The IIA National Awards for Excellence in Architecture 2023

Hosted by IIA Gujrat Chapter

THE INDIAN INSTITUTE
OF ARCHITECTS
MAHARASHTRA CHAPTER

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WESTERN REGIONAL CONFERENCE
24-25 JANUARY 2025

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Dear Fellow Members,

With the swift passing of days, the year 2024 draws to a close.

Wishing each one of you all a happy and prosperous new year 2025 in the coming month.

While thinking of the new year, it also reminds us how busy 2024 was.

We achieved many goals, every Chapter, Centre and Sub-Centre is working hard to make their events successful.

Last month, the Southern Region Conference (SRC) which took place at Wayanad, Kerala was a nicely-curated event in which all the Chapters of the Southern Region participated wholeheartedly.

After that the Eastern Region Conference (ERC) took place at Ranchi, Jharkhand, and that too at a very short notice. Despite that, they organised it in a very creative manner with speakers, presenters and even cultural activities which made the event successful. In these both the events, wholehearted public participation was seen.

Realizing the power of architecture to influence people and positively impact their daily lives, is a motivator and inspiration, that we all must consider ourselves as someone who can be a change-maker, impacting both, the built environment and also lives, and to remain motivated and inspired in our architectural careers, establish small but clear daily goals. After achieving these smaller goals, one will realise the daily magic.

Stay current with industry trends, seek opportunities for learning and workshops, travel and exposure to diverse architecture typologies.

IIA gives opportunities to everyone for exposure and also recognises their talents through IIA Awards.

For this year, the last date for submission is during the first week of January 2025.

Let us try the magic and be a motivator to the younger generation.

Ar. Vilas Avachat
IIA President

EDITOR'S NOTE

The year comes to an end with another successful journey of IIA in 2024.

This has been the most active year for IIA in the recent past. It shows the potential of our institutional strength and effectiveness of IIA's decentralised model to reach out to the last member placed across the national framework. We shall continue this successful journey into the New Year 2025 and raise the bar for the coming New Year.

I take this opportunity to thank all my fellow IIA members who have worked tirelessly to achieve this success for the fraternity.

We conducted many national events like Natcon, IIA National Awards, Anveshan, PinkPrint, regional events like IIAPL Golf Season 2, Mahacon, SRC and ERC hosted by various IIA Chapters and many events organised by IIA Centres and Sub Centres. It seems the whole year's calendar was full for all members to be enriched by the diverse content.

This is the year where we have seen the synergy between the two premier bodies of the Indian architectural fraternity, COA and IIA. We have never witnessed the COA President attending so many national events of IIA and helping to create stronger bonds between these two apex bodies. This has opened up lots of opportunities to resolve the concerns for architects across the nation.

Similar phenomena are seen on the international platform as well where IIA participation on various fronts like ARCASIA and UIA is significant. Various dignitaries of ARCASIA member institutes visited our events. Several ARCASIA Office Bearers also graced these national events. International speakers from these member institutes delivered the various talks during many of such events as well.

The main achievement of this year has definitely been the winning of the bid for hosting the *UIA Forum* in India for the first time in the history of IIA. This event will be hosted by Mumbai city in 2027. It is very important to participate in the preparation of this event by every IIA member for its grand success from now on and showcase our leadership in architecture worldwide.

The New Year awaits with more of such opportunities to be captured. Let's work together to achieve these higher goals for IIA and our fraternity. We urge all IIA members to participate in all these events and continue the support you have shown during this year.

An appeal to all IIA members to contribute to JIIA with articles, projects, research papers and most importantly, in terms of sponsorship and funding. Thank you for your continued support and readership.

Prof. Vinit Mirkar
Editor

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PURVODAY
Reawakening of the East

The cover design of this edition of JIIA celebrates the spirit and cultural vibrance of the recently-concluded PURVODAY, the Eastern Regional Conference (ERC) held at Ranchi, Jharkhand. This visually compelling artwork pays homage to the rich cultural heritage, architectural grandeur and dynamic evolution of the Eastern Region of India.

The imagery captures a harmonious blend of traditional and contemporary elements, weaving a narrative that resonates with the Conference's theme- Reviving, Preserving and Redefining the architectural ethos of Eastern India. At its core lies the symbolic map of the Eastern Region, serving as the centrepiece of this cultural mosaic.

Surrounding the map are various motifs that highlight the essence of Eastern India:

The tribal figures, adorned in traditional attire, symbolize the deep-rooted heritage of the indigenous communities. Their presence celebrates the cultural diversity and artistic brilliance of the region. The depiction of temples, stupas and iconic structures reflects the architectural legacy of Jharkhand and its neighbouring states. These landmarks embody the region's historical significance and its contribution to India's architectural landscape. Elements such as the fields of wheat, flora and fauna celebrate the region's natural wealth and its intrinsic connection to the environment. The serene landscapes depicted underscore the importance of sustainability- a key focus of PURVODAY.

The intricate patterns, inspired by tribal and Madhubani art forms, bring out the region's artistic excellence. The motif of the Sun God and depictions of traditional dance forms echo the vibrancy and festive spirit of Eastern India.

The soldier's figure represents the historical valour and resilience of the people of this region. It signifies the harmony between tradition and modernity, as well as the region's ongoing contribution to national progress.

PURVODAY, 2024 served as a platform to explore the interplay between traditional architecture and modern innovations, fostering a dialogue on preserving cultural identity while embracing sustainable design practices. This cover design stands as a visual testament to the conference's vision, encapsulating the beauty, resilience, and dynamism of the Eastern Region.

Through this artwork, JIIA celebrates the profound essence of PURVODAY, offering readers an inspiring visual narrative of Eastern India's architectural and cultural heritage, a testament to the Reawakening of the East.

Ar. Sourav Toppo (A-24806) is the Principal Architect at *Inked Wall Studio LLP*, based in Ranchi, Jharkhand. He holds a B.Arch. degree from the prestigious Birla Institute of Technology, Mesra. With a deep passion for design and architecture, he has been an influential figure in the field, blending innovation with practicality in his projects. Ar. Sourav is also an Executive Member of IIA Jharkhand Chapter, where he contributes his expertise to the growth and development of the architectural community in the region.
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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/hyhsCoK6QPe6qDJu8

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.

RESEARCH PAPER

Critical Analysis on Kerala City Circular
An exclusive model of Bus Rapid Transit System initiated by Smart City Trivandrum Limited

By Reebu Saju Stephen and Ar. Surabhi S. Pai

Abstract
Urbanization in Kerala has increased over the years, which led to an increase in travel demands and pressure on public transport systems. Public transport in Kerala, mainly contributed by the unorganized private sector, faces issues such as overloading, lack of fare standardization, compromising user safety and security, inconvenience among commuters, etc. The Kerala City Circular, launched in Thiruvananthapuram in 2022, the first urban mass transit system in the city, provides promising and efficient ridership to the public. This study evaluates the service quality of Kerala City Circular through five parameters in the evaluation matrix identified through literature review, namely reliability, responsiveness, assurance, empathy and tangibility, focusing on user experience of daily commuters, accessibility to the service and potential for scalability as a well-defined exclusive bus rapid transit (BRT) system within the existing infrastructure and linkages. Through qualitative and quantitative analysis, the study compares Kerala City Circular with other exclusive and inclusive BRT systems in India to identify their features, strengths, limitations and areas of improvement. The results from the analysis indicates a below average service quality on Kerala City Circular showing gaps in administrative, infrastructural and service areas. The research concludes with actionable recommendations for an effective and well- defined exclusive BRT system within the existing urban constraints, promoting sustainable urban mobility and passenger- centric transit system.

Keywords: BRTS, Kerala city circular, passenger-centric design, SERVQUAL, sustainable urban mobility

1. Introduction
Thiruvananthapuram has a work participation ratio of 36% and includes all user groups from students to elderly as daily commuters in both private and public transport with a trip frequency of 55% on daily basis. According to the Kerala Motor Vehicles Department, the total number of registered vehicles in the capital city has grown at an average annual rate of 8% over the past decade. In 2023 alone, the city witnessed a 12% increase in vehicle registrations compared to the previous year which became a threat to the 'Evergreen City of India' (Thiruvananthapuram Master Plan, 2023).

Thiruvananthapuram has the first model of bus transit system in Kerala, an initial by Smart City Trivandrum Limited (SCTL), which turned out to be a huge success for the Kerala State Road Transport Corporation (KSRTC) Department and reports an average daily ridership of 1000 passengers across its bus network, indicating a substantial reliance on public transport services. However, the guiding principles, policies and regulations for urban public transport modes prepared in the 12th Five-Year Plan under National Transport Development Policy Committee (NTDPC), only included tangibles, infrastructure and built factors which lacks Indian contextual studies and the integration of the system in the current infrastructures of the country and

does not include the service quality and commuter satisfaction components. There is a proper need to study and understand and draft a framework on the basis of the parameters that determine the quality of services using certain evaluation mechanisms for passenger centric public transport services.

1.1 Aim and Objectives

This research aims to analyze whether Kerala City Circular has the potentials to scale up as a well-defined exclusive model of Bus Rapid Transit System considering its successes, challenges and potentials in user experience, connectivity to multimodal transportations and long-term impact on urban mobility, or is more likely to persist with a standalone urban only. The study is carried out with following objectives:

- To understand the implementation and current approaches of Kerala City Circular service as an under- defined model of Bus rapid transit (BRT) system in terms of travel patterns and route mappings, information accessibility, economic incentives, first and last mile connectivity and intermodal transitions, infrastructures, etc.

- To compare and analyze how extent has the implementation of Kerala City Circular in Thiruvananthapuram with no Bus Priority Lane (BPL) influences the social dynamics, passenger satisfaction, accessibility, economic beneficiaries, traffic management and inclusivity, with the other BRT systems in India and the strengths and limitations of Kerala City Circular as an exclusive model of BRT system.

- To explore the potentials of Kerala City Circular in providing service quality within the constraints of an undefined exclusive BRTS model.

- To infer the overall effectiveness and feasibility of Kerala City Circular as a well- defined model of BRT development, considering the local context and potentials for scalability as a successful and well-defined exclusive BRT system and recommendations for an effective passenger centric service system.

The scope of this research includes actionable recommendations for improvements in Kerala City Circular in Thiruvananthapuram and in the future implementations of Kerala City Circular in the cities of Kochi and Kozhikode. The research also gives scopes for studies on the BRT implementation within the existing infrastructural conditions in the cities of India.

The study is limited to the service quality and passenger centric aspects of multimodal integration and BRT systems. The research is conducted within a specific timeframe and may not include long term impacts and changes that occur in the dynamic patterns of urban transportation, and has is focused on the public transport dependent commuters having transits on a daily basis.

2. Literature Review

- *Thiruvananthapuram Study Profile*

Thiruvananthapuram also has a modal split of 43% constituted by public transport services, 46% by private vehicles and 4% using IPT modes. As per the City Mobility Plan of 2015, 55% of the inter-city trips were found to be daily trips and the remaining 45% were non-regular trips. Majority of inter-city trips, about 40% were made for the purpose of work and the rest for other purposes (NTPRC, 2015). (see Fig. 1).
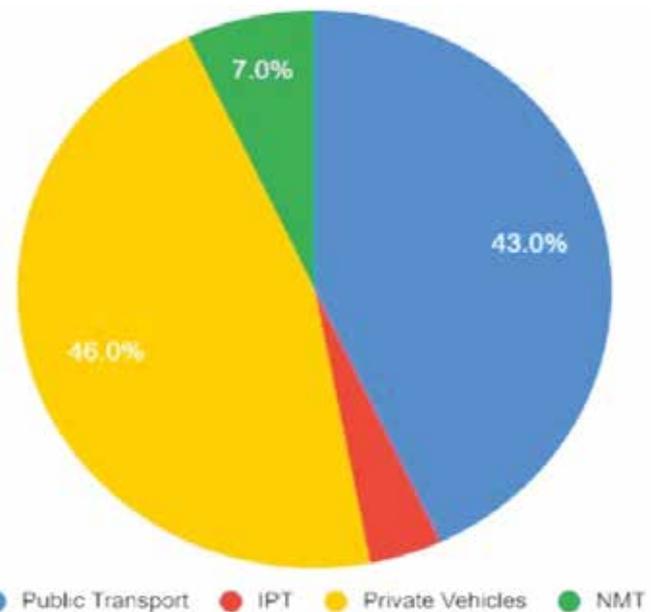
Figure 1: TVM Modal Split
Source: TVM City Mobility Plan 2015

- *Kerala City Circular*

City Circular Service is a mass transit network, introduced by Kerala State Road Transport Corporation (KSRTC) for first time in the capital city of Kerala. The city had the first launch in Thiruvananthapuram and later will be introduced in other major cities like Kozhikode, Kochi etc. This is the first public transportation system in Kerala with BRTS exclusive light model with the concept to promote public transport as a service. Kerala City Circular turned to be award winning city circular transit service in the country (SCTL, 2022).

- *KCC Infrastructure*

Hard infrastructures constitute tangible features of a BRT system which includes the following features in KCC:

- Kerala State Road Transport Corporation has 11 depots in Trivandrum District in and out of the city. Kerala City Circular shares 4 depots with the KSRTC within the city premises as shown in Table 1.

- Kerala City Circular has more than 1000 bus stops with less than ten bus stops having modernized facilities. But the modernized facilities do not accommodate the needs of fleet accessibility like platform level boarding and universal design.

- Kerala City Circular currently has 132 fleets in service which includes smart and enhanced transport infrastructure features with advanced technologies like electric vehicle, CCTV surveillance, stop alarms, etc. (see Fig. 2)
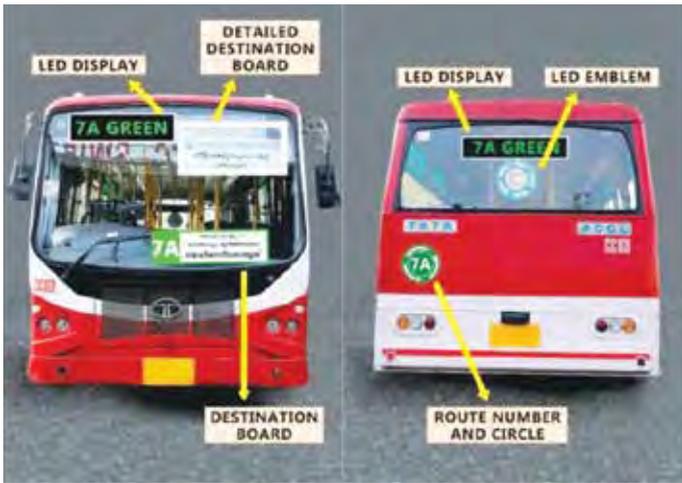
Figure 2: Fleet Infrastructure
Source: Smart City Trivandrum Limited

- Buses have 25 percent of seats reserved for women as per Kerala Motor Vehicle Department Amendment 1989. The reservation of seats for elderly people constitutes 20 percent out of which one half each is provided for both senior citizen gents and senior citizen ladies. There are no reservations for differently abled defined in the bus service but one seat is designed accommodating the needs of the differently abled.

Soft infrastructures constitute non-tangibles of a BRT system which includes the following features in KCC.

- Communicating with passengers about the system is in the development process for the KCC project. Live tracking system and application are under construction and are expected to be included in the phase two of development with the integration of Google Maps for live tracking and an upgraded version Ente Kerala Neo app with both live tracking and real time interface. Phase 1 of Ente Kerala Neo app included only the route details and route mappings.

- Kerala City Circular have Near Field Communication (NFC) cards based on RFID technology provided with a first-time charging offer of Rs. 50 per card free. The maximum recharge limit of KCC NFC cards is Rs 2000, which can be recharged by conductor, depots and recharge points across the city.

- Map designed in the electric circuit model derived from other transportation maps around the world, helps Kerala City Circular daily commuters as well as commuters new to the city to easily access all parts of the city accessible via KCC services. Figure 3 shows the route map of Kerala City Circular.
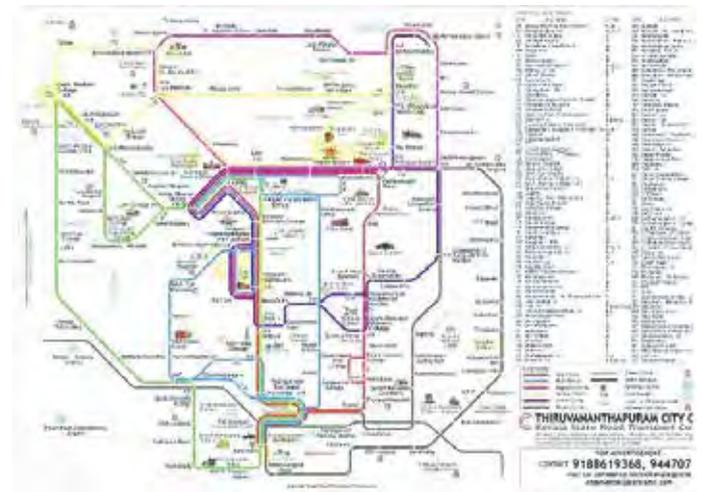
Figure 3: KCC Route Map
Source: Smart City Trivandrum Limited

Table 1: KCC Depots
Source: Smart City Trivandrum Limited

Depot Name	CC Services	P-o-P Services
1. Pappanamcode Depot	-	P01, P07, P08, P10, P13, P14
2. City Depot	2C, 2A, 6C, 6A, 7C, 7A, 8C, 8A, 9C, 9A, 10C, 10A, 11C, 11A, 12C, 12A, 13C, 13A	P05, P12
3. Peroorkada Depot	3C, 3A, 4C, 4A, 5C, 5A	P02, P03, P06, P09, P15, P16, P17
4. Vikas Bhavan Depot	1C, 1A,	P04, P11

- Interchange points are major stops were intersecting two or more circular services where passengers can switch to different routes. There are currently 24 interchange points out of which 23 are identified and listed in Table 8.

Critical infrastructures which are necessary for a BRT system includes the following features in KCC services.

- City Circular services are planned along the main arterial roads connecting the major junctions and nodes with multiple ridership through a single network thus by giving multiple options for daily commuters (SCTL, 2022).

- *KCC Models and Deployment*

Hop On Hop Off (HOHO) is a popular service among the tourists around the world. The HOHO services in India includes Delhi Darshan, HOHO Goa in and around the tourist destinations in the city. But in the case of Kerala City Circular, it is mainly meant for the routine commuters. In the initial phase of KSRTC City Circular service, there are 13 routes provided. These are operated in circular routes at fixed intervals with multiple services in which bus services would be available, in both clockwise and anti-clockwise directions. A passenger can board the bus from a stop which is HOP ON and then can alight at another stop called HOP OFF. This would get repeated until the passenger reaches his/her final destination. Passenger will not be forced to wait at arrival for more than 10 to 30 minutes, depending on the time of travel. In the next phase, eight more circular services will be introduced expanding the City Circular services. The most tangible feature of this transport is that all the city circular services will have a unique colour-based on the respective destinations which helps the passenger in hopping on the right fleet. For example, magenta colour service is based from Peroorkada depot (ibid.).

- *Transit Patterns in KCC*

The current KCC network incorporate circular or loop routes that run around specific areas or depots. These routes may provide local circulation within a particular area or connect multiple activity centres within the city and operates on a trunk-and-feeder network model. High-capacity buses run along major arterials or corridors namely, City Circular acting as the trunk of the system. Feeder buses, namely Point to Point Buses then connect surrounding neighborhoods to the trunk routes, allowing passengers to access the system from various points within the city (ibid.).

- *Service Structure in KCC*

City circular services are designed to connect government offices, business establishments, educational institutions, tourist centers etc., almost all the places within the limits of the Thiruvananthapuram city provides an accessible and inclusive experience to the public commuters' who rely on KSRTC's city bus services for daily commuting. The service provides a convenient and robust solution to the daily public transport commuters, who visit the various offices, shop, markets, etc inside the city on a hop-on hop-off model (see Fig. 4).

Figure 4: City Circular
Source: Smart City Trivandrum Limited

Point to point services are designed to connect the outskirts of the city together, acting as feeder service connected to trunk services i.e., city circular services thus by providing more smooth and convenient transit (see Fig. 5).

Figure 5: Point- to- Point Service
Source: Smart City Trivandrum Limited

City Fast Services are designed to connect to the outskirts of the city like Pothencode, Venjaramoodu, Mannanthala, Nedumangad, etc. This service lacks a proper planning and route mapping and does not take consideration of the fleet ridership capacity (ibid.).

- *Multimodal Integration in KCC*

Since the Kerala City Circular is in its initial stages of deployment, the multimodal integration is not well defined. But the existing services of City Circular incorporates Airport and Railway locations of Thiruvananthapuram. Also, all the current major bus points have access to intermediate public transport services.

- Blue Circle service multi functions as Venad Connect and Jan Shatabdi Connect during train departure and arrival timings to the Trivadrum Central Railway station.

- Air- Rail Circle service starts from East Fort North Bus Stand - Thampanoor Railway Station - East Fort South Bus Stand- Manakkad- Valiyathura- Airport (Domestic)- Airport (International)- Chakka- Petta- Pattur- Kerala University- Thampanoor Railway Station (ibid.).

3. Methodology

3.1 *Research Design*

The research method shall follow a hypothetical system of enquiry, where it is assumed that Kerala City Circular has the potential for scalability based on the service quality contributing to the user experience within the daily commuters. The research adopts a behavioral method of study, using qualitative aspects where social and individual responses are examined through trained observation and interpretation (see Tables 2 and 3).

3.2 *Evaluation Matrix*

Parasuraman, Berry, & Zeithaml (1991a) revealed five dimensions of service quality defining the overall performance of the system which includes reliability, responsiveness, assurance, empathy and tangibility. In another paper titled *Refinement and Reassessment of the SERVQUAL Scale* (1991b), the same authors derived the service quality model from the magnitude and direction of above five dimensions i.e., understanding, service standards, service performance, communications and service quality.

The literature of such a study focuses on bus rapid transit system and passenger centric design approach and is related to accessibility, reliability and responsiveness in the transportation sector.

The evaluation matrix includes different parameters and dimensions of service quality derived through the literature review and used to analyze and quantify the service quality and commuters' user experiences and satisfactions. The SERVQUAL dimensions provides attributes for the problem identification thus by, finding the gaps in each dimension (see Table 4).

4. Data Analysis and Findings

Passenger centric design analysis of Kerala City Circular was done based on the evidence-based physical observation, mappings and online survey.

Table 2: Data Collected
Source: Author

Type of evidence	Research method	Participant observation	Non-participant observation
Contextual Evidence	Service Maps, Commuters' Interviews	YES	YES
Determinative Evidence	Photographs, Route Maps	NO	YES
Recollective Evidence	Key Person Interview	YES	NO
Material Evidence	Evaluation Matrix	YES	YES

Table 3: Detailed Methodology
Source: Author

Objectives	Data Collection	Interpretation/ Method
1. To understand the implementation and current approaches of Kerala City Circular service as an under- defined model of BRT system.	Collection of literature studies to understand the concepts of mass transits and analyzing their different types of transfers.	Interpretation of secondary data collection
2. To compare and analyze how extent has the implementation of Kerala City Circular in Thiruvananthapuram with the other BRT systems in India and the strengths and limitations of Kerala City Circular as an exclusive model of BRT system.	Literature case studies of BRT system and comparative studies to identify the parameters for the service quality.	Interventions from case studies
3. To explore the potentials of Kerala City Circular in providing service quality within the constraints of an undefined exclusive BRTS model.	Primary data regarding commuters and transit systems (frequency, demand, no. of commuters).	Interventions from primary and live case studies and surveys
4. To infer the overall effectiveness and feasibility of Kerala City Circular, potentials for scalability as a successful and well-defined exclusive BRT system and recommendations for an effective passenger centric service system.	To identify gaps and potentials in achieving efficient transfers in the service.	Findings from the above objectives and addressing the gaps.

Table 4: Evaluation Matrix
Source: Author

SERVQUAL Dimensions	Parameters for Problem Identifications
Reliability	• Ticketing and billing services are consistent. • Buses are punctual in terms of departure and arrival. • Safety and security service are reliable. • Queuing time for ticket and waiting time for bus. • Information availability at bus stations and mobile applications.
Responsiveness	• Provide specific time and efficient service. • Communication with staffs is clear and helpful. • Staffs are always willing to serve you. • Involving public in service-related decision makings.
Assurance	• Driver and conductor are consistently courteous and polite with the passenger. • Driver and conductor are knowledgeable. • Bus ridership is concise and assured. • Safety and security information and facilities in the fleets.
Empathy	• Bus fleets give a convenient operating hour as per the suggestions of daily commuters. • Staffs understanding the needs of daily commuters. • Priorities for students, daily commuters, elderly and differently abled.
Tangibility	• Bus stations and physical facilities are comfortable and advanced. • Buses have spacious and comfort seats. • Interior and exterior of bus, facilities, and equipment are clean and hygienic. • Physical condition of the bus is apt for the service. • Potentials for safe and self- dependent commuting environment.

Analysis has been done by identifying whether the various service quality principles and elements are provided in the project or not. The extent and effectiveness of passenger centric design is understood based on analysis of data collected from online survey conducted among daily commuters and also by analyzing Kerala City Circular route maps.

4.1 Reliability

The survey data provides an inconvincible response due to the initial deployment level of Kerala City Circular and also due to media and public negativity on the project (see Fig. 6). Traffic congestion due to the width of the roads at major points marked and listed in Table 5, hinders the smooth and reliable service during peak hours (see Table 5).

Overlapping and unrationalized service planning and fleet- route segregation decreases the reliability factor in KCC. The service schedules during peak and off- peak hours are roughly estimated based on the relevant data provided by the authorities as shown in Table 6 and Table 7.

Service schedules must be based on the other modes of public transport available and also based on the crowd. There should not be any overlapping of services. There are no services in feasible routes- Sreekaryam to Pothenkode; Anayara to Kazhakkoottam; KIMS Hospital- East Fort Bypass roads. These routes have a potential no. of commuters, especially from Techno Park on a daily basis, depending solely on public transports (see Fig. 7).

Figure 6: Survey Data
Source: Author
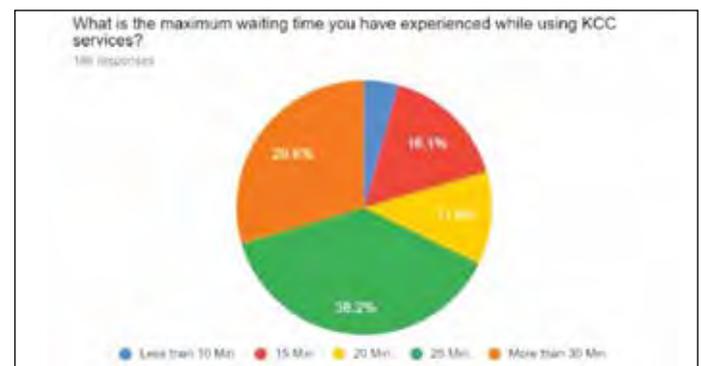
Figure 7: Survey Data
Source: Author

Table 5: Major Traffic Conflicting Points in the City
Source: Author

Karamana	Ulloor Junction	Vazhuthacaud
Killipalam	Sreekaryam	Vellayambalam
Thampanoor	Kazhakoottam	Peroorkada
Overbridge	Bakery Junction	Sasthamangalam
Palayam	Asan Square	Vattiyoorkavu
LMS Junction	Attakulangara	Medical College
PMG	Thiruvallam	Kumarapuram
Pattom	Chakkai	Jagathy Junction
Kesavadasapuram	Venpalavattam	Pottakuzhy

Table 6: Schedule Frequency of Services during Peak Hours
Source: Author

Point	Fleet Frequency in 1 hour
A	C- 7; A- 7; 15 min. Interval – 56 Services
B	C- 4; A- 4; 15 min. Interval – 16 Services
C	C- 5; A- 5; 15 min. Interval – 20 Services
D	C-4; A- 04; 15 min. Interval – 16 Services
E	C- 01; A- 1; 15 min. Interval – 4 Services
F	C- 3; A- 3; 15 min. Interval – 12 Services
G	C- 2; A- 2; 15 min. Interval – 8 Services
H	C- 2; A- 2; 15 min. Interval – 8 Services

Table 7: Schedule Frequency of Services during Off- Peak Hours
Source: Author

Point	Fleet Frequency in 1 Hr.
A	C- 7; A- 7; 30 min. Interval – 28 Services
B	C- 4; A- 4; 30 min. Interval – 8 Services
C	C- 5; A- 5; 30 min. Interval – 10 Services
D	C- 4; A- 4; 30 min. Interval – 8 Services
E	C- 1; A- 1; 30 min. Interval – 2 Services
F	C- 3; A- 3; 30 min. Interval – 6 Services
G	C- 2; A- 2; 30 min. Interval – 4 Services
H	C- 2; A- 2; 30 min. Interval – 4 Services

Kerala City Circular currently lacks operational profitability, due to factors like overlapping of routes, prime time shortages of services, unscientific service operation etc. The road from LMS to East Fort along a six kilometers stretch is a major arterial road having eleven junctions along the road. It is the largest MG road existing in the state of Kerala in terms of its size and traffic levels. MG Road from LMS to East Fort has seven traffic signals. This could possibly lead to delay in services. Also, this route has a significant number of commuters due to colleges and offices along the area.

4.2 Responsiveness
Responsiveness is possible only by the contribution of both provider and user, in this case, the Kerala City Circular and the daily commuters (see Fig. 8).
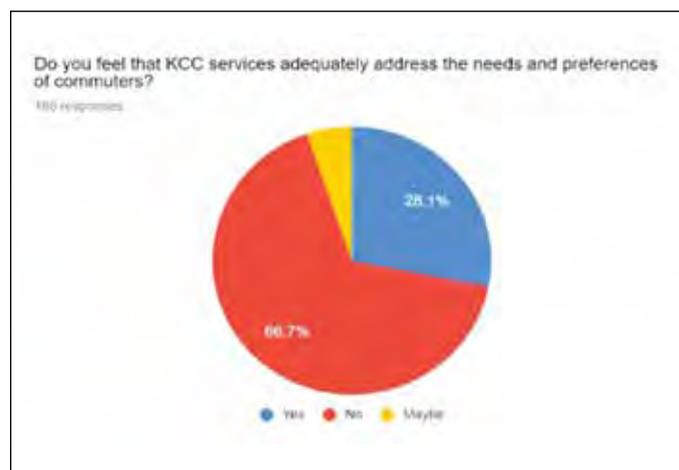
Figure 8: Survey Data
Source: Author

The factors resulting lack of responsiveness from the KCC services is due to its initial level of deployment of the project. This would be improved as the infrastructure, facilities and deployment level gets upgraded. Kerala City Circular has involved the public from its initial route making which ensures that responsiveness may get improved with proper feedback mechanisms.

4.3 *Assurance*

Assurance includes providing a promising and quality service which would assure the commuters' comfortable ridership (see Fig. 9). The survey data shows a negative response on promoting the service to another person. This could only be improved by providing the essential features that could raise and make people rely on the service.
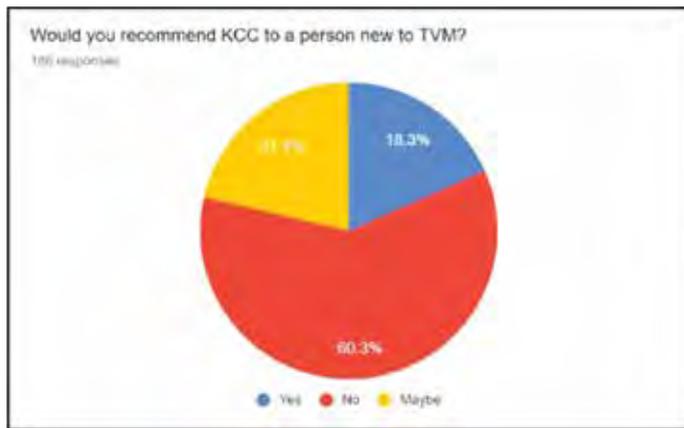
Figure 9: Survey Data
Source: Author

The minimum fare is from Rs. 5 to a maximum fare of Rs. 30 which was initially Rs.10 in all services provided by Kerala City Circular to make the public aware of such an implementation. But a hike in the fare structure without any evidence- based justification and prior notice created dissatisfaction among users (see Fig. 10).
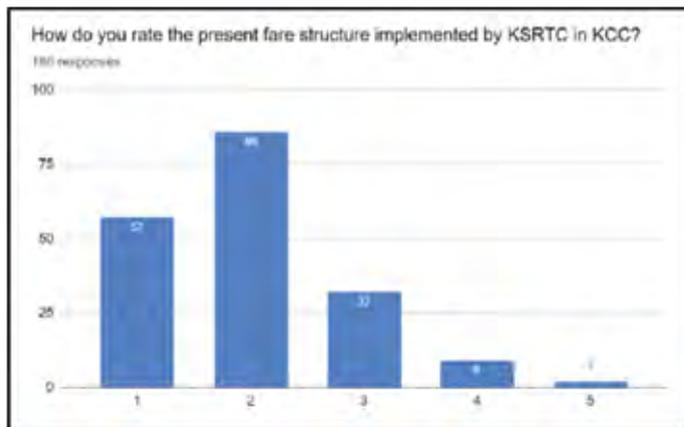
Figure 10: Survey Data
Source: Author

Kerala City Circular also offers two types of ticket structures, Today's ticket of Rs. 30 to access the service from anywhere, and multiple times and have a validity till 12 a.m. of that particular day. The second type, as shown in Figure 5-10, Good Day ticket of Rs. 150 with an inaugural offer of Rs. 50 only, has similar features as that of today's ticket but provides 24 hours of unlimited travel in any city circular buses and both tickets are non-transferable.

4.4 *Empathy*

Empathy involves the passenger centric approach of Kerala City Circular towards all diverse groups, socio-economic groups and differently-abled provisions in the service infrastructure (see Fig. 11).
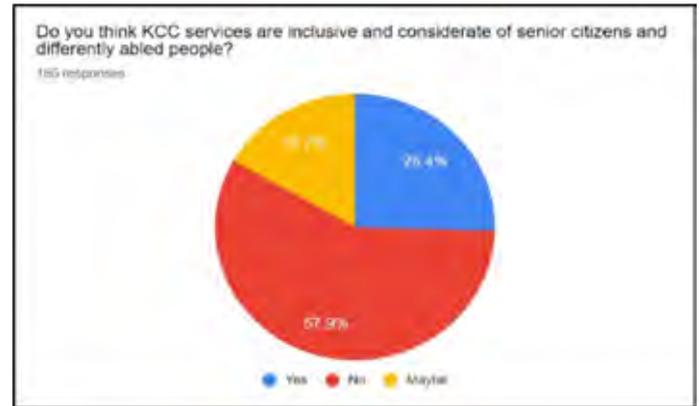
Figure 11: Survey Data
Source: Author

The survey data shows the accessibility design is absent in the service. This is essential and needed as the public transport users in off-peak time includes the majority of senior citizens. There is a seat reserved for differently-abled which is not at all defined or designed for accommodating a differently abled. The access to the bus and provision of ramps or other provisions like platform level boarding, etc. are not considered (see Fig. 12).
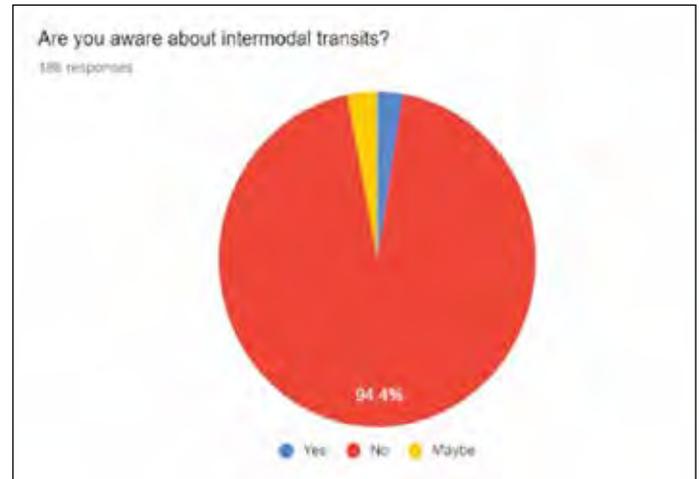
Figure 12: Survey Data
Source: Author

Interchanging points are provided in the Kerala City Circular services. But only 6 persons are aware about it due to no proper details and list of interchanging points among the users. Also, this requires an advanced infrastructure as majorly senior citizens constitute the commuters. The major interchanging points identified from the circular service mapping are shown in Table 8.

4.5 *Tangibles*
This includes the physical infrastructures that contribute to the branding of the service (see Fig. 13).
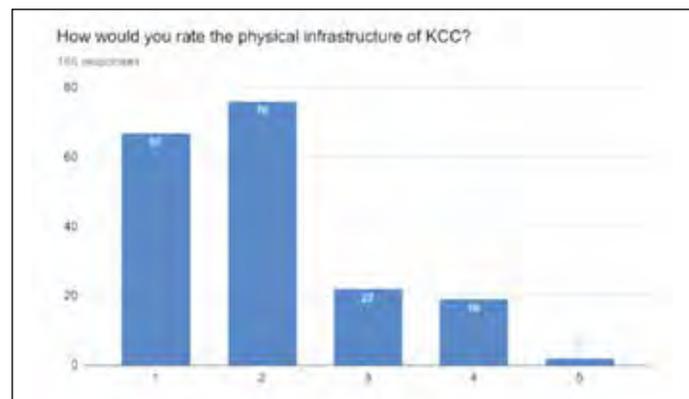
Figure 13: Survey Data
Source: Author

The survey data has low ratings due to the physical infrastructure and fare structure. The service does not have a visible difference in the service types having different fare structures which confuses the commuters. No proper data is available to rely on the service.

Kerala City Circular has poor fleet infrastructure and management. City Fasts in KCC are serviced by SWIFT non- AC EV buses whose ridership capacity is questioned while servicing to the outskirts of the cities like Nedumangad, Pothencode, Attingal, etc. SWIFT non- AC EV buses can run around 200 kilometres in a single charging of ~1.0 to 2.5 hours, i.e., a single charging can run till the last service in the city. A single bus services an average of 12 times while covering an average distance of 15 kilometres in one service, which constitutes to a sum of ~180 kilometres. Upgrading the SWIFT non- AC EV buses as city fasts reduces the ridership capacity and number of services contributed by a single bus fleet. Thus, an effective rationalization of bus services and routes along with segregation of inter- city and intra city services by KSRTC and KCC together can increase the reliability of services (see Table 9).

Table 8: Interchange Points in KCC
Source: Smart City Trivandrum Limited

No	Interchange Points	Circular Service
1	LMS	Red, Blue, Magenta, Yellow, Violet, Green
2	Palayam	Red, Blue, Magenta, Yellow, Violet, Green
3	Museum	Red, Blue, Magenta, Yellow, Violet
4	Ayurveda College	Red, Blue, Magenta, Violet, Green
5	Statue	Red, Blue, Magenta, Violet, Green
6	East Fort	Red, Blue, Brown, Green
7	Thampanoor	Red, Blue, Brown, Green
8	Vellayambalam	Red, Blue, Magenta, Violet
9	PMG	Magenta, Yellow, Green
10	VJT	Red, Blue, Violet
11	Kerala University	Red, Blue, Yellow
12	Peroorkada Depot	Magenta, Yellow, Violet
13	Vazhuthacaud	Red, Blue, Violet
14	Ambalamukku	Magenta, Yellow, Violet
15	Pattam	Magenta, Yellow
16	Sasthamangalam	Brown, Violet
17	Uppidammoodu Bridge	Blue, Green
18	Idapazhanji	Blue, Brown
19	Bakery Junction	Blue, Magenta
20	Kowdiar	Yellow, Violet
21	Govt. Medical College	Yellow, Green
22	Murinjapalam	Yellow, Green
23	Keshavadasapuram	Magenta, Yellow

Table 9: Fleet Types of KCC
Source: Author

Type of Bus	Features
City Circular, City Radial, City Fast	• Non-AC Old RTC Low Floor Buses • SWIFT non- AC EV busesRed Livery with similar signages
Point to Point	• SWIFT non- AC EV Min buses • Effective model for narrow roads
City Ride	• Double decker non-AC SWIFT bus • Special black livery depicting tourism elements

Kerala City Circular has a real time tracking interface on Google Maps and the Ente KSRTC Neo app. The former have only a few routes integrated and the latter have poor app development and interface and are not convenient to use according to the survey conducted (see Fig. 14).
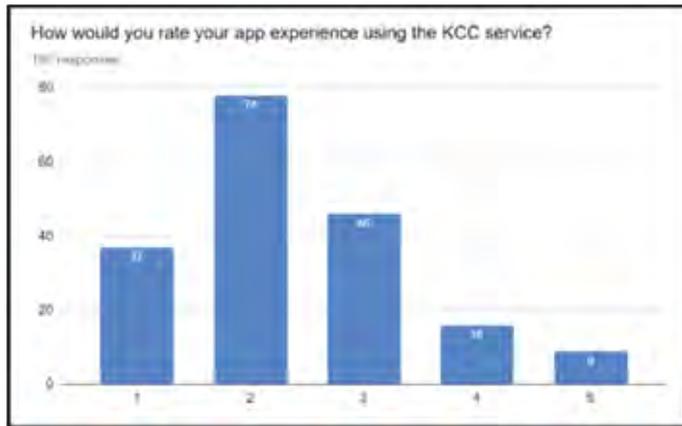
Figure 14: Survey data
Source: Author

The survey data have a low response due to many not aware of such apps available and also since the Kerala City Circular is in the initial development phase, a defined HCI model might be available in the near future of KCC deployment.

5.   Results and Discussion

The gaps identified and to be addressed from the above data collection based on the literature review and parameters are shown in Table 10.

The potentials of scalability of Kerala City Circular for an efficient ridership and service can be achieved through the parameters drawn from the data collection.

5.1 *Administration*

•   Need for a defined administration body for Kerala City Circular like Bengaluru Metropolitan Transport Corporation (BMTC).

Table 10: KCC Service Gaps
Source: Author

SERVQUAL Dimensions	KCC Trivandrum	Gaps Identified
Reliability	• Low • No BPL, BPS, wide roads, etc. • Unbalanced frequency distribution	• Service Performance Service Standards
Responsiveness	• Moderate • Public Participation in route mapping	• Communications
Assurance	• Low • Basic ITS service Unfair fare structure	• Service Quality Service Performance
Empathy	• Low • Under KSRTC • Users take time in accepting new technologies	• Understanding Communications
Tangibles	• Low • Poor, unidentifiable fleets Poor HCI integration	• Service Performance Service Standards Communications

- Proper feedback mechanisms and responsiveness from the service.

- Rationalization of bus routes for each individual depot based on detailed road user surveys.

5.2 *Infrastructure*

- Bus Priority Signals (BPS) to be provided to have smooth transit during peak hours along the traffic conflicting points identified in the primary study.

- A stretch of LMS Palayam- East Fort MG Road could accommodate Bus Priority Lane (BPL) of 3.5m wide along one side, considering the no. of daily commuters and no. of bus stops within a distance six kilometers of the road stretch.

- Fleet infrastructure must be recognizable and different for each service structure for people to understand.

- Addition of new service bus depot near Kazhakkootam as the p depot nearer to the location at Anayara, serves as a bus garage depot of KSRTC Swift with no active KSRTC or KCC services from the depot. KSRTC has a land of ~5.8 acres in Enchakkal and ~2 acres of land in Anayara which could serve the purpose.Platform levels of bus stations/stops must be as that of bus boarding level and ramps and railings to be provided.

- Priority provisions for senior citizens and differently-abled should be defined.

5.3 *Services*

- More services to be provided along the periphery of the city connecting to the trunk services in the city

- Services via Sreekaryam to Pothenkode; Anayara to Kazhakkoottam; KIMS Hospital to East Fort via Bypass Road, etc. to be considered given the no. of daily commuters using public transports are high.

- Hop and Spoke service network to be provided for increased ridership and reduced waiting hours.

- Rationalization of services, i.e., KSRTC as a direct service from the outskirts to the city peripheral, from where the Point- to- Point service acting as feeder connects to the City Circular services as shown in Figure 15.

- Fare structure to be revised with concessions for senior citizens and students.

Figure 15: Proposal for KCC Service
Source: Author

- Monthly or yearly pass with discounts to be provided for daily commuters.

- Awareness of interchangeable services and points through demo videos, drills, billboards at bus stops and brochures.

- IPT services to be integrated with the KCC service ensuring first and last- mile connectivity through pre- paid auto services near the bus stops and service interchanging points.

5.4 *Technology*

- Implementation of Intelligent Transportation System (ITS) to optimize traffic flow and improve service information.

- A complete application with precise information like recommended routes, services to be taken, interchangeable options, real time interface, voice assistance, etc., in multilingual languages to be developed.

- Awareness and adaptation of application technology in the public through FM radios, social media platforms, digital advertisements, billboards, brochures, etc.

6. Conclusions and Recommendations

Kerala City Circular has an immense potential to upgrade as a well- defined exclusive model of Bus Rapid Transit System, enhancing the urban and public mobility within the city. The integration of intelligent transportation systems, efficient transit routes, and user-centric approach in Kerala City Circular can significantly elevate the public transit experience, encouraging increased ridership and

reducing reliance on private vehicles contributing to the reduced carbon footprint and sustainable urban planning approach.

The upgradation and expansion of the Kerala City Circular is a strategic move towards creating a more connected, sustainable, and inclusive urban environment. This could be implemented in all the cities of the state, proving that it has a positive response from the commuters' view, thus reinforcing Kerala's commitment to improving the quality of life for its public transport dependents through innovative and equitable transportation solutions. But the quest for passenger centric design in transportation remains the same over years due to changing views and perceptions of the world.

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RESEARCH PAPER

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Form follows Faith: City of Puri in Odisha, India

By Dr. Arathy Gopal

Abstract

Across the world, many cities have traditionally developed around religious cores. The South Asian cities have many with a temple at its core. Unlike the Cathedral cities of the West, these continue to attract huge numbers of pilgrims. Domestic tourists traveling for religious rituals continue to be the highest contributors to tourist influx in many Indian cities. The urban form of these cities continues to be changed by a social determinant of 'faith'. In India, there are cities which have developed radially from a temple core as well those which had a linear form of development along major streets. In the latter form of urban development, these streets could be either access streets to the core temple or streets known for a religious ritualistic procession. Puri city in Odisha is an example of the latter form of development. The objective of the research was to study the urban form of city of Puri and analyse the changes for effect of 'faith' on Lord Jagannatha (deity of the core temple of Puri) on its urban form. The ritualistic procession of the temple (Rath Yathra) involves movement of the chariots along the Grand Road. The methodology involves analysis of the change in urban form along the Grand Road. The methods involved physical survey, photographic documentation, survey and analysis. The findings suggest significant changes in urban form along the street, over a short period of a year. There is a 'conservation effect' of the religious belief system as more people tend to preserve their property due to their 'faith' in the Lord Jagannatha. The study concludes with a way forward to initiate more research on Temple cities of India, its urban form and change agents. The possibility of integrating technological advancement to have more precise quantitative analysis of urban form is also discussed.

Keywords: Urban form, Sacred urbanism, Temple city, Faith, Culture

1. Introduction

Urban forms in all cities change but historic cities with religious cores most often undergo rapid undesirable changes owing to their ever-increasing influx of religious tourists. Studies focusing on the changes are needed to link knowledge and action for managing this change. In historic- religious cities with cultural tourism potential, where the 'culture' and 'market' co-exist, a major challenge could be how to promote a 'development with identity'- where the benefits of tourism are tapped and the undesirable changes in urban form due to the same are minimised to retain the cultural identity. There are studies that recommend considering the role of territory in spatial planning and strategies operating at multiple scales are often suggested for effective governance (Albrechts, Healey, & Kunzmann, 2003; Vigar, 2009; Walsh, 2014). For formulation of effective strategies for spatial planning and governance in cities undergoing rapid change in urban form, studying the change with emphasis on territoriality is relevant. A study of the change in urban form across multiple scales and exploring the relationship between physical form and its socio-spatial attributes specific to a region is hence relevant.

Urban form is the construction of the city over time (Rossi, 1982) and it changes to adapt to the changing socio-economic conditions (Frey, 1999). Urban forms in all cities change but historic cities with religious

cores most often undergo rapid undesirable changes owing to their ever-increasing influx of religious tourists. Studies focusing on the changes are needed for formulation of strategies for management of the same. It is further restated as Oliveria, et al. (2010) states that studies restate the need for development of relationships between urban form studies and urban planning policies. Hence it is necessary to initiate more research on change in urban form for translation of findings to future urban planning policies.

Previous studies have addressed various fragmented dimensions of change in urban form like - urban sprawl at a metropolitan level (Lata, et al., 2001; Sankhala & Singh, 2014; Kumari & Joshi, 2015), relationship between form and quality of life at a sub- metropolitan level (Bardhan, Kurisu, & Hanaki, 2011) and imageability at a community level (Satish, Kumar, & Jawaid, 2016). However, a holistic assessment with the morphological evolution of the city form and assessment of changes in urban form at a street scale, focusing on the temporal changes in urban form is missing. This paper attempts to address this gap in literature by studying the change in urban form in the Temple city of Puri in Odisha.

1.1 Aim and Objectives

The aim of the research was to study the urban form along streets in the city of Puri and analyse the changes for effect of 'faith' on Lord Jagannatha (deity of the core temple of Puri) on its urban form. The study objective was to study the aspects of urban form visible along streets and to analyse the urban form along Grand Road and arrive at possible effects of 'faith', if any. The aspects of urban form were derived from a systematic review of existing literature on the urban form.

The method of empirical study involved physical survey, photographic documentation, survey and analysis. The data was collected for 2 years - 2018 and 2019. The comparison suggests significant changes in urban form along the street, even over a short period of one year. The findings address the research question of what the changes in urban form along streets in the city of Puri and possible effects of 'faith' on urban form is.

The major ritualistic procession of the core temple (Rath Yathra) involves movement of the chariots along the Grand Road (Figure 1). It attracts lakhs of tourists/pilgrims every year. Hence the scope of the study was delimited to study of urban form along the 2.5km stretch of Grand Road between the Jagannatha temple and Gundicha temple.

Figure 1: Rath Yathra along Grand Road in Puri
Source: Author

2. Literature Review

Urban form has been defined along different perspectives since the 1960s. One of the earliest attempts was by Rose (1967) who defines it as the arrangement of functional units of a city determined by the spatial pattern of land uses. This definition focuses on the spatial pattern and distribution of functions. Most of the Indian cities which have evolved from a temple core had their spatial pattern and distribution of functions determined by the location of the core temple.

There are definitions of urban form stemming from a societal perspective as well. Urban form is defined as that produced by the interaction between space and society (Castells, 1983). In this definition, the relevance of societal aspects in determining urban form is evident. In the case of Indian cities which evolved from a temple core, societal aspects have a significant role in determining the urban form. Bharne and Krusche (2012) describe the importance of temple-related beliefs and religious rituals in determining the urban form in such cities.

A more recent attempt at defining urban form defines it as the morphological attribute of cities at all scales (Williams, Jenks, & Burton, 2000). This definition highlights two concepts - scale and morphology. Studying the city at multiple scales is highly relevant in the context of Temple cities. In these cities, the economic benefits of tourism may be distributed over the whole city but the urban issues may be limited to the temple core. The issues concentrated in the core include congestion, pressure on existing services and urban spaces, social unrest and noise (Williams, Jenks, & Burton, 2000; Barrera-Fernandez, Hernandez-Escampa, & Balbuena Vazquez, 2016). There may also be potentials at the temple core, including better awareness regarding conservation and availability of funds for conservation efforts

(Barrera-Fernandez, Hernandez-Escampa, & Balbuena Vazquez, 2016). Studying at multiple scales is hence quite relevant to the context.

The second concept emphasised in the definition is morphology. It involves the study of historical transformations of urban form. Studies focusing on morphological evolution define it as the analysis of a city's historic evolution and later changes, identifying and studying its various aspects (Moudon, 1997) as mentioned by Ahmed, Hasan, & Maniruzzaman (2014) and Oliveria (2016). The temple plays a major role in the evolution and development of the city in its formative years. The temple could be the foci of an 'unintentional' organic growth (as in the case of city of Puri in Odisha).

Rossi (1982) explains urban form as the architecture of the city and details it as the construction of the city over time. He describes its two underlying ideas as follows. Firstly, the city is a huge man-made object, a product of architecture, that is changing over time. Secondly, the aspects of city form, which he calls 'urban artifacts' are characterised by their history (ibid., p.29). In many historic cities with religious tourism potential, the tourist influx exerts pressure on the urban fabric changing the traditional townscape in favour of transportation infrastructure, commercial development and lodging infrastructure (Maroufi & Rosina, 2017). At present, in Temple cities, these incremental changes may contribute largely to the urban form as perceived by a resident or a tourist.

The definitions suggest five dimensions to be considered in studying urban form – pattern (urban pattern and distribution of functions), society (societal aspects), scale (study at multiple scales), history (morphological evolution during formative years) and time (transformation over time). Since the study objective involved understanding the change in urban form, 'construction of the city over time' as described in Rossi's definition and description of the analysis of morphology and typology was found to be highly relevant.

The study objective calls for more focus on the dimension of transformation over time, However, the other dimensions of urban form cannot be neglected. Segregated views often have the limitation of failing to see the complete picture. Irrespective of the study objective and disciplinary background of the researcher, the urban form of the city is perceived as a whole entity. It is contributed in parts by the multiple dimensions. Hence the morphological evolution of the Temple city through transformative years (history) needs to be considered. However,

additional emphasis needs to be given to the dimension of time (transformation over time) for the study.

3. Methodology

The methods involved physical survey, photographic documentation, survey and analysis. The data was collected for 2 years - 2018 and 2019. The 2.5 km stretch of Grand Road between Jagannatha temple and Gundicha temple was studied. The photographic documentation over the two years was then compared and analysed for changes. The possible causal agents were extracted by survey of residents. The motivation of the tourists to visit the city was also studied by a survey of visitors. The method adopted was adapted from the methods used in the doctoral research of the author on Thanjavur city (2022). Relevant modifications were made to suit the case.

4. Data Analysis and Findings

The city of Puri in Odisha has evolved historically as a Temple city developed with the Jagannatha temple as the core. The city has an area of 16.32 sq.km. and a population of 2,64,930 (Census of India, 2011). The study involves two sections - morphological analysis tries to understand the evolution of form of the city through history; and observation study of the temporal changes in urban form due to tourism. The study and findings are presented in subsequent sections.

4.1 Morphological evolution
The morphological evolution of the city of Puri in Odisha is presented chronologically in subsequent sections.

Till 1100 CE
There is no archaeological evidence referring to the temple of Lord Jagannatha at Puri before the 12th century, but literary sources do reveal that there was an earlier temple of Purusottama worshipped on the seashore (Patnaik, 1994). Sankaracharya is believed to have visited the region in the 9th century CE and declared it as a 'Char Dham'- one of the four major destinations for Hindu pilgrims to attain spiritual salvation. He further established the Gobardhan Matha at a destination close to the seashore. Literary and inscriptional evidence state the presence of a temple much earlier than 12th century (Patnaik, 1994).

1101 - 1200 CE
The present temple was built in 12th century by ruler Anantavarman Chodaganga Deva of Ganga

dynasty and completed by Anangabhima Deva III. According to the ancient texts, the king Indrayumna constructed the initial temple of Lord Jagannatha atop a hillock where a tribal god (of Savara tribe) by the name Nilamadhaba was worshipped. There was a strong influence of Vaisnavism on the royal family by early 12th century CE, overcoming the prevailing cults of Saivism and Buddhism. Thus, the temple of Jagannatha, a manifestation of Vishnu, was constructed (Patnaik, 1994). The temples of Odisha belong to Kalinga style of architecture. Originally, Nilamadhaba was worshipped in a sacred banyan tree which could have possibly resulted in the style of architecture. Purusottama and Jagannath being two names of the same main deity of the temple, the settlement that grew around the temple of God Purusottama came to be known as 'Purusottama Puri'. Shree Jagannath temple which forms the core temple is shown in Figure 2.

Figure 2: Temple of Lord Jagannatha at Puri
Source: Author, 2019

1201 - 1300 CE

In 1230, the then ruler of the region Anangabhima III accepted Lord Jagannatha as the sole deity of the state. Nilamadhaba could have been the earlier name of the deity. Historical sources state that "Nilachala (the abode of Nilamadhaba) was at first a little island within the sea and got connected by large volumes of silt gradually deposited by rivers". The initial temple of Nilamadhaba is believed to have been near to the seashore. When the temple of Lord Jagannatha was constructed at the present location during this period, the urban settlement started evolving around it.

The Atharnala bridge was also constructed at this time, probably as a means for pilgrims from the North to reach the temple. The car festival might have started in 13th century. In a report by Frias

Odoric, published in 1321, it is first mentioned in detail about the Car festival or Rath Yathra at Puri. It is stated that every year, on the day when the idol was made, the localites would take the idol and put it on a fine chariot and the then king and queen and the people jointly draw it forth with loud singing of songs.

There was a river called Saradha also known as Malini or Matiani which dried up later. It existed between the Jagannatha and Gundicha temples, thereby dividing the Grand Road in the present city of Puri. Since there was a river cutting across the present-day Grand Road 6 chariots were used during Rath Yathra. Three chariots stayed on the other side of the river to receive the deities from the three chariots from the temple of Lord Jagannatha. The Jagannatha temple thus forms the starting point of the Rath Yathra. The Rath Yathra ends at the Shree Gundicha temple. The schematic map of evolution till 1300 is shown in Figure 3.

Figure 3: Schematic map of evolution of Puri till 1300 CE
Source: Author

1301 – 1400 CE

Artificial filling of the Saradha channel with sand may have been done in the late 14th century to smoothen the journey of Lord Jagannatha's chariot from the Jagannatha temple to the Gundicha temple, which removed the surface evidence of the river. The initial residential growth occurred radially with temple as the core and 8 residential colonies or sahis (City HRIDAY Plan for Puri, 2016). The settlement was determined by the adjacency to the temple as well as the course of Matiani stream, which was then feeding the temple tanks but dried up later. Sahis were residential colonies, each with 3 parts - temple, its own wrestling areas (jagagharas) and a pond. In this period there were 8 major sahis evolved with the temple of Jagannatha as the central core presented in Figure 4.

Figure 4: Schematic map of evolution of Puri till 1400 CE
Source: Author

1401 – 1500 CE

In 1434, Kapilendra and his son Purushottama overthrew the king of the Ganga dynasty. Purushottama after ascending the throne started the ritual of cleaning the road for chariots during the Rath Yathra, symbolising the ruler as the servant of the Lord. Rath Yathra gained more importance during this period. The temple and the fest attracted pilgrims in large numbers from other states. The settlement growth deviated to the Grand Road along which the Rath Yathra happens. Five sahis evolved predominantly towards Grand Road and Puri Sea beach in addition to the existing ones (see Figure 5).

Figure 5: Schematic map of evolution of Puri after 1400 CE
Source: Author

1501 – 1700 CE

In the battle of Tribeni of 16th century, Orissa came under Mughal rule. There was a road laid known as the road to Swargadwar – literally meaning 'gateway to heaven' leading to a 'sacred' beach with believers bathing in the sea to attain salvation. Pilgrim tax was enforced in Puri around 1665 whereby pilgrims visiting the temple of Jagannatha were expected to pay a stipulated amount and obtain passes to enter the town and perform rituals in the temple . The town entries during this period were through Atharnala bridge and Loknath ghat. Almost 10,000 visitors came annually as pilgrims to Puri. Konark Sun

Temple also attracted considerable tourists during this time. The water body near the Puri Sea beach may be representing the remains of the dried up Sarada river channel.

1701 – 1800 CE

In the 1760s, Jagannath Ghat was built in Calcutta and Jagannath Sadak, a pilgrim route connecting the ghat in Calcutta and temple in Puri, formed in the late 1700s, the location of which is shown in Figure 5. Revenue as pilgrim tax varied a lot, roughly between 35,000 and 70,000 and the expenses of the temple were fully taken care of by the collected amount. The number of tourists must have been between 10,000 and 25,000. In the 18th century, Marathas occupied the provinces.

1801 – 1900 CE

In 1804, British occupied Orissa and divided the state along the river Mahanadhi into two parts and Puri in the Southern part of Orissa was made the capital till 1816. In 1828, Orissa had three divisions - Cuttack, Balasore and Puri. Pilgrim tax was discontinued from 1803 to 1806 but continued after that and collection surged as high as 2 lakh (around 1815). In 1822-26, Puri was connected to Calcutta by Orissa Trunk Road or Old Jagannath Sadak. In 1840, pilgrim tax was abolished. At that time nearly 9 lakh rupees used to be collected annually as pilgrim tax indicating the huge number of tourists.

The 1840-41 map of Puri recorded a town area of 19.72 sq.km. with 23,837 population, 6,620 houses and 7 major streets. In 1866, Orissa famine brought about 2,13,944 deaths in Puri. Puri municipality was formed in 1881 with 13 residential areas. In 1896, railway lines were opened connecting Bhubaneshwar-Khurda and a Khurda-Puri section was added in 1897 and the old Jagannath Sadak fell into disuse.

1901 CE to present

The city of Puri expanded from the earlier recorded population of 23,837 in 1840-41 to 2,64,930 in 2011 (Census of India, 2011). At present the city has an area of 16.32 sq.km. (Census of India, 2011). The boundary of the urban area in comparison to the historical evolution is shown in Figure 6.

4.2 Change in urban form along street

The urban form along street is studied as the changes are visible along four zones. The four zones are schematically shown in Figure 7.

Zone 1

This zone from Jagannatha temple to Marichikote chowk has mostly buildings catering to tourists. The

Figure 6: Comparison of map of historic evolution of Puri and the boundary of the urban area at present
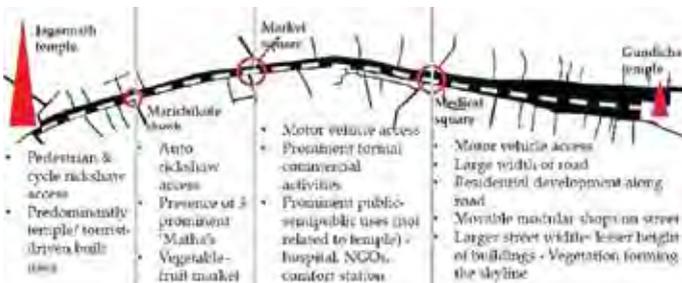*Source: Author, adapted from Google map and City HRIDAY map*

Figure 7: Zones along Grand Road, Puri
Source: Author, adapted from City HRIDAY plan

buildings are put to either religious uses or tourist facilities. There is a relatively fine grain and uniform texture as evident from Figure 8. The temple tower is visible from all points of the street. At the time of Rath Yathra, vehicular access is restrained to facilitate the movement of tourists as pedestrians or in cycle rickshaws only. The change in urban form is observed in this zone is lesser than that in Zone 2 and 3.

Zone 2
This zone from Marichikote chowk to Market square (as seen in Figure 9) has buildings of distinct architectural style. The presence of three prominent mathas including the Chaitanya Gudiya Math forms major landmarks. The street stretch has many

North side of Grand Road

South side of Grand Road

Figure 8: Zone 1: Urban form along street
Source: Author, 2019

buildings of three-storey height. The raised skyline is accompanied by a wide street. Hence the space is not felt as an enclosed narrow street. This zone along with Zone 3 forming a stretch of 1.6 km. from Jagannatha temple shows rapid changes in built form over the years.

Zone 3
This zone from the Market square to the Medical square (as seen in Figure 10) has several commercial buildings. The street stretch has many buildings with uses converted to commercial use. This zone shows rapid changes in built form over years.

Zone 4
This zone from Medical square to Gundicha temple (as seen in Figure 11) has relatively smaller buildings predominantly of residential or commercial use. The street stretch has relatively lesser modifications of buildings to commercial use. The buildings are

North side of Grand Road

South side of Grand Road

Figure 9: Zone 2: Urban form along street
Source: Author, 2019

mostly two-storey heights only. The permanent changes in urban form along street is relatively least in this zone. However, at the time of Rath Yathra, this zone had temporary changes in urban form. At the time of the fest, movable modular shops were put up in these zones. These shops cater predominantly to the tourists. There is also excessive covering of existing buildings with hoardings. The wide road and bus stand is also converted to parking space for the chariots at the time of Rath Yathra.

Along Grand Road, it was found that there were changes in urban form. Relatively, maximum change

North side of Grand Road

South side of Grand Road

Figure 10: Zone 3: Urban form along street
Source: Author, 2019

in urban form is observed in zone 3. The initial stretch of the Grand Road, from Jagannatha temple to Medical square (1.6 km) had the maximum observed changes. The changes were visible even for a period of one year as shown in Figure 12.

North side of Grand Road

South side of Grand Road

Figure 11: Zone 4: Urban form along street
Source: Author, 2019

5.   Results and Discussion
In Puri, the urban space is retained in a way that facilitates the annual fest of Rath Yathra. The Grand Road formed the spine of urban development with the initial stretch till the Medical square (1.6 km) having the earliest evolved traditional settlements. The street is retained as such for the fest and the

Figure 12: Example of changes in urban form from 2018 and 2019
Source: Author

space where the chariots are parked is used as a bus stand. There were changes in urban form along the street, visible even in a period of one year. The maximum change was observed in the initial stretch of the Grand Road from Jagannatha temple to Medical square (1.6 km). The shops were mostly catering to tourists and residents except near traffic nodes. There the shops were found mostly catering to residents (general stores/pharmacy).

The predominant motivation for the visitors to Puri was a desire to see the temple and pray to the deity, both during the time of the fest and at other times of the year. During the time of the fest, majority of the people reported visiting the temple as the only itinerary of the trip. Of the total number of tourists, the majority had visited the temple before. The city offered relatively cheap options for accommodation, food and local travel. Though the Konark Sun Temple, a major cultural tourism destination is adjacent to the city, few visitors to Puri at the time of Rath Yathra reported their plan to visit it.

6.   Conclusions and Recommendations
The aim of the research was to study the urban form along streets in the city of Puri and analyse the changes for effect of 'faith' on Lord Jagannatha on its urban form. The study objectives were to study the aspects of urban form visible along streets and to analyse the urban form along Grand Road and arrive at possible effects of 'faith', if any. The study findings suggest effects of 'faith' as detailed.

The study presents a methodology for quantitative assessment of change in urban form. The morphological analysis helps understand the construction of the city over time. The visible changes in urban form evident in the built form along the street restate Lynch's ideas of the perception of urban space being fragmentary. Though Rossi had suggested morphological and typological analysis for the study of temporal change in the urban form aspects, there were limited studies employing the same for quantitative assessment of change at multiple scales. As stated by Moudon (1997), urban form could be understood through transformation of three fundamental physical elements - buildings, plots and streets. As there was a lack of available data

regarding change in plots and streets across time, the scope of the study was limited to transformation of buildings alone.

The findings of this study suggest significant changes in urban form along the street, over a short period of a year. There is a 'conservation effect' of the religious belief system as more people tend to preserve their property due to their 'faith' in the Lord Jagannatha. There is need to initiate more research on Temple cities of India, its urban form and change agents. There is also a possibility of integrating technological advancement like drone recording and automatic map generation using Photogrammetry techniques or GIS, to have more precise quantitative analysis of urban form. The method demonstrated in this paper could be useful for similar studies involving analysis of change in urban form. However, in other cities, the results need to be supplemented with indicators specific to the context, since urban form is also dependent on many socio-cultural aspects.

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Taking From Architecture
Developing a Pedagogy for Interior Design History

By Ar. Sanjana Samel-Ambekar

Abstract

Interior design history has always been a faint shadow of architectural history. There needs to be a realm where histories can be focused on interior spaces. In this scenario, architecture takes a back seat, coming to aid only when required. Interior histories tend to show subtle shifts in cultures and traditions. Hence, it should evolve beyond design elements and delve into the meaning and human relationships forged by spaces. As the title suggests, the study develops a pedagogy to examine Interior history by understanding the relation of space and elements with individuals in relation to physical character, surrounding environment, social relations and culture. This study moves from the quantitative nature of interior histories and delves into qualitative factors that lend a narrative nature to spaces. The research states a framework in terms of "Interpretations" to conduct inquiries into the Interior Histories. A co-relational analysis is then obtained through it to infer cultural directives and identify underlying contextual systems.

Keywords: Interior history, interior history pedagogy, spatial narratives, space making components, cultural directive, interiority

1. Interiority - An Adaptation of Identity

From the beginning, humans have tried to discover their surroundings and innovated using it to their advantage. First came the tools 2.5 million years ago to sustain human need to hunt for food. With the tools, they began building shelters to sustain climatic changes and protect themselves. Thus, structures came into being.

Consider any structure. Perceive it to be broken down into various components, called 'Space Making Elements'. For example, columns, ceilings, walls, floors, etc. forming not only its architectural but interior features. Physically, an interior space is the sense of being bound by these space-making elements. The spatial experience designed with and from within these elements, is referred to as Interior Design. The representations on these elements also become important. This may include materials and further relates to objects present in its interiority bringing diversity in its conception and essence. Interiority, as defined in realms of philosophy, speaks about an individual's own inner nature or musings. The same applies to an interior space. They form an integral part of shaping lifestyles. Interiors make the space a tool for communication and become a social unit, a space where all the activities take place. The function of interior spaces becomes much more than a utilitarian concept. Bachelard (2014) speaks about how initially simple objects with planes and right angles 'welcome' human complexity and adapt to its inhabitants. When delved deeper, interiors relate to reflections of personal identities within the realm of community. Traditions, culture and religion are embedded in their conception and stories are weaved through the materials, workmanship, aesthetics as well as ornamentation. For example, the importance of rice crop for the paddy cultivators on the outskirts of Puri, a temple town on the south-eastern coast of India. It (rice) is embedded into the built culture. Dried rice straw is used for the roofing and paste from the rice grain powder mixed with water is used to paint the walls of their dwellings. The themes depict a fruitful harvesting of the paddy

fields (Schaewen & Sethi, 2009). All the interiors, even when executed in the same style, design and make will differ subtly in its characteristics due to the user or inhabitant. Change in culture, familial traditions and experiences bring about the diversity in interior spaces. On a deeper level, creation of interior spaces also addresses the issues of diversity and inclusion. Spaces, elements and objects are designed in the interior with inclusion and sometimes, deliberate omission. For example, spaces catering to a particular gender while barring others.

The concept of 'Interior History' is considerably a new subject, just as the realm of Interior Design as an individual field itself. As a result, interior histories have been explained as a mere paragraph in the book of architectural history. However, in the intervening years, it has evolved from being merely an architectural accessory to a comprehensive design principle that provides the fundamental framework necessary for a human to function comfortably in any kind of structure. This concept has been explored by a few historians. One of the attempts has been made by John F. Pile and Judith Gura in 'A History of Interior Design' giving a quantitative exploration of personal and public spaces, also involving 'objects and artefacts' such as furniture, lighting, textiles and sometimes art (Pile, Gura, & Plunkett, 2023).

It is a fact that interior space cannot exist without the shell and it now becomes very important to analyse the same shell inside out. One can often argue that the space making components spoken about in the paper are formed under the architectural purview. However, where the form of some of these space making elements (like columns) would come under architecture, the quality of space formed and the treatment given to the elements to form a relationship with other objects (say furniture) or their inhabitants comes to be in the realm of an interior history study.

When interior histories are studied from the point of view of 'Interiority' they can make volumes. They can lead to the factors that lend a narrative nature to spaces as well as objects within the space. The narratives act as directives to form that interior space, an interior design history that analyses the materials, techniques and design evolution. Histories that are an exploration of interior spaces from the perspective of its inhabitants representing evolving personal ideas must present particular emphasis on these factors. Conjunction between narratives lead to emergence in interesting angles to interior history or as Attiwill coins 'inter-story' (Attiwill, 2010), an interior history that delves into the meaning and human relationships forged by spaces. A closer look

into the semiotics of space created within a built form can lead to the following questions - Why were the interiors of a room designed in a specific manner? It could lead to close that point to the social, economic and political realities and forces that have had a major impact on interior environments. The planned interiors exert their influence on the activities and lives that they witness leading to the formation of the 'Idea of a Room'.

2. Methodology

Presently, the studies that offer an exhaustive look into interior histories are not comprehensively connected to the theories that have emerged in Interior History. The studies presenting a quantitative data lack the answers to 'why?' of a built space. This inquiry offers a framework to connect the two studies as well as examine narratives that might answer the question as to why an interior space was designed in a certain way. The foremost aim of the research is to articulate a pedagogy to study interior histories that connect the quantitative aspect of a space to the qualitative aspect. The objective is to inquire about the purview of interior design history. The intent is to analyse the questions that an Interior History Course should answer. Finally, the objective is to evaluate where interior and architectural histories diverge.

The first step towards an interpretation of Interior History is to differentiate between Interior and Architectural Histories. It becomes important to ascertain a tangible boundary between the two realms. Next, it creates a start point for the study of interior history. Furthermore, the research gives a perspective of how to look at an interior history. Attaining the start point through differentiation, a path to Interior History needs to be charted, to understand the challenges and limitations the study could present. For example, the building elements that are usually understood from the outside in could be looked at inside to outside. The roof rather be seen as a ceiling that has attributes. Following a shift in perspective, a framework has been laid in terms of 'Interpretations'. This answers the 'what?', 'why?' and the 'how is it different'. Literature study conducted shows a quantitative list of interior projects answering the 'what', however, evading the equally important latter questions. The framework follows a dissection of this quantitative data according to the functional aspects of that element allowing a smoother, concise and definitive understanding of the matter. These elements then can be questioned individually or at a macro level. The research goes on to applying the framework to case studies, in this case a Haveli. Haveli was chosen as subject

matter as it speaks about not only the Patron, but the Maker. Within the context of Haveli, there are cultural and social markers observed (example, the door in a Haveli). An underlying issue is brought to the forefront with the use of an interior element (issue of 'purdah' through the jali). Overall, while the case study shows an evident spatial differentiation between the inside and outside, both have common elements of design, such as the jharokha and the jali. Therefore, a perspective can be laid out to how to study an interior space. Lastly, layers can be observed in its creation – beliefs as a community as well as individuals.

The primary sources of data collection have been a quantitative literary data, such as John F. Pile and Judith Gura's book A History of Interior Design, from which examples have been observed and analysed in various lecture seminars. The quantitative data has been elemental to understand the tangible aspects of a built space. Other literary sources have been articles that suggest theories in Interior Design, for example, Atiwill's theory of 'Inter-story' or Lonescu's theory of 'Interiority.' These sources have been instrumental in devising the framework and its application to the documented study of Patwa Haveli.

3. Differentiation between Interior and Architectural History

Architectural and Interior histories can be differentiated at both tangible and intangible levels. In tangible terms, the physical surface that divides the external surroundings to the internal environment becomes the boundary. This boundary can perhaps have a similar language in its conception or completely different. In intangible terms, the relationship of the individual or group of individuals for whom a space has been designed becomes the envisioned boundary between a building's interior and architecture.

Studying influences on the architecture and interiors are necessary. Architecture is influenced by a larger canopy of political and social forces along with climatic response. The aesthetic lent to its form and structure is a culmination of the masses and rests on the social and physical environment of the time and place. For example, the consensus that led to the 'International Style' crystallising modernism in architecture devoid of any extraneous ornamentation and consisting of geometric forms. The ethos emphasised the use of new techniques and materials without reference to a socio-political atmosphere or religious views. An opposition to the mediaeval precedents (which were based heavily around social, religious and political environments) and in acceptance of the industrialisation (Machine Age) taking place across Europe in the 19th century.

On the other hand, Interior History is influenced at a personal level, the traditions and culture followed by the people who occupied the space. Their beliefs become inherent in the space that is seen from the inside. For instance, the belief of 'life after death' held by the Egyptians is realised in the interiors of tombs created. The interior elements of the space (such as walls and ceilings) are adorned with all the personal possessions a person might need in daily life, such as food, furniture, etc. Apart from this, prayers to Osiris (Egyptian God of necropolis) are inscribed along with his painting, for a fulfilled afterlife. Furthermore, forms of guardian dogs, Anubis, are painted at the entranceway to guard the person buried inside. Jambs of the interior openings of the burial chamber exhibit prayers to gods seeking their company and an ascent to heaven (Lythgoe, 1923), an indication of interiors as a tool for communication, representation and expression.

In the function of ornament, Farshid Moussavi (Moussavi & Kubo, 2008) explains that any built form needs a mechanism for it to become connected to culture. The purview of Interior History could be seen in layers that become the said mechanisms. The first layer concerning the inhabitants of the space, their narratives, needs, wants, etc. The second layer involves the beliefs of a community or a more local level. The third layer comprises the larger perspective subset of the architectural history such as the context, political and social scenario, etc. Fourth and the most important layer looks into the meanings of inclusion and disparity in designed spaces. Engaging the viewer in an interior space actively contributes to the architectural experience as well.

4. Interior History: Challenges and Clues

The four layers lend an observational quality to writing the history of interiors. When they are combined, interior history presents a complex web where all the threads are interconnected. From structurally integrated elements to soft furnishings, elements that fall in the purview of interior design have a larger repository. As Ansley, Kirkham and Sparke write in their introduction to Issues in Interior Design History - "recent approaches to interior have stressed that it is both a composite and complex space, which requires a range of historical methods to interpret its full meaning" (Anysley, Kirkham, & Sparke, Fall-Winter 2008-2009).

Personal histories intertwine when an interior space is created. Objects or elements in the interior can become a reflection of a kind of life led or personal taste. The space and objects articulate a realm of nostalgia. Interactions between space -

object - body - beliefs obtains a relationship. Every individual residing or using a space establishes their own separate connections with them, just as they establish connections with other inhabitants. More the users, more the connections.

Beliefs at the community level are also mirrored in how an interior space is built. For example, the frescoes made in Shekhawati havelis (in Rajasthan) in the northwestern region of India, offer a glimpse into the faith of the occupants. These havelis were homes to the wealthy merchants of India. The frescoes were a sign of opulence. Most of the frescoes were painted with the stories from the Hindu mythology and religion with Krishna being particularly popular. The frescoes began to feature European women and men, post the beginning of the British rule in India. They now showed the changing allegiance as a community. The arrival of machines yet again changed the subject of the paintings. They began to feature telephones, trains and even hot air balloons. The symbolism in the same motifs vary from the perspective of a user or patron, a maker and a designer. Different meanings can be interpreted from all perspectives. For example, the use of 'Jali' in the openings of a haveli. The jali, designed by the architect or designer, was used to combat the hot air in dry weather from coming in. The craftspeople associated with the making used only geometrical shapes in it as most of the stone craftspeople employed hailed from the region of Persia and followed Islamic religion. Interior history further gives an overview into the social scenario, ideas of passing and covering. From the perspective of the users, the jali was used as a 'purdah' for women of the family, a veil that did not allow the visitors from viewing women. In a country such as India, interior spaces are of a vernacular nature. It changes from region to region. A change is also noticed between the rural and urban environment.

An interior space is temporal in nature (unless in a preserved heritage building), hence, they are often temporary and secondary additions. Furthermore, they are easily transferable and adaptable (Ionescu, 2018). It can vary with the change in occupants or even generations. The more the number of users, the more and varied the narratives. For example, the Reichstag building in Berlin. In the pre-world-war two era, it housed the Imperial Diet. Adorned in Neo-Baroque sculptures, reliefs and inscriptions (Douglass - Jaimes, 2015), it told the story of the German imperialist rulers. After World War II, the interiors of the Reichstag building showed scars in the hateful graffiti by soldiers of the Red Army takeover during World War II (Carter, 2017). Post

unification of Germany and restoration efforts with the addition of a glass dome and ramp, the spaces stand for equality and transparency. The idea of transparency is evident as the majority of the interior uses glass as a partition material dividing the spaces. The workings and debates of the parliament are made visible to the public. The ramp above the parliament also allows the public to symbolically be above the government. The final layer comprises the larger perspective; subset of architectural history such as the context and political atmosphere.

5. Interpretation Of Interior Histories

With the evolution of built environments, people have tried to express their innate ideas. Interior design has unknowingly come into the picture since the prehistoric times when people started painting the surfaces of caves with their experiences, making the field of interior design vast. It is therefore necessary that the volumetric data available be classified and streamlined. For a broader classification, interior histories can be interpreted according to their Quantitative and Qualitative aspects. Quantitative aspects of an interior space are visual in nature and give clues of overall evolving styles in interior design. These styles develop and differ according to location, beliefs, traditions, religion, etc. Decoding quantitative features leads to Qualitative interpretations, which are narrative in nature. They are the unique characteristics found in an interior space under the larger umbrella of interior design styles. Qualitative and Quantitative interpretations are more often than not interdependent.

Pile, et al. specify in 'A History of Design', interior does not exist in isolation, but within some kind of a shell (Pile, Gura, & Plunkett, 2023). It is formed by spatial components such as walls, columns, roof, etc. Within the spatial constraints that make up the interiors, objects and artefacts such as furniture, lighting, textiles, etc. are placed. Together these two features lend various styles to the interiors. They differ widely according to their geographical locations and architectural and design practices.

Quantitative aspect is visual in its interpretative nature, and thus, can be further divided into: a. Spatial Interpretation and b. Object-related interpretation. Spatial interpretations study the built experiences created by space-making elements. This history tends to overlap with architectural history. It strictly observes the space making elements such as arches, columns, brackets, walls, etc. that tend to be bound to the structure. Spatial interpretation studies structural components of buildings from the inside out. Through exploration of these space making

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elements, there is a conscious effort to observe the narratives they create and narratives that govern their ornamentation. The 'formation' aspects of these elements depend upon the structural constraints, material availability, local climate and hence, fall under the realm of architectural history. However, the quality of interior space, its use, elements, surface treatments as well as the motifs fall under the realm of interior history. Space making elements can be classified into the following: Framework, Floor, Ceiling, Wall, Screen and Aperture. Each of these elements need to be studied: How do they affect the space created inside? How do they lead to origin stories about the occupants, designer and maker? The treatment given to the elements speaks about the workability of materials used as well. The design of these elements speak about the patron, user, designer and maker. The buildings built by the British in India beginning their rule illustrate the same. The interiors of Victoria Terminus, Mumbai (now known as Chhatrapati Shivaji Terminus) showcases a blend of Gothic Revival with motifs of local species such as elephants and Asiatic lions engraved into the surfaces and ceilings. The mix emphasised the arrival of the British architects and designers in India and their collaboration with Indian craftspeople.

The second part looks at the objects that could be called to some extent 'of purely interior purpose' and coined as Object - Relational History. It includes the history of furniture, tapestry, textiles and other objects, adding to the experience of that space, however, not structurally bound to it. As Ionescu puts it, "Adorning and integrating objects within its structure affects its spatial experience" (Ionescu, 2018). They have a design and constructive concept of their own that have led to movements in design and culture. One of the most well-known examples one could say is the Chair No. 14 or the Bistro Chair, designed by Michael Thonet that was synonymous to the evolving Café Culture in Europe at the time. Moreover, the first piece of furniture to be disassembled into parts and able to be transported with ease, a precursor to principles of furniture based on 'do-it-yourself' assembly, it also became the quintessential example of bentwood furniture (Albus, Mehlhose, & Wellner, 2009).

The chronological sequence while interpreting could be deliberately relinquished in favour of imparting important design ideologies from history. Hence, importance is given to typologies rather than chronologies. Furthermore, selective examples from each typology could be taken. Detailed interpretations can lead to personal contexts and concepts that form the qualitative aspect of interior design history.

Ionescu in 'The interior as Interiority' argues that interior design is more than a spatial arrangement or a collection of objects. Interior is a moment when a building receives its cultural significance (Ionescu, 2018). It is through interior design that users show their thoughts, involving their gender roles and differences. A Qualitative interpretation observes these nuances, in succession, exploring the interpersonal nature of space. When further subdivided, qualitative interpretations can be studied as Contextual narratives and Cultural directives.

Approaches point to cultural directives that narrate the design of spaces, surfaces and objects. They become the factors that establish the concepts of vernacular Interior Design. A distinctiveness between culture and traditