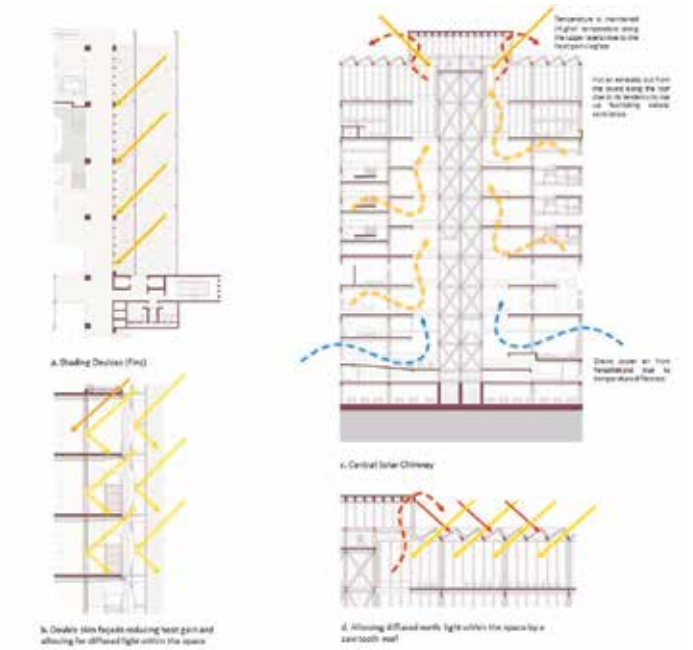

Figure 9: Sustainability Techniques

adding changes to our palette of spatial qualities with the inclusion of a public square which portrays the ever-changing aspirations. The project makes the site an important landmark with process, experience, knowledge, innovation and public interface. Hence, a system neglected or isolated and less known in the city will be re-envisioned in a busy urbanscape.

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Implementation of Virtual Reality Techniques in Architectural Projects

By Prof. (Dr.) H.M. Thapliyal and Mr. Ankit Arora

Introduction

Architecture is an evolution-defined industry. There is no doubt that the adoption of technology in architectural practice has made it easier to achieve this creativity, but it has also enabled the industry to extend its business proposal far beyond its traditional design and construction remit. Virtual reality has just broken into the scene and civil construction has already been transformed.

Virtual reality has evolved into a practical technology that has been recently introduced across many different industries. In the construction industry alone, the innovative tool has started to show its worth by limiting rework resulting in time saving and identifying design flaws.

Need of the Study

The major goal of research is to fulfil the need to introduce advanced technologies in the field of architecture and construction practices. Virtual reality creates a totally new and independent environment of the real world; augmented reality includes virtual elements that interact with what already exists. It is thus possible to combine virtual architectural designs with the reality of the construction site, increasing efficiency and accuracy, reducing the occurrence of errors and saving time, money and resources.

Aim

Adopt virtual reality techniques to help architectural projects in line with 21st century technological shifts which will open a way to new and promising architectural development.

Objectives

1. To study different virtual reality techniques and their implementation in construction industry.
2. To understand the use of virtual reality technology in different stages of a building project limited to

- Design stage and
- Execution stage

Scope

1. Virtual reality model of architectural design of the selected sample project.
2. To study virtual reality in project planning and monitoring.
3. To study the various virtual reality tools and software which are reinventing the industry and subsequently creating a model that allows people to get a picture of how a final project will be executed during different stages in the construction process.

Limitations

1. Few people understand how to make virtual reality models.
2. Lack of streamlined software is a challenge.
3. In India, there is a lack of awareness among people about this technology in architecture and construction.

Literature Review

Architecture is an industry described by evolution. Virtual reality has just broken onto the scene & has already been remodeling civil construction. The

modifications are viewed no longer only in designing but also in building. Virtual reality benefits the whole development team of engineers, designers, architects, project managers & service providers. In the construction industry alone, this modern tool has started to exhibit its worth via limiting rework, time saving and identifying design flaws.

1.1 Understanding virtual reality

Virtual reality (VR) is the use of computer technology to create a simulated environment. Unlike ordinary user interfaces, VR places the user in an experience. Instead of viewing displays in front of them, users are immersed and able to interact with 3D worlds. By simulating senses such as vision, hearing, touch, even smell, the computer is converted into a gatekeeper to be near real.

1.2 Types of virtual reality systems

There are different types of VR systems which are categorised on the basis of display hardware systems, graphic renders algorithms, level of user involvement with the physical world.

1.2.1 Immersive VR

An immersive VR system is typically referred to by means of a user sporting a head-mounted display (HMD) or a spatially immersive display (SID). The notion of immersion is that the digital surroundings surround the user partially. There is a range of degrees of immersion. For example a widespread CAVE has screens on 4 of the six facets of a cube: the user is only partially surrounded with the aid of the display. A related but separate notion is presence-the subjective feeling of "being there". For a consumer experiencing high stages of presence, the virtual world replaces the physical world as his reality.

1.2.2 Desktop VR

Non-immersive VR systems normally run on standard computer laptop workstations, accordingly the term "desktop VR". Desktop VR structures use the identical 3D computer photographs as immersive VR systems, but there are two key differences. First, the show of the virtual environment does not encompass the consumer-it is viewed only on a single display screen in front of the user. Second the user normally navigates through and interacts with the surroundings with a mouse & keyboard.

1.2.3 Fish tank VR

It is possible to use a computer blended with a head tracker to grant a "window" into a small virtual world, so that customers can acquire one-of-a-kind views of the world using natural head notions. This has been referred to as "fish tank VR" because the effect is like looking into a variety of components of a fish tank with the aid of moving one's head relative to the tank. The head monitoring allows the user to effortlessly understand the depth of 3D objects in the scene. Often, stereo pictures are used to beautify the 3D depth which requires stereo glasses.

1.2.4 Image based VR

Most VR structures display an absolutely synthetic (computer generated) digital environment. The objects in these environments are made up of geometric primitives (usually triangles) alongside colours and textures. However, it is also viable to show a realistic digital world with the usage of solely these images. This is referred to as image-based rendering and its fundamental approach is to manipulate the pixels in pictures to produce the phantasm of a 3D scene, rather than to construct the 3D scene explicitly. The easiest kind of image-based VR is a panorama - a series of pictures taken with digicam at a single position pointed in multiple directions. These snap shots can then be "stitched" collectively so that the seams are no longer visible allowing the person to see in any direction. Apple's Quick time VR is one of the most frequent types of panoramic VR. Image-based rendering has not yet made a massive influence in VR, but it is genuinely a way to amplify the realism of digital environments.

1.2.5. Highly interactive VR

All VR applications involve interaction: that is, they enable the consumer some degree of control over what is happening. This is the attribute that distinguishes VR from static 3D images or per-computed 3D animations. Many VR systems, however, are simply walkthroughs or fly through-they display a static environment and enable the person to navigate (position and orient the viewpoint) via that environment. Highly interactive VR systems permit the user to operate other tasks in the VE, such as selection, manipulation, machine control and symbolic input. Highly interactive VR structures can enable customers to function in a VE that until now has solely been handy in 2D computer structures. This takes VR from being clearly a visualisation device to being a tool for producing real-world results.

1.2.6 Telepresence

Telepresence is related to VR and entails interacting with actual environments that are far flung from the user. Teleoperate systems are developed as a result of the need to have interaction with environments from a distance. This science hyperlinks faraway sensors and actuators in the actual world

(teleoperators) with human operators who are at a distant area from that environment. This hyperlink affords the operator with a faraway view of and restricted manipulation over the teleoperator's environment. This leads to a feel of telepresence. Current function of telepresence contains the use of remotely operated automobiles like robots in, hazardous stipulations (nuclear accident sites) or for deep sea and space exploration.

2. Analysis

2.1 Questionnaire results (Sample size 60)

Q.1. Which, if any, of these Virtual Reality devices have you heard of? (see Figure 1)

Q.2. Do you use 3D CAD software for architectural modelling? (see Figure 2)

The design process starts from the use of 2D CAD software, followed by 3D CAD software, then 3D CAD rendering visualisation software, then real-time 3D graphic rendering software and at last 3D real-time graphic rendering devices/ equipment – as

HMD or CAVE.

Q.3. How important is Virtual Reality?

a) Design process (See Figure 3)

b) Communication between architects (see Figure 4)

c) Communication between architects and experts (see Figure 5)

d) Communication between architects and users (see Figure 6)

Q.4. In your opinion, can VR contribute to the architectural scope? If yes, how? (see Figure 7)

It can bring major innovation in architecture. Besides VR being an unused resource, the majority recognised that VR is important/very important for the architect in the design process in the job market. They also consider VR important to the communication between the architects.

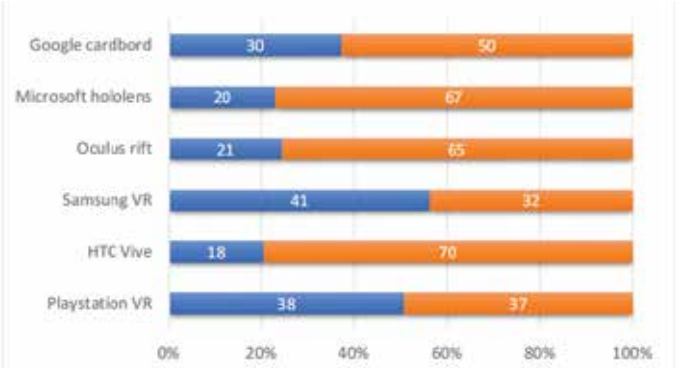

Figure1: Which, if any, of these Virtual Reality devices have you heard of?

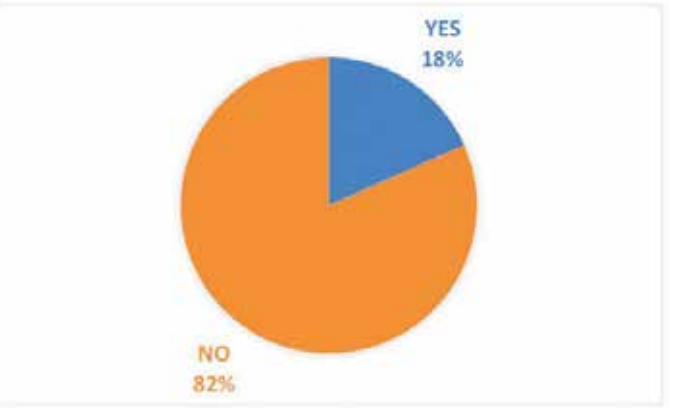

Figure 2: Do you use 3D CAD software for architectural modelling?

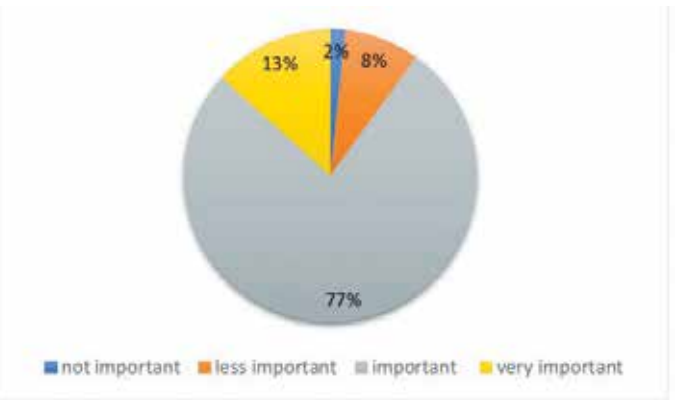

Figure 3: How important is Virtual Reality in the Design Process?

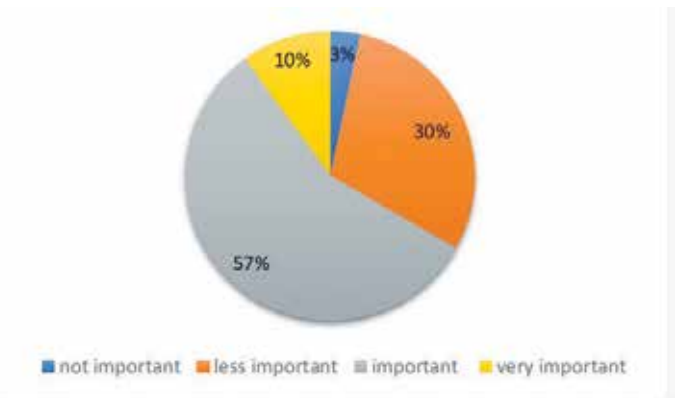

Figure 4: How important is Virtual Reality in Communication between architects?

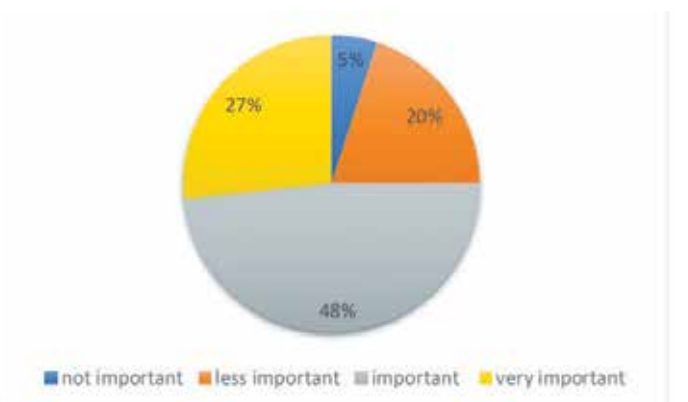

Figure 5: How important is Virtual Reality in Communication between architects and experts?

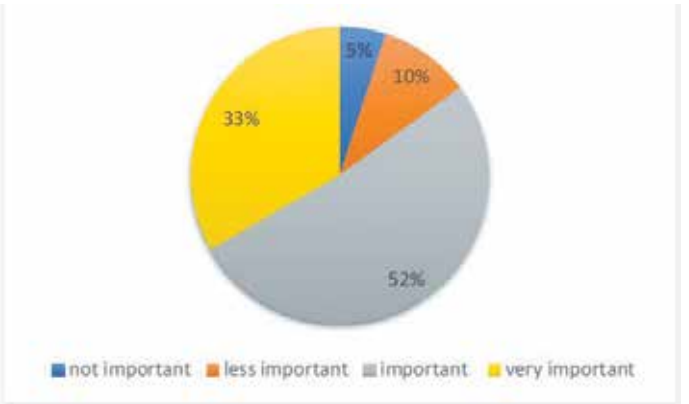

Figure 6: How important is Virtual Reality in Communication between architects and users?

Figure 7: In your opinion, can VR contribute to the architectural scope? If yes, how?

In the communication between architects and experts - as engineers and managers - opinions are divided between considering VR important and very important. While into the communication between architects and clients or end-users, most of the people believed that it is very important.

Also, an open-ended question was made in order to understand other contributions that VR could provide in the architectural scope. People mentioned other contributions such as - a contribution to save time and resources, to generate new types of architecture, to replace traditional methods and to build and interact with a virtual world.

Q.5. If you believe that Virtual Reality is important to Architecture, please, identify the most important role (see Figure 8)

Q.6. How do you see the future development of VR in Architecture?

a) Job market (see Figure 9)

b) School (see Figure 10)

Q.7. What could be the most important role of Virtual Reality in the execution phase in construction? (see Figure 11)

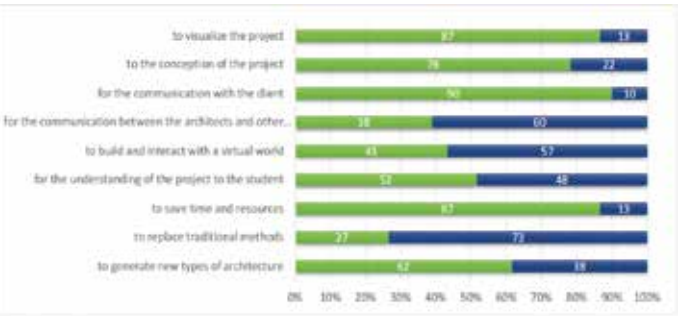

Figure 8: If you believe that Virtual Reality is important to Architecture, please, identify the most important role

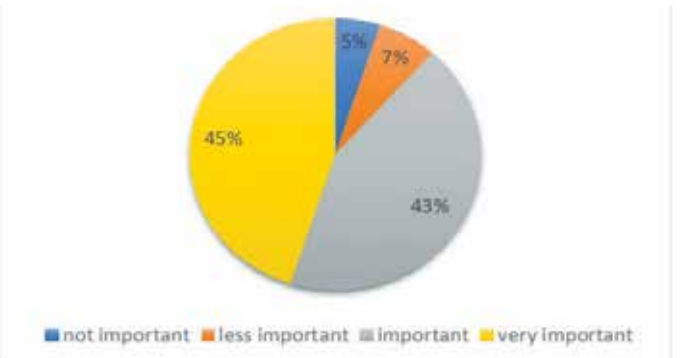

Figure 9: How do you see the future development of VR in Architecture into the Job market?

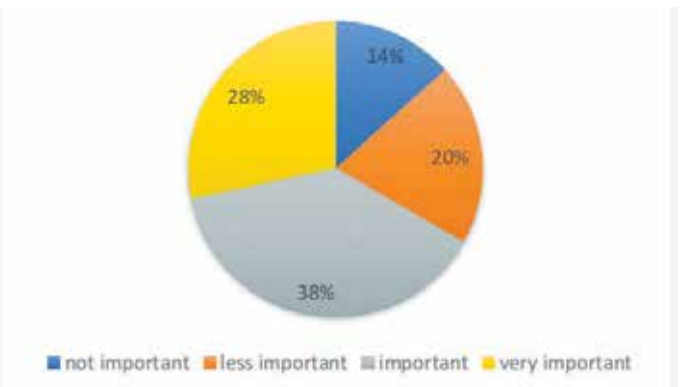

Figure 10: How do you see the future development of VR in Architecture into School?

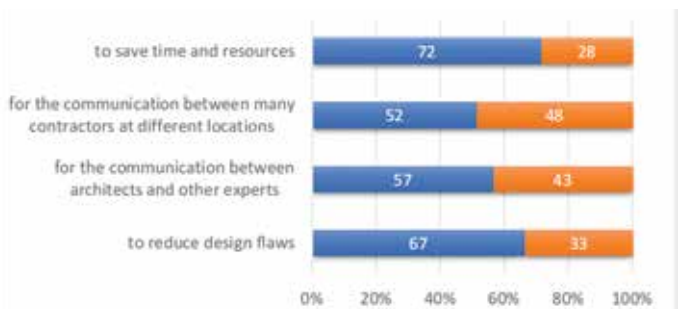

Figure 11: What could be the most important role of Virtual Reality in the execution phase in construction?

3. Conclusion

3.1 Conclusion and Future Scope

In conclusion, more than half the architects surveyed have positive expectations and opinions about VR potential into the architecture scope, even though

the majority do not work with VR environments nor use VR devices. However, there is willingness to learn about VR. The fact that architects do not work with VR could be due to the fact that they do not have the software or the devices available. However, with the launching of VR devices in 2016 for commercial purposes, the situation may change as they are likely to acquire VR devices.

In addition to creating more realistic projects, VR allows contractors, customers and designers to collaborate effectively throughout the project. Working with three-dimensional objects and three-dimensional worlds enables the entire team, including multiple stakeholders and end-users, to understand the idea much better even before the start of construction. Customers who almost always see things differently than architects and designers, can identify some design elements that can affect the desired result of the space.

It is concluded from the above research that:

1. Effective communication:
   One of the biggest challenges an architect faces is effectively communicating a design to customers, developers and investors. Immersive experience through VR is key to selling the right idea to a client.

   Virtual reality allows you to show the project when it comes even to the sale of unfinished facilities. Wearing a VR headset, potential buyers can stroll through a virtual apartment, as well as explore the proposed common outdoor area.

2. Change design in real-time:
   Real-time changes can take place in the virtual world, allowing customers to get a sense for specific aesthetic features, such as wall colour, lighting and furniture. The use of immersive technology saves time – the ability to build the project virtually means that design glitches and unforeseen problems are seen and caught earlier, long before the project reaches the building stage, thus preventing needless delays. This also leads to substantial financial savings in reduced labour, capital and material costs, as well as saving on the environmental waste caused by having to correct problems, spend longer on-site, etc. Receiving real-time feedback by being able to quickly jump into models, going from a third-person to the first-person perspective completely transforms the way in which architects and designers are able to create spaces.

3. Better collaboration between customers, contractors and other stakeholders:
   Another reason for the savings outlined above is that the various contractors/ stakeholders involved can 'meet' inside the VR model. This allows a range of disciplines to collaborate in the final design from an early stage, in detail, bringing their own perspectives to the process. The details can be discussed in a way which was not previously possible, making it easier to avoid communication problems between specialists (e.g. engineers and interior designers).

4. Lower cost of implementation:
   This benefit is the consequence of all the above-mentioned items. Project changes cost the company millions in fixes and overall brand reputation. But still, many savvy and experienced architectural businesses fail to match expectations with reality. You can draw up plans, 3D renderings and even physical models but chances are there are a lot of details that are lost in translation. Elements like structure position, lighting and spacing cannot be understood accurately until each stakeholder can be totally immersed in the building and consider how they are going to use the space.

All of these benefits show the main thing – Virtual reality offers endless possibilities in terms of interacting with a project. By improving scalability, streamlining collaboration, VR helps architecture, design and construction companies create a more profitable and satisfying customer experience. And as a consequence, immersive technologies will speed up customer approvals and minimise late-stage changes.

All graphs are sourced from the Author

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ARTICLE

ESG in Real Estate

The New Revolution and How Graduating Architects Can Lead the Change

By Ar Dhiraj Salhotra

Environmental, Social and Governance (ESG) criteria have moved from a niche add-on to a core driver of value in the real-estate sector. As investors, regulators and occupants demand greener, more inclusive and transparent built environments, the industry faces a talent gap: it needs architects who can embed ESG principles into every stage of a project, from site selection to post occupancy evaluation. Today, ESG is reshaping real-estate development. Graduating Architects through pursuance of acquiring the skills, credentials and mindset needed to deliver sustainable, socially responsible and governance sound projects, can play a disruptive role in leading the transformation.

ESG is the New Revolution in Real Estate:

There is an increased focus on implementation of ESG and as an outcome the regulatory mechanisms are being created to build the pressure for its implementation. Governments worldwide are tightening building codes, carbon pricing mechanisms and mandatory disclosure rules (e.g., the EU Taxonomy, India's Green Building Council rating upgrades). The investors today are aware about the importance of investing in ESG compliant projects and are catalysing the demand. Institutional investors now are taking keen interest in screening assets for ESG performance, often engaged in linking financing terms to sustainability metrics. The buyer and tenant markets in the industry are seeking value for money and are now having higher expectations from investment outcomes. Companies are committing to net-zero targets and prefer occupiers that can demonstrate low-impact footprints and healthy indoor environments. The increased commitment of the industry towards risk mitigation against climate change for ensuring sustainability is also contributing significantly. Climate related events, social unrest and governance scandals can devastate asset value; integrating ESG reduces these exposures. Together, these forces are turning ESG from a buzzword into a decisive factor for project feasibility and profitability.

Need of the Hour:

The design sense that addresses and manifests holistic design thinking is required to balance environmental performance with social equity along with transparent governance. As more and more projects are being developed on technically sound decisions that are data driven, while integrating the use of building information modeling (BIM), life-cycle analysis (LCA) and ESG reporting platforms, as a mode to add measure in the indices. The current projects are being developed as a collaborative effort bringing together professionals from divers areas and ensuring an overall cross disciplinary decision making. The collaboration between engineers, financiers, architects, urban designers, planners and community stakeholders. Due to significance of project performance benchmarking, the leadership is being measured through robust parameters of LEED, IGBC, NETZERO, WGBC and other certifying authorities.

Role of Young Architects:

Invest in Skill Updation

Graduates can bridge these emerging domains by creating a premium on talent that can "walk the ESG talk". They can deepen their technical knowledge and develop specialisation in the domain of sustainability fundamentals. They can undertake

Figure 1: Scale of Urban projects generate the demand to address ESG
Source: Author

Figure 2: Emerging projects in sub-urban Mumbai with ESG factor
Source: Author

certified training programs/ courses or electives in building physics, renewable energy integration and climate responsive design. The graduates can hone skills to undertake Life Cycle Assessment and Carbon Accounting. They can learn to quantify embodied and operational carbon, by using tools such as One Click LCA, SimaPro, or the Embodied Carbon Estimator. There is an increased demand for BIM specialists that can create building models that act as digital twins. They can Master advanced BIM workflows that feed ESG dashboards; explore digital twin simulations for energy performance optimisation. Earning Green professional credentials can help create a calibrated and validated as a baseline competency in sustainable design. With professional accreditations from GRESB, can help familiarise with the globally used benchmark for real-estate ESG reporting. The journey can also be taken ahead with achieving proficiency as a Net Zero Certification professional with Programs like the International Living Future Institute's Zero Carbon certification signal expertise in carbon neutral design.

Develop Social and Governance Insight

There is also a need to grow the awareness base and thus the resulting demand through engaging community and introducing design interventions in public domains. By participation in studios or pro-bono projects that involve local stakeholders, ensuring projects meet social needs and foster equity, could also act as a change enabler. The entire profile of the ESG professional is on understanding fiduciary responsibilities, anti-corruption frameworks and stakeholder communication. The professionals must

be aware about the regulatory frameworks while being equipped to address needs of diversity, while achieving inclusivity. The frameworks and guidelines for designing accessible spaces and addressing cultural uniqueness is about adopting a sensitive and empathetic approach.

Softskill Essentials

As most of the development in the arena of ESG though in high demand is in its nascent stage the ability to translate the most complex concepts and technical data into compelling narratives for investors, clients and occupants is the most sought after skill by the industry. While working with multidisciplinary teams the alignment of ESG goals with focus on budget and schedule can only be completed with thorough market knowledge on available resources, tools, techniques and innovation. Knowledge of project management with agile methods can lubricate the implementation of ESG in projects seamlessly and cost effectively.

A graduating architect can move from "designing a building" to "designing a sustainable, inclusive and governable asset."

ESG is no longer a peripheral concern; it is the engine driving the next wave of real-estate development. The industry's rapid pivot creates a unique opportunity for fresh talent—especially architects—who are equipped with the technical know-how, credentials and interdisciplinary mindset to turn ESG goals into built reality. By proactively building sustainability expertise, earning recognised certifications, engaging with social and governance dimensions and cultivating collaborative leadership, new graduates can position themselves at the forefront of this revolution, delivering projects that are not only profitable but also resilient, equitable and future proof.

The future of real estate is being written today; architects who understand ESG are the authors.

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ARTICLE

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Thermal Comfort and Cost Efficiency Analysis of Alternative Construction for Affordable Housing in Kerala, India

By Ashly S, Nithin M and Dr. Prassana T K

1. Introduction

India continues to face a severe shortage of adequate housing. According to government assessments under the *Pradhan Mantri Awas Yojana (PMAY)*, the national demand for affordable housing exceeds 11 million units (Lok Sabha, 2021). In Kerala alone, approximately 432,000 families remain without proper shelter (Government of Kerala, 2020). This shortfall emphasizes the urgent need for scalable, sustainable and cost-efficient housing solutions.

To meet this demand, the Government of India has promoted the adoption of alternate construction technologies that can accelerate project delivery while ensuring durability and quality (Khare, Roy, & Nanda, 2022). Examples include reinforced concrete (RC) shear wall systems, large area formwork tunnel form technology, precast elements, lightweight concrete systems, cold-formed steel structures and Glass Fibre Reinforced Gypsum (GFRG) panel construction. Among these, Light Gauge Steel Frame (LGSF) technology has gained particular momentum due to its rapid assembly, structural reliability,and compatibility with modular construction practices (BMTPC, 2021).

Kerala's affordable housing initiatives have begun experimenting with LGSF technology to achieve the state's goal of providing safe and sustainable dwellings for the homeless and landless. However, while LGSF offers significant benefits in speed and material efficiency, its acceptance is challenged by concerns regarding thermal performance, user adaptability and long-term cost implications. Addressing these issues is essential, as housing design must not only provide physical shelter but also ensure environmental comfort and affordability throughout the life cycle (TERI, 2021; Malik & Bardhan, 2022).

This study explores the performance of LGSF construction in Kerala's affordable housing sector, with a specific focus on thermal comfort and cost efficiency. By combining field data with simulation analysis, the research provides evidence-based insights into whether LGSF can be considered a viable and sustainable alternative to conventional building practices.

2. Literature Review

2.1. Thermal comfort and affordable housing

Thermal comfort is defined by the *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 55-2004* as "a condition of mind that expresses satisfaction with the thermal environment." It is determined by factors such as air temperature, humidity, air velocity,

mean radiant temperature, clothing insulation and metabolic activity (ASHRAE, 2004; Elhadad & Orban, 2021; Malik & Bardhan, 2022). Ensuring thermal comfort is critical for building sustainability, as it directly influences occupants' health, well-being and productivity.

In warm-humid regions of India, most low-cost housing operates in mixed-mode conditions, relying heavily on natural ventilation even during peak summer months. This reliance provides a social benefit by reducing dependence on mechanical cooling systems, though comfort levels vary significantly (Sen, Bhattacharya, & Chattopadhyay, 2021; Malik & Bardhan, 2022).

Affordability also plays a role in thermal comfort. Financial limitations often reduce energy consumption, which may result in only partial fulfillment of thermal needs. This highlights the interplay between economic constraints and comfort perception (Ferrara, Sirombo, Monti, Fabrizio, & Filippi, 2017).

Additionally, research emphasizes the influence of building materials, orientation and ventilation on indoor comfort. The building envelope acts as a thermal barrier; thus, the use of materials with low thermal conductivity is essential for maintaining stable indoor temperatures. Adequate airflow is equally important, as poor ventilation diminishes comfort. Optimized building orientation further contributes to energy efficiency and thermal stability (Givoni, 1971; Hyde, 2000; Latha, Darshana, & Venugopal, 2015; Homod et al., 2021).

2.2. Thermal comfort standards and Indices

Comfort standards introduced by ASHRAE, ISO and CEN were grounded in Fanger's heat balance model, which was originally validated under controlled laboratory experiments. This framework gave rise to the Predicted Mean Vote (PMV) and Predicted Percentage of Dissatisfied (PPD) model, which remain central tools in assessing indoor comfort (Fanger, 1972; Pressbooks, 2021).

The PMV index is used to estimate how a group of individuals would perceive thermal sensation, measured on a seven-point scale from –3 (cold) to +3 (hot), with 0 signifying thermal neutrality. The PPD index complements this by estimating the proportion of occupants likely to feel dissatisfied under the same conditions. Together, these indices form the basis for international thermal comfort standards such as ASHRAE Standard 55, which guide the design and evaluation of building environments (SimScale, 2023).

The PMV equation is expressed as:

$$PMV = (0.303e - 0.036M + 0.028)\{(M-W) - 3.05\times10-3[5733-6.99(M-W)-Pa] - 0.42[(M-W)-58.15] - 1.7\times10-5(5867-Pa) - 0.0014(34-ta) - 3.96\times10-8fcl[(tcl+273)4-(tr+273)4] - fclhc(tcl-ta)\}$$

Equation (1): Predicted Mean Vote (PMV)

Where:

M: metabolic rate (W/m²) (Fitness-VIP, 2023)

W: external mechanical work (W/m²), generally negligible indoors

Icl: clothing thermal resistance (m²·K/W)

fcl: clothing area factor (Homod et al., 2012)

ta: air temperature (°C)

tr: mean radiant temperature (°C)

Var: air velocity (m/s) (Academia.edu, 2013)

Pa: partial vapor pressure (Pa)

hc: convective heat transfer coefficient (W/m²·K)

tcl: clothing surface temperature (°C)

The supporting equations include:

Clothing area factor:

$$fcl=\{1.00+1.290Icl, 1.05+0.645Icl, Icl\leq0.078m2.K/WIcl>0.078m2.K/W\}$$

Equation (2)

Convective heat transfer coefficient:

$$hc=max(2.38|tcl-ta|0.25, 12.1v)$$

Equation (3)

Clothing surface temperature (iterative):

$$tcl=35.7-0.028(M-W)-Icl\{3.96\times10-8fcl[(tcl+273)4-(tr+273)4]+fclhc(tcl-ta)\}$$

Equation (4)

Finally, the **PPD index** translates PMV into the percentage of dissatisfied occupants:

$$PPD=100-95\times exp(-0.03353\times PMV4-0.2179\times PMV2)$$

Equation (5): Predicted Percentage of Dissatisfied (PPD)

These indices together provide a structured method to evaluate indoor comfort, with PMV indicating the mean thermal vote and PPD quantifying expected dissatisfaction levels.

2.3 Alternative Construction for Affordable Housing

Alternative construction technologies differ from conventional on-site practices by introducing mechanization into parts of the process, which enhances efficiency, precision and uniformity. These technologies are generally grouped into four categories: (i) alternate formwork systems, (ii) prefabricated sandwich panel systems, (iii) steel structural systems and (iv) precast concrete technologies (BMTPC, 2021). Among these, the **Light Gauge Steel Frame (LGSF) system** has gained significant popularity in India. In this approach, galvanized light-gauge steel sections are prefabricated in factories and transported to the construction site, where they are assembled into wall and floor panels using screws and bolts. This forms the primary load-bearing framework for internal partitions, external walls, ceilings and floors. The assembly is followed by the application of insulation layers, after which the external surfaces are finished with materials such as Cement Particle (CP) boards or dry-mix shotcrete (BMTPC & Ministry of Housing and Urban Poverty Alleviation, 2014).

While the construction sequence in LGSF resembles that of reinforced concrete buildings, the choice of materials and methods of assembly set the two apart. Each component is pre-designed, labeled and delivered either as individual profiles or pre-panelised sections depending on transport logistics and site conditions. On site, trained installation teams follow architectural drawings to assemble the profiles using specialised studs, with no welding involved. Once the frame is erected, cavities are filled with insulating materials such as fiberglass or Rockwool and wall surfaces are finished with standard boards or other approved coverings (Technology Profile Structures, 2014).

Table 1 provides an overview of the various components of an LGSF building and the typical materials used for each element.

Table 1: Summary of LGSF components and materials employed
Source: Authors

Sl. no.:	Component	Materials and Details	References
1	Structural Components	- Cold-formed steel sections (U, C, Z profiles)	(CortésPuentes, Palermo, Abdulridha, & Majeed, 2016) (Santos, 2017) (Krava nja & ula, 2010) (Gnana chelvam, 2022)
		- Galvanised steel studs (hot-dip zinc immersion)	
2	Sheathing Panels-	Gypsum plasterboard (inner layer)	(Gnanachelv am, 2022)(Cortés -Puentes et al., 2016)(Santos , 2017)
		High-density cement fiberboard (outer layer)	
		Concrete panels	
		Precast boards, blocks, EPS panels	
		Cement Particle Board	
3	In-fill Concrete and Panels	Steel-reinforced concrete panels (610 mm x 305 mm x 20 mm thick)	(Gnanachelv am, 2022)(Cortés-Puentes et al., 2016)(Santos, 2017)
		Lightweight concrete to fill the gap between panels	
		Electrical and plumbing pipes/conduits in service holes	
4	Insulation	Mineral wool (Rockwool or Glasswool)	(Gnanachelv am, 2022) (Cortés-Puentes et al., 2016)(Santos, 2017)
		Expanded polystyrene (EPS)	
		Polyurethane foam (PUF) External Thermal	
		Insulation Composite System (ETICS)	
5	Floors	Pre-assembled floor joists forming cassettes	(Gnanachelv am, 2022) (Cortés-Puentes et al., 2016) (Santos,2017)(Krava nja & ula, 2010) BMTPC
		Flooring board for resistance to the top flange of joists	
		- Optional top thin concrete/mortar layer (e.g., 50 mm) for increased thermal inertia/ mass and reduced floor vibrations	

2.4. Cost efficiency analysis of light gauge steel frame buildings: literature review

Several studies have examined the economic performance of lightweight structural systems. Naji et al. (2014) compared three systems—wood light frames (WLF), light gauge steel frames (LGSF) and three-dimensional sandwich (3DSP) panels—and found that 3DSP construction is the most economical, costing approximately 34.6% less than WLF and 27.7% less than LGSF.

Abu-Hamd and Abouhamad (2019) performed a life cycle cost analysis on cold-formed steel (CFS) structures with cement-based walls and reinforced concrete floors. Their findings suggest that CFS framing is competitive when compared with reinforced concrete and hot-rolled steel alternatives, particularly when both construction and end-of-life recycling costs are considered.

Similarly, Begum et al. (2013) assessed steel composite construction for medium- to high-rise developments in Bangladesh. Their results indicate that while reinforced concrete remains more cost-effective for low-rise projects, composite steel construction offers superior economic performance as building height increases.

Taken together, these studies emphasise that the cost-effectiveness of structural systems is strongly influenced by building scale and design requirements. Approaches such as composite systems and CFS framing can therefore provide significant financial advantages in suitable contexts.

3. Methodology

3.1. Location of study area and the case study housing unit

The study was conducted in Kottayam, India, situated at approximately 9.533° N latitude and 76.6° E longitude, with an elevation of 78 meters above sea level. According to the Köppen–Geiger classification, Kottayam falls under the Aw category, representing a tropical wet-and-dry (savanna) climate.

Climatic conditions in the region are characterised by an annual mean temperature of 27.3 °C. The maximum temperature recorded for 99% of the year is 34.6 °C, while the minimum temperature recorded for 1% of the year is 23.0 °C. The cumulative annual horizontal solar radiation is approximately 1736.75 Wh/m² (NASA POWER, 2023).

The case study focuses on an affordable housing project located in Chembola village within Vijayapuram Panchayath, Kottayam. This development was designed to serve landless and homeless families in the area. The apartment complex consists of four stories (G+3) and incorporates a hybrid structural system that combines Light Gauge Steel Framed Structures (LGSF) with Pre-Engineered Steel Building (PEB) technology. In total, the project delivers 44 individual dwelling units distributed evenly across the four floors (Figure 1).

3.2. Material specification

The reference LGSF building employs **fiber cement boards** on both sides of the wall panels, with **Rockwool insulation** provided in between to enhance thermal and acoustic performance (Figure 2). In wet areas such as kitchens and bathrooms, the walls are further finished with **ceramic tiles** for durability and ease of maintenance.

The floor assembly consists of **galvanised iron (GI) decking sheets**, overlaid with **Plain Cement Concrete (PCC)** and finished with **vitrified tiles**. The building features a **flat roof**, finished externally with a **vapour barrier layer** and **grey exterior paint** for weather protection.

For joinery, **unplasticised polyvinyl chloride (uPVC) windows** fitted with **3 mm clear glass** are used across the building. Ventilators are fitted with **glass**

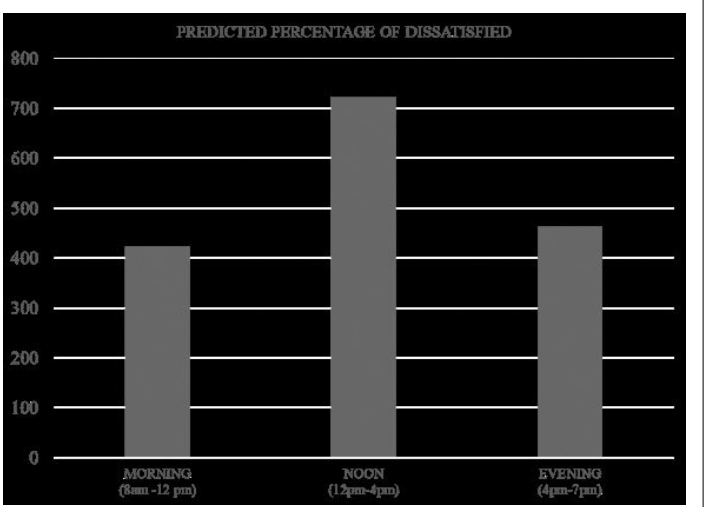

Figure 1: Predicted Percentage of dissatisfied from on-site measurement
Source: Authors

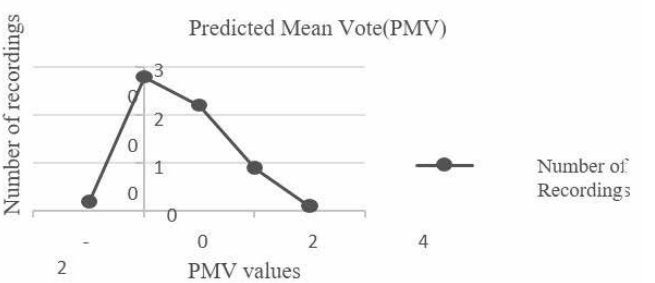

Figure 2: Predicted Mean Vote from onsite reading.
Source: Authors

Venetian blinds, allowing occupants to regulate natural lighting and privacy. To reduce direct solar heat gain, a **horizontal shading device** of 60 cm depth is installed above each window.

3.3. Data Collection

To evaluate occupant thermal comfort and satisfaction, a combination of questionnaire surveys, on-site measurements and simulations was employed.

The questionnaire survey aimed to capture residents' perceptions of comfort and their strategies for adapting to indoor conditions, thereby reflecting the effectiveness of the construction technology from the occupants' perspective. Data collection followed two approaches:

- Interviews with occupants and
- Building walkthroughs, supported by a structured paper-based survey form.
- The survey instrument was designed to record:
- General demographic information of respondents,
- Self-reported thermal sensation indoors,
- A clothing insulation checklist and
- A metabolic activity checklist.

Before filling out the questionnaire, respondents were clearly informed about the purpose of the study and the meaning of technical terms. All interviews were conducted in the regional language to ensure clarity and accurate feedback.

For thermal sensation, the study adopted the ASHRAE seven-point scale, ranging from –3 (cold) to +3 (hot), with 0 denoting neutrality (Table 2). In addition, Nicol's thermal preference scale was used to record whether occupants desired changes in their environment on a five-point scale: much cooler, a little cooler, no change, a little warmer, much warmer (Table 3). For analysis, these responses were later simplified into a binary input: 0 = unacceptable; 1 = acceptable.

In addition, a clothing garment checklist was prepared, tailored to local dressing practices in India but adapted from the comprehensive lists provided in the ASHRAE Handbook. The measured clothing insulation (clo) values indicated that typical indoor attire corresponded to 0.21 clo for men and 0.25 clo for women.

The study involved 24 randomly selected flats situated on different floors within the chosen

Table 2: ASHRAE 55 – Seven Point scale
Source : Authors

Scale	
3	Hot
2	Warm
1	Slightly warm
0	Neutral
-1	Slightly cool
-2	Cool
-3	Cold

Table 3: Nicol's thermal preference five point scale
Source: Authors

Scale	
1	Much warmer
2	Bit warmer
3	No change
4	A bit cooler
5	Much cooler

case study buildings. The indoor environment was assessed using calibrated digital instruments, specifically a heat index meter and anemometer (Figure 3). Measurements were taken at a height of 1.1 meters from the floor level.

The instruments recorded simultaneous physical parameters such as air temperature, relative humidity (RH), globe temperature and air velocity, which reflected the immediate thermal environment surrounding each participant. The minimum observation period for each measurement interval was fixed at the apartment level.

The survey was conducted during the day, slightly slipping into the night. (8 am– 7 pm).The weather condition of the location on the day of recording was

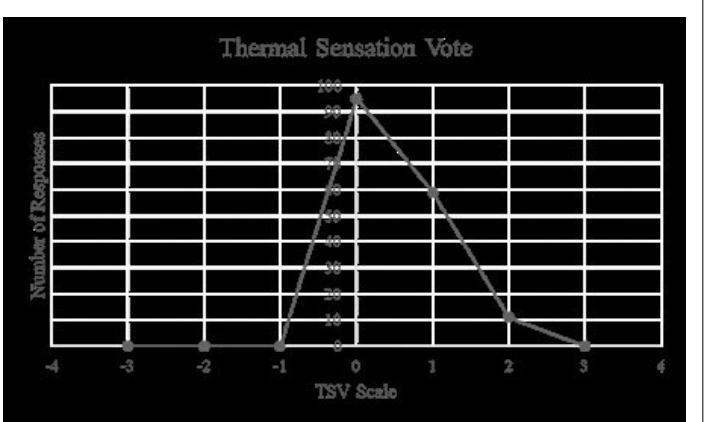

Figure 3: Thermal sensation vote based on survey
Source: Authors

noted from daily weather data as well as from taking measurements outdoor.

3.4. Indoor Thermal comfort evaluation

On-site data collection recorded air temperature, relative humidity, globe temperature and air velocity. Using these variables, the mean radiant temperature and operative temperature were then derived. Using these parameters, the **mean radiant temperature** and **operative temperature** were subsequently derived to provide a more comprehensive representation of the thermal environment. A summary of the measured indoor environmental variables is provided in Table 4.

Mean radiant temperature (MRT/ *Tmr*) is calculated from the air temperature, velocity and globe temperature in accordance with the International Organisation for Standardisation (ISO 7726) Operative temperature was calculated from the formula

$$TOP = (hrTmr + hcTair)/(hr + hc)$$

Equation 6

where

Top is operative temperature (°C)

Tair is air temperature (°C)

hc is the convective heat transfer coefficient (W/ m2K),

hr is the radiative heat transfer coefficient (W/m2K)

Tmr is the mean radiant temperature (°C)

4. Results and Discussions

The values of PMV- PPD were computed using the above consideration.

It can be observed from Equation. (1) to (4) that the calculation of PMV is an iterative process. In this work, the calculations were carried out by using the CBE Thermal Comfort Tool (Tartarini et al., 2020), applying the ASHRAE 55 standard.

The analysis of the recorded data from the Predicted Mean Vote (PMV) survey reveals significant findings. (Figure 2) Firstly, the majority of responses 46% converge around a PMV value of 0, indicating that a substantial portion of participants perceived the thermal conditions as neutral. It was also observed that approximately 43.7% of the time, PMV values exceed 1, implying that a considerable duration is marked by a perception of slight warmth in the building's thermal comfort. Fewer respondents recorded PMV values of -1, 2 and 3, suggesting that a smaller proportion of individuals experienced slightly cool, warm, or hot thermal conditions.

The analysis of the Predicted Percentage Dissatisfied (PPD) index, derived from on-site measurements, yields notable findings. Morning PPD values indicate instances of moderate dissatisfaction, varying from 10 to 54.9. (Figure 1). The noon period exhibits heightened dissatisfaction, peaking at 74.8 and frequently exceeding 50. In the evening, substantial

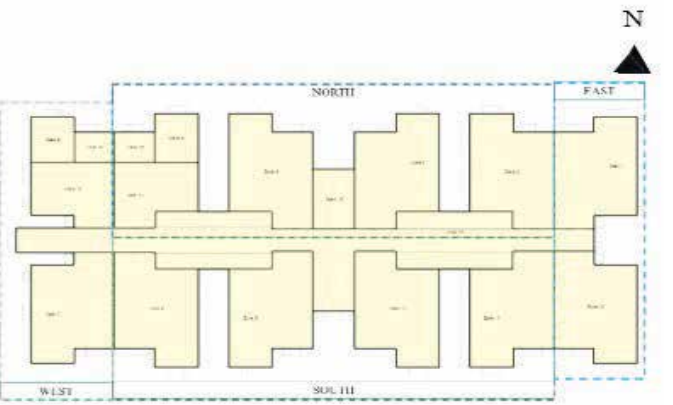

Figure 4: Division of units based on directions
Source: Authors

Table 4: Summary of indoor variables recorded.
Source: Authors

SL no:	Variable	Maximum	Minim um	Mea n	Standard deviation
1	Indoor air temperature (ºC)	32.6	26	30.2 3	1.11
2	Indoor globe temperature (ºC)	32.6	28.1	30.3 6	1.04
3	Indoor relative humidity (%)	83.3	65.9	74.1 1	4.26
4	Indoor air velocity (m/s)	2.8	0	0.60	0.56
5	Indoor mean radiant temperature (ºC)	33.8	22.6	30.3 8	1.77
6	Indoor operative temperature (ºC)	32.7	26.3	30.2 9	1.21

dissatisfaction is observed, with several instances surpassing 50 and notable values such as 89.4.

Thermal Sensation Vote (TSV) serves as a tool to gauge individuals' subjective perceptions of whether they feel too cold, too hot, or comfortable. The study revealed that TSV predominantly leaned towards the warmer side of the thermal sensation scale. A substantial 57.5% of respondents reported a neutral thermal sensation, signifying that a majority found the indoor conditions thermally comfortable. On the other hand, 35% of participants felt slightly warm, indicating that a significant portion perceived the indoor environment as somewhat warmer than their preferred comfort level. Furthermore, a smaller percentage (6.6%) reported a warm sensation, suggesting that a minority found the indoor environment noticeably warm or possibly uncomfortably warm, leading to discomfort.

The combination of PMV, calculated from on-site measurements and TSV, derived from a survey, provides a comprehensive understanding of the occupants' thermal comfort in the case study building.

The agreement between these two metrics contributes to validating the real sense of thermal comfort experienced by the building occupants. The fact that both PMV and TSV indicate a reasonable balance in thermal comfort, with a majority perceiving neutral conditions, suggests alignment between objective measurements and subjective experiences.

The values of PMV calculated at different directions of the building based on figure 7 are presented in Table 5.

The analysis of PMV values across different sides of the apartment reveals distinct patterns in thermal comfort. The eastern side consistently exhibits the highest PMV values, indicating a warmer environment, followed by the southern side. Specifically, on the eastern side, approximately 83.33% of PMV values were above 1, signifying that the majority of the time, occupants may perceive the thermal conditions as too warm. The southern side, with approximately 55.56% of values above 1, also experiences a notable portion of time with potential discomfort.

In contrast, the northern and western sides have lower PMV values, suggesting relatively cooler conditions. Based on these findings, unit on the eastern-southern side units is considered for thermal comfort simulations, as they represent areas where warmth is more prevalent based on the PMV analysis.

Table 5: PMV values based on cardinal directions.
Source: Authors

Directions	***PMV (average)***
North	0.78
East	0.92
South	0.42
West	0.71

4.1. Simulation Design

The prototype chosen for simulation was a southeast-facing corner unit located on the top floor of the apartment block. This unit is **southeast-oriented** and the corresponding bedroom was selected as the prototype space for analysis. The choice was based on **lower thermal comfort levels observed during on-site measurements**. Figure 5 illustrates the typical floor plan of the block, highlighting the southeast-facing bedroom used for the study.

To enable a comparative assessment, a **conventional RCC (Reinforced Cement Concrete) framed structure** with the **same floor area and layout** was also modelled. This reference unit represents the **typical construction practices in affordable housing in Kerala**, consisting of:

- 20 cm solid block masonry walls,
- wooden doors and windows,
- cement concrete flooring,
- concrete roofing and
- exterior whitewashing as the surface finish.

The Energy Plus simulation tool, widely applied for building performance analysis, was used to generate year-round hourly indoor operative temperatures for various envelope configurations. These simulations were carried out through DesignBuilder V6, which serves as the graphical user interface for EnergyPlus (Figure 5).

The weather data file for Kottayam was obtained from the NASA POWER database (NASA POWER, 2023). The region experiences four major climatic conditions: winter, summer, southwest monsoon

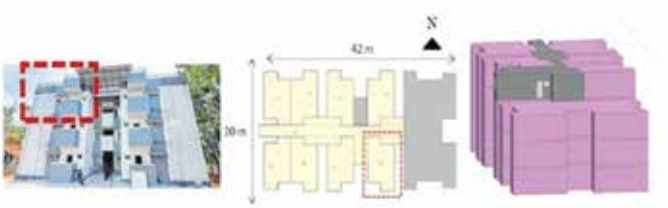

Figure 5: a) Unit selected for simulation b) floor plan of unit selected for simulation (Not To Scale) c) Design builder model.
Source: Authors

and northeast monsoon. For this study, however, only the summer typical week—identified by the weather data translator in DesignBuilder as the hottest week of the year—was considered for the comfort analysis.

To ensure controlled comparisons, simulations were conducted under a closed-window environment, thereby minimising the influence of wind-driven ventilation. The thermo-physical properties of the materials used in the simulation are provided in Table 6.

4.2 U value calculation of wall for simulation

The thermal transmittance (U-value) of the building envelope plays a crucial role in determining the overall thermal performance of a structure. To ensure accuracy, it is necessary to account for the heterogeneity of materials used in Light Gauge Steel Frame (LGSF) walls.

For this study, 2D Finite Element Method (FEM)-based simulations were carried out using THERM 7.7, a tool developed by the Lawrence Berkeley National Laboratory (LBNL). The calculations follow the ISO 6946 procedure, which is recommended for building components with inhomogeneous layers.

Boundary conditions were applied by setting the external temperature to 0 °C and the internal temperature to 20 °C. The convective surface heat transfer coefficients were assigned as per EN ISO 6946 standards.

The results show that the U-value of the homogeneous layer (without steel studs) is 0.044 W/m²·K, whereas the U-value of the full assembly with steel studs increases to 0.15 W/m²·K (Figure 9). This difference highlights how the inclusion of steel studs significantly reduces the insulating capacity of the wall. Because steel conducts heat efficiently, its inclusion raises the overall heat transfer and creates potential thermal bridges within the wall assembly.

4.2.1 Model calibration

To align the simulation model with real-world conditions, on-site measurements of air temperature and relative humidity were collected from the case study building during August 2023. These values were used to calculate the hourly operative temperature through Equation (6). The calculated temperatures were then compared with simulation outputs to validate accuracy.

Figure 7 presents the comparison of simulated and

Table 6: Summary of thermos-physical data obtained from [17][18]
Source: Authors

Sl no:	Assembly	Wall components	Material Thickness (mm)	Conductivity (W/m K)	Density (kg/m3)	Specific Heat (J/(kg K))
1	Wall	Cement fibre board 9mm	9	0.23	1200	1500
		Cement fibre board 8mm	8	0.23	1200	1500
		Cement fibre board 6mm	6	0.23	1200	1500
		Rockwool	50	0.038	250	1030
2	Roof	GI deck sheet	6	0.02998	503	1000
		PCC with 3/4 mm Wire mesh	80	0.16	600	1000
		Mortar / screed	20	0.41	1200	840
Glass properties	Thickness (mm)	U value	Vlt (%)	Solar Heat Gain Coefficient (SHGC)		
Clear Glass	6	6.12	88	.81		

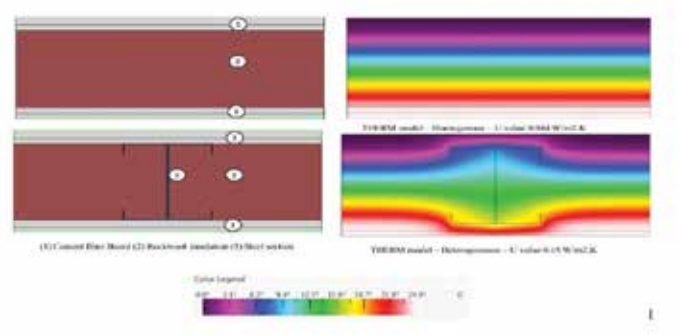

Figure 6: THERM interface showing the U value calculation of wall assembly
Source: Authors

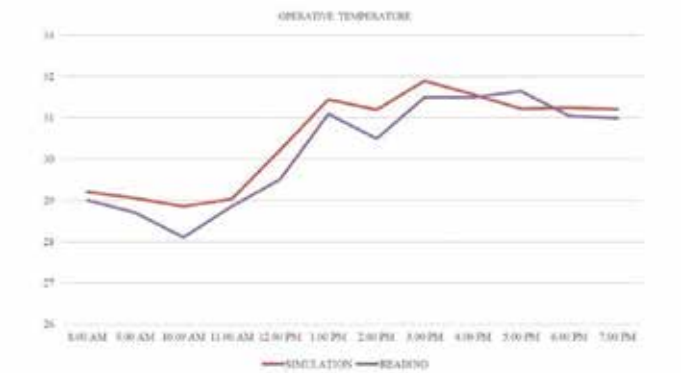

Figure 7: Simulation model calibration - Operative temperature, Simulation v/s calculated using on site measurement
Source: Authors

measured operative temperatures, averaged across three consecutive days between 8:00 a.m. and 7:00 p.m. The building simulation was developed to closely replicate actual conditions by incorporating construction materials, glazing details and shading devices.

4.3 Simulation result

Thermal comfort evaluation was carried out by calculating the hours of discomfort, representing periods when indoor conditions deviated from the adaptive comfort model. Results show that most discomfort occurred during occupied hours, reflecting when the indoor environment was most critical for residents (Figure 6).

When comparing the two building types, the Light Gauge Steel Frame (LGSF) model consistently outperformed conventional construction. During a typical summer week, the LGSF unit recorded an average of 33.5 discomfort hours, whereas the conventional unit experienced 64.75 hours.

A zone-wise breakdown revealed that the Kitchen (Zone 2), Bedroom 1 (Zone 4), Bedroom 2 (Zone 5) and Living/Dining Room (Zone 6) in the LGSF model had significantly fewer discomfort hours (Figure 8).

In every zone across the unit, the thermal discomfort hours are consistently lower in the LGSF) construction compared to the Conventional building. Specifically, in Zone 2 (Kitchen), Zone 4 (Bedroom 1), Zone 5 (Bedroom 2) and Zone 6 (Living/Dining Room), LGSF demonstrates an advantage with fewer discomfort hours, of an average 33.5 hours in LGSF reference unit, compared to 64.75 hours in conventional unit.

In this context, it appears that the LGSF building offers better thermal comfort during the summer week as it falls short of meeting comfort standards for fewer hours compared to the conventional construction.

Table 7: Time Not Meeting the Adaptive Comfort Models during Occupied Hours (summer typical week)
Source: Authors

	LGSF (Hours)	Conventional (Hours)
Zone 2 -Kitchen	45	49
Zone 4 – Bedroom 1	25.5	77
Zone 5- Bedroom 2	26.6	77
Zone 6 –Living /Dining Room	33	56

4.4 COST BENEFIT ANALYSIS

4.4.1 Cost comparison

Typical Estimate for a similar building with conventional practice prevailing in Kerala for affordable housing Solid block masonry 20cm, doors and windows with wood, Cement concrete flooring, Concrete roof and white washing)

The survey and discussions with the beneficiaries and Officers and Engineers of Government of Kerala and Construction Company in charge of the project were conducted to seek the data and reactions of the beneficiaries on the housing project

Percentage increase= [(2315067-1927286)/ 2315067] * 100%

Percentage increase= [(448663.3) / 2315067] *100%

Percentage increase ≈ 16.7%

So, the percentage reduction in cost from LGSF to RCC is approximately 16.7%.

4.4.2 Comparison of time taken for of construction

- LGSF construction is faster than RCC construction for structural assembly due to off-site fabrication and dry construction methods.

- RCC construction may have a longer timeline, particularly when considering curing time for concrete and weather-related delays.
- LGSF construction often requires a smaller workforce compared to RCC construction, particularly for the structural assembly phase.
- The specialized skills required for LGSF assembly may limit the availability of labour in some regions.
- Both methods require skilled labour for plumbing, electrical and HVAC installations.
- RCC construction may require more labour for the foundation phase, while LGSF construction may have a quicker structural assembly phase.

Table 8: Dependability on skilled labour
Source: Authors

Sl .No	Dependability on Skilled labour	
	Conventional	**LGSF**
1	Skilled labour - 60%	Skilled labour - 80%
2	Unskilled labour 40%	Unskilled labour 20%

5. Conclusion

This research examined the application of **Light Gauge Steel Frame (LGSF)** construction for affordable housing in Kerala, focusing on its ability to deliver indoor climate comfort when compared with conventional Reinforced Cement Concrete (RCC) structures. The central assumption was that LGSF would provide superior comfort performance, making it a viable option for low-cost residential development in the region.

The findings strongly support this hypothesis. Both field measurements and EnergyPlus simulations, evaluated through indicators such as Predicted Mean Vote (PMV) and Predicted Percentage of Dissatisfied (PPD), consistently showed that LGSF buildings achieved better levels of thermal comfort for occupants.

Although the initial cost of LGSF projects may be slightly higher than RCC, the overall economic analysis reveals its long-term viability. Faster assembly, reduced labour requirements and enhanced comfort performance together position LGSF as a competitive and sustainable alternative.

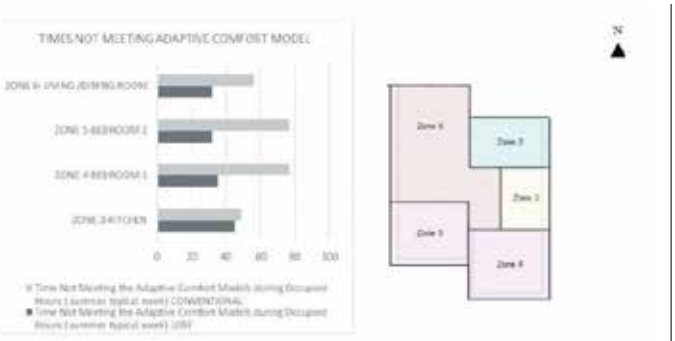

Figure 8: Comparison of discomfort hours between LGSF building and Conventional building
Source: Authors

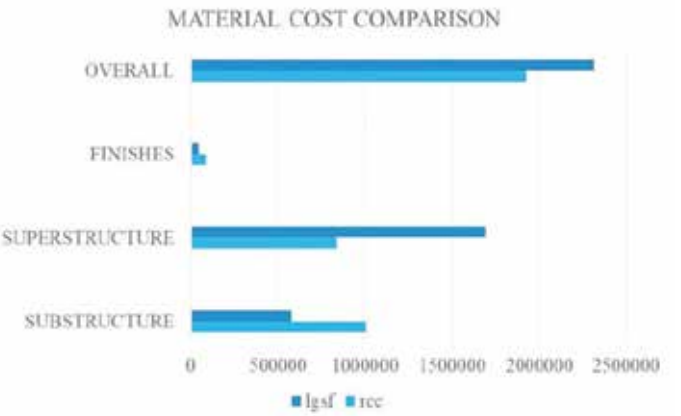

Figure 9: Material cost comparison
Source: Authors

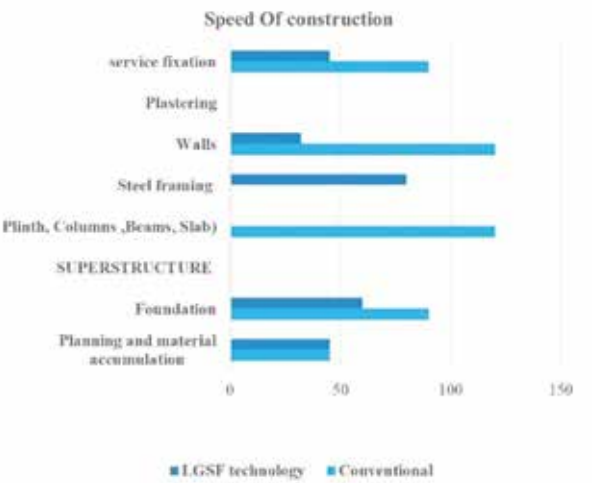

Figure 10: Speed of construction
Source: Authors

In summary, LGSF technology demonstrates clear potential to improve the affordability, quality and sustainability of housing in Kerala. Its ability to provide healthier and more comfortable living environments, while also addressing the urgent need for rapid housing delivery, highlights its relevance for future housing initiatives.

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Lest we forget in the era of AI

Design TALK

By Ar. Harshad Bhatia

"It's the thought that counts", how often have you said that? Has it ever occurred to you that when you stretched your vocal cords, pursed your lips, pressed them, made those sounds and put the thought out in front of the people it was meant for, did it actually count? This is a question I ask you. The point to be made here is that how often, I stress on this again, how often do we actually think before speaking. Mind you, the point here is not on the frequency of your thoughts but on whether you are able to convey the message correctly or not. How aptly you put the words meant to convey the thought needs to be considered. I have come across and many-a-time I too have become a victim of misunderstandings - misunderstandings of 'thought'.

The ability to express your thoughts is often a hindrance to success when misunderstood. The most common language of an architect is the 'visual' presentation commonly termed as 'drawing'. The difficulty which arises in communicating this visual data of Plans, Elevations etc. to the client is obvious. It is clear that not every being is trained to read a drawing the way architects do. This leaves a void in the mental communication of the architect and client, which could give rise to ambiguity on either side. To avoid situations like these, the presenter should explicitly speak out the visual medium in common terms. The drawing should therefore be substantiated with a clear verbal dialogue, if not a text. This dialogue at the lowest level be related to common sense as understood by people from all walks of life, not necessarily architects.

There have been instances of great designers and visionaries who have reached their goals in the discipline of Architecture. Their success lies in the ability to draw, write and speak the design in common terms. There are also good designers who have yet to see their ideas being presented in reality. These good designers differ from their successful counterparts by an impeding disability that prevents easy communication in either medium.

The language of architects is just as important as their ability to prepare presentable drawings. An obvious example which comes to mind regarding the validity of creating impressive drawings without a supportive verbal text is the use of computers. It is seen that computer drafted output is regarded as quality oriented but in the absence of verbal communication they cannot be directly interpreted by a layman. This proves a point that an architect cannot be replaced by a draftsman, which also applies to the architect's ability to design.

However, an architect who cannot explain his design drawing verbally is not much different from a draftsman. The level of perception attained by an architect is also gauged by his ability to speak. This does not imply that one should 'talk more, work less'. Similarly, the phrase of 'work more, talk less' is also valid up to a limit. Of course, this was quoted in a different context altogether but if applied in the context of communication, this is limited purely to physical production of work.

Many architects work more and talk less, and this is a drawback that restricts their ability to the drawing board or the computer screen. There are others who talk more and work less and however good speaker they may be, their ignorance in other respects is obvious. Hence, architects should equate work and talk in direct proportions, when presenting their ability to laymen.

Another important aspect in the verbal milieu is that of using the right language. An appropriate vocabulary and the use of meaningful expression are always encouraging in presenting a confident and to-the-point image. The tendency of using inappropriate words at serious conversations is clearly demonstrated in this tragically humorous verbal dialogue between the architect and developer:

sword is an anagram of words ....

but a pen is mightier than the sword

Situation: Architect explaining his design concept on a block model at 1:500 metric scale at a Board meeting.

Architect: *"The windows shall not have conventional weather shades but ingenious devices which function with 100% efficiency and also offer aesthetic appeal."*

Chairman: *"What do you mean?"*

Director: *"Could you be more specific?"*

President: *"Can you show us a sample in any building?"*

Now, it is obvious that the client would have questioned the architect's statement as the mode of visual presentation is that of a block model to a scale that cannot express the details of the 'device'.

In reply to the queries of the Board members, the architect replied:

Architect: *"I understand that it is not possible for one to see those devices on this model. Hence, I suggest we blow it up to see the details."*

An informal statement like this could sound humorous to the one who understands the situation and on the other hand, bear tragic consequences on the layman's thoughts. This is what the Board members felt (they did not say it):

Board: *(B O O M !!) blow it up!*

The story ends with a sad note where the architect lost the project job prior to execution. Oops, sorry! What I meant was the execution of the job and not the architect. Like a slip of the tongue, this slip of the pen is another example of misunderstandings, but only in the textual context. Anyway, I leave that as a different matter, the knowledge of which is also essential to enable an architect in reinforcing his medium of presentation.

Image courtesy: Author

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Almaty
A City of Apple Trees

By Ar Moksha Bhatia

The word "apple" in Kazakh, алма, means "full of apples" and is the source of the name Almaty. Kazakhstan's largest city, Almaty, is close to the Kyrgyz border in the southeast.

Almaty is Central Asia's principal center for industry, culture, education, finance, media and transportation. It has a national park that extends from the George Turgen to the Chimlogan River and is renowned for its natural beauty. Since November 2017, the city has been a member of the UNESCO Creative Cities Network for Music.

The city is also known as "the garden city" because of its varied plantations. Besides greenery, notable structures are built in mostly neo–Russian

Image 1: The Ascension Cathedral, completed in 1907
Source: Author

Image 2: Alto relievo "The Feat" in the Memorial Complex, shows the heroic panfilovs who stood up for Moscow.
Source: Author

Image 3: Military History Museum of the Ministry of Defense of Kazakhstan
Source: Author

Image 4: Upside Down house in Kok Tobe in Almaty
Source: Author

Image 5: Magnificent view of the city from the Kok-Tobe urban park
Source: Author

Image 6: An urban space in Almaty surrounded by colourful trees
Source: Author

Image 7: The façade of Louvre Ball room
Source: Author

Image 8: Central State Museum of Kazakhstan
Source: Author

Image 9: Republic Palace in Almaty
Source: Author

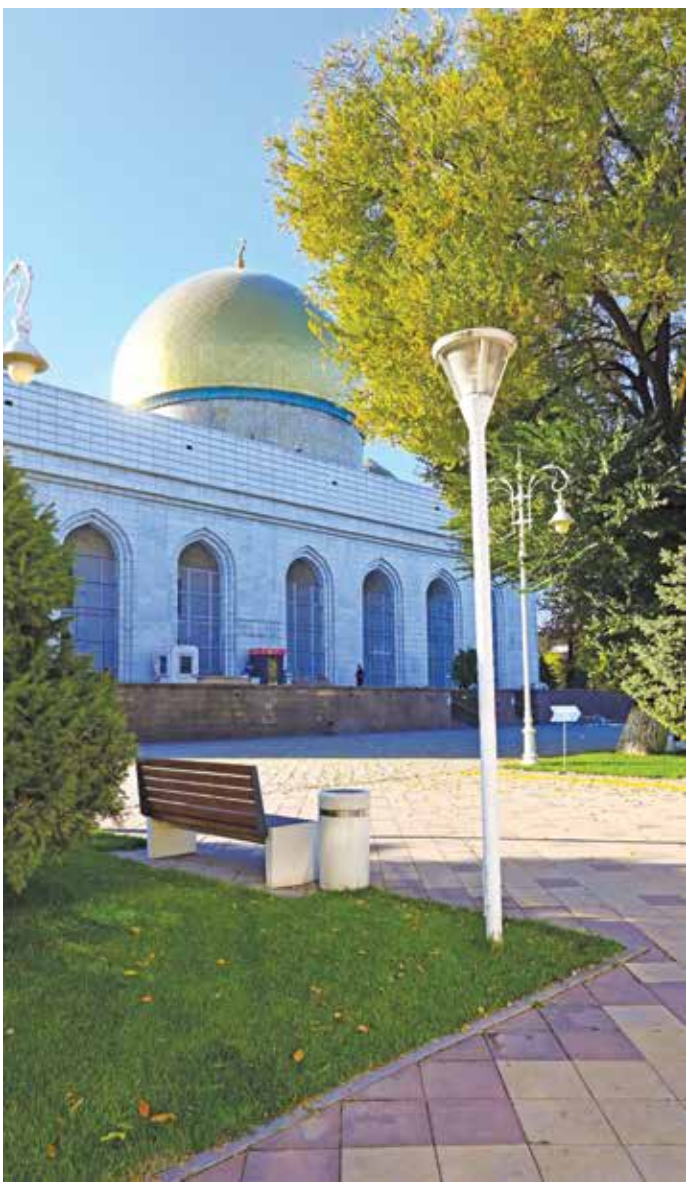

Image 10: The Central Mosque of Almaty
Source: Author

architecture. Many theaters, museums and residential buildings were constructed in the 19th century. Urban art is given a lot of importance. Almaty's open spaces, distinctive characteristics and pedestrian-friendly zones define its urban form.

The city is a must-visit preferably in winter months.

Ar. Moksha Bhatia (A27831) is a graduate of Punjab Technical University, Mohali and has completed her Masters in Urban Design. She is an avid traveller and documents different places for her Urbanism Spinning platform. Being an architect, she likes to photograph heritage buildings and districts. She believes that architecture and traveling co-exist.
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EVENT REPORT

SANJH 2.0

IIA Punjab Chapter's State Conference

IIA Punjab Chapter successfully organised its State Conference SANJH 2.0 on 17 January 2026 at the INTEX EXPO-26 Exhibition Ground, Ludhiana, in association with the Institute of Town Planners India (ITPI), Punjab Regional Chapter. The Conference was curated by Ar. Pritpal Singh Ahluwalia, Chairman, IIA Punjab Chapter, and Shri Pankaj Bawa, Chief Town Planner, PUDA and Chairman, ITPI-PRC. The initiative marked a significant collaborative effort between the two premier professional bodies, aimed at bringing architects and town planners onto a common platform for networking, professional coordination, and future knowledge exchange.

The Conference witnessed enthusiastic participation and concluded with remarkable success. The Chief Guest for the event was Shri Sanjeev Arora, Hon'ble Minister for Local Bodies, Power, and Investment Promotion, Government of Punjab. The Guests of Honour included Smt. Niru Katyal, IAS, Director, Department of Town and Country Planning, Punjab; Shri Pradeep Kapoor, National President, ITPI; and Shri Jeet Kumar Gupta, Trustee, IIA. Their presence added great value and stature to the proceedings.

The event was attended by a large number of architects and town planners from across Punjab, as well as neighbouring states including Haryana, Jammu & Kashmir, Himachal Pradesh, and Chandigarh, reflecting the regional relevance and wide professional interest generated by the Conference. A key highlight of the Conference was the signing of a Memorandum of Understanding (MoU) between the IIA Punjab Chapter and the ITPI Punjab Regional Chapter, formalising mutual cooperation in professional networking, joint activities, knowledge sharing, and participation in future academic and professional platforms of both organisations.

The ceremonial lamp lighting by Hon'ble Minister Shri Sanjeev Arora and Smt. Niru Katyal, IAS, Director, Department of Town and Country Planning, Punjab, marking the formal inauguration of SANJH-2.0, Organized By IIA Punjab Chapter alongside other dignitaries.

During the proceedings, Ar. Pritpal Singh Ahluwalia requested the Hon'ble Minister and the Director, Town and Country Planning, to ensure the inclusion of architects in relevant committees involved in framing building by-laws and town-planning reforms. The dignitaries assured that appropriate action would be taken. The Hon'ble Minister further encouraged architects to actively participate in the self-certification of building plans, an initiative of the Punjab Government. The IIA Punjab Chapter extended its full support to the government, subject to necessary policy amendments.

A panel discussion on Planning and Policies in Punjab was conducted, featuring eminent professionals including Smt. Mandeep Kaur, Chief Town Planner, TCP Punjab; Ar. Gautam Kumar, Chief Town Planner, Local Government; Shri Nawal Kishore, Senior Town Planner, Ludhiana; Shri Ashwani Luthra, Lead Researcher in Sustainable Urban and Transportation Planning; and Ar. Tripat Girdhar. Valuable insights were also shared by Shri Manmohan Khanna and Ar. Jeet Kumar Gupta, enriching the deliberations.

Keynote addresses were delivered by Ar. Vijay Kataria and Ar. Mansi (Delhi) on Modern Architecture in Punjab, while Shri Rajneesh Sareen, Programme Director – Sustainable Buildings and Habitat, CSE New Delhi, spoke on Urban Heat Effects, highlighting the urgent need for climate-responsive urban design.

Cultural Programme and Student Participation

The cultural programme featured Ganesh Vandana, Bhangra performances by students of UIA, Chandigarh University, and Gurbani Kirtan, adding a rich cultural dimension to the event. The programme management was undertaken by students of GNDCE School of Architecture, Ludhiana, under the guidance of Ar. Akanksha Sharma, HOD.

Exhibition and Design Competitions

An exhibition titled Pehchan, showcasing studies and drawings highlighting the architectural heritage of Punjab, was organised by students from various architecture colleges. The exhibition was coordinated by Ar. Swati Bahl, HOD, UIA Chandigarh University, and Ar. Rajan Tangri, Joint Secretary, IIA Punjab Chapter. Additionally, a poster-making competition titled Amanat: How Punjab Heritage is maintained in Architecture was organised under the coordination of Ar. Harveen Bhandari, HOD, Chitkara College of Architecture, along with Ar. Indu Arora and Ar. Dinesh Bhagat, who also played an active role in coordination.

The signing of the Memorandum of Understanding between IIA Punjab Chapter and ITPI Punjab Regional Chapter by Ar. Pritpal Singh Ahluwalia Chairman IIA PC and Shri Pankaj Bawa, Chairman ITPI PRC marking a milestone in architect–planner collaboration.

Expert forum and panel discussion on "Building Punjab Together: Practice, Policy and Planning", with (from left) Ar. Pritpal Singh Ahluwalia, Moderator; Prof. Ashwani Luthra; Ar. Jeet K. Gupta, Trustee, IIA; Ar. Gautam Kumar, Chief Town Planner, Local Government, Punjab; Smt. Mandeep Kaur, Chief Town Planner, Punjab; Shri Nawal Kishore, Senior Town Planner, Ludhiana; Shri Manmohan Khanna; and Ar. Tripat Girdhar.

Ar. & Urban Designer Vijay Kataria and Ar. Mansi Kataria being honoured during the State Conference SANJH-2.0.

Inauguration of the INTEX EXPO-26 Exhibition at SANJH-2.0 with the ceremonial ribbon cutting

Ar. Pritpal Singh Ahluwalia addressing the press, briefing them about the SANJH-2.0 conference and the activities of the IIA Punjab Chapter.

Ar. Indu Arora, Treasurer, IIA Punjab Chapter, addressing the gathering from the stage.

Gurbani Kirtan rendered by the students of Guru Nanak Dev Engineering College, Ludhiana, invoking blessings and marking the auspicious commencement of SANJH-2.0.

An energetic Bhangra performance by the students of the University Institute of Architecture, Chandigarh University, celebrating the vibrant spirit and rich cultural heritage of Punjab.

Impressed by the quality of exhibits and entries, the Hon'ble Minister announced cash awards of ₹50,000 for First Prize, ₹30,000 for Second Prize, and ₹20,000 for Third Prize, to be awarded collectively for the competitions and displays.

Architects Ar. Sanjay Sharma, Ar. R.S. Sandhu, Ar. Arjun Deep, Ar. Varunesh Kumra, Ar. Yogesh Singla, Ar. Rajneesh Walia, Ar. Vivek Sehagal, Ar. Amit Mihas, Ar. Nitin Batra, and many other architects played a pivotal role in making the event a grand success. Sh. GS Dhillon from Udan media Ludhiana was sponsor of the Conference.

The Conference successfully strengthened professional ties between architects and town planners, reaffirming the importance of interdisciplinary collaboration in shaping sustainable, well-planned urban environments, while ensuring the maintenance and promotion of Punjab's rich architectural heritage.

Ar. Sanjay Kumar (F-24064) is an architect from Jalandhar and serves as the Head of the Events and Finance Committee of the IIA Punjab Chapter. He plays a key leadership role, actively guiding, coordinating, and leading various professional and organizational activities of the IIA Punjab Chapter.
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NEWSLETTER JANUARY

IIA ANDHRA PRADESH CHAPTER

IIA Andhra Pradesh Chapter took the initiative of enabling the Institutional Membership for two colleges of architecture recently- Andhra University, College of Engineering and GITAM University apart from School of Planning and Architecture Vijayawada. The Chapter Chairman, Ar. Vijay Bhaskar and Hon. Secretary Ar. Subba Rao have been conducting outreach programs aggressively and have been instrumental in increasing new memberships and upgradations from Associates to Fellows.

World Habitat Day 2025 on the theme 'Urban Crisis Response' and *World Architecture Day* on the theme 'Design for Strength' was a collaborative event organised on 6 October 2025 by the School of Planning and Architecture (SPA) Vijayawada in association with the Indian Plumbing Association (IPA), Amravati Chapter, the Institute of Urban Designers, India (Hyderabad Centre), Institution of Engineers, India (AP State Centre), IIA, Andhra Pradesh Chapter, and the Institute of Town Planners India (AP Chapter). The session included insightful discussions, expert perspectives and collaborative dialogues focused on addressing urban challenges through innovative design and planning approaches.

IIA Kakinada Centre

IIA Kakinada Centre organised a *Meet and Greet* event titled *Samaaroh* on 6 September 2025 at Sarovar Portico, Kakinada. Prof. Ar. Bheemesh, Founder of *Vinootna Architecture & Appropriate Ventures* and Ar. Venkata Krushnarao Palukuri, green building consultant, were invited as speakers for the session. Ar. M.V. Venkatesh, Hon. Secretary; B. Srinivas Vice Chairman and VVLN Murthy, Chairman of the Centre elaborated on the developments and aims of the IIA Kakinada Centre and the IIA at large.

IIA Tirupati Sub-Centre installation event

IIA Tirupati Sub-Centre

IIA Andhra Pradesh Chapter initiated the formation of a new Sub-Centre at Tirupati. The newly-formed IIA Tirupati Sub-Centre installation was held at Marasa Sarovar Premiere on 12 September 2025 in Tirupati. Architects from the Rayalaseema region formed this Sub-Centre and made Tirupati as Headquarters. Ar. Polu Sai Srikanth was elected as the Chairman of the IIA Tirupati Sub-Centre. The event was graced by the IIA HO Imm. Past President, Ar. C.R. Raju; Ar. Vijay Bhaskar, Chairman IIA Andhra Pradesh Chapter, Office Bearers and other members of the IIA Andhra Pradesh Chapter.

IIA TAMIL NADU CHAPTER

IIA Puducherry Centre

Since November 2025, IIA Puducherry Centre has been holding *D'Talks,* an informal presentation/ discourse mostly by non-architects who inspire/ influence /assist our profession and design process at several stages. This one-hour evening activity, envisaged to be a growing platform of ideas, dialogues and collaboration, has been regular on Thursdays at a fixed venue and time. It is since gaining popularity among architects, students of architecture and non-members of IIA as well. The audience have a hearty exchange with the presenter and clarify their thought processes first-hand. This has fused the Centre with renewed energy. Speakers have been lined up until March 2026.

From L to R: Ar. Neelratn, Hon Treasurer, IIAPC; Ar. Dr. A. Parisutha Rajan, Chairperson, IIAPC; Shri J.B. Prashant More and Shri Chamanlal Gupta

A guided tour of the Eco-Park at the Adyar Estuary was conducted on 10 January 2026. The Chapter strategically used the season of the year to conduct a walk through one of the lungs of Chennai city, the Tholkaappiya Poonga, a section of an inland waterway coming from the Adyar Estuary, curving its way along the Quibble Island up to Greenways Road at R.A. Puram, Chennai. This walk curated by Landscape Architect Dr. A. Parisutha Rajan was attended by over forty enthusiastic members, limited due to administrative restrictions.

So far, talks have been held by an auditor (on accounts, IT, GST), a drone entrepreneur (aerial imaging for site studies), a passionate bird watcher/ structural designer (on environmental threats, conservation measures), a visiting project manager (on artificial lighting and on tenets of executing interior design projects), a granite stone specialist on landscape sculptures and elements, a craftsman (on handmade lampshades with paper and fabric), an engineering expert on the latest in MEP and electrical drawing, an award-winning young architect couple, on their winning experience, a young structural designer, on the challenges of new ways of buildings and a historian of international repute.

Thursday Talks were held at La Papillon Maison, Puducherry on 15 January 2026. French Historian from Pondicherry, Sri. J.B. Prashant More, eminent scholar and former faculty, INSEEC Paris, was invited to give a speech on 'French Settlement of Pondicherry: Its History and the Grand Canal'. He gave a brief outline on the evolution of the French settlement of Pondicherry, tracing its colonial origins, distinctive urban planning and architectural character. He highlighted how French administrative and cultural influences shaped the town's identity and way of life. A key focus was the layer of the Grand Canal and its historical role in drainage, transport and urban organisation. His speech also reflected on its present relevance and importance of preserving Pondicherry's unique heritage. This evening was notably attended by Shri Chamanlal Gupta, solar energy expert, philosopher and mentor who felicitated the historian.

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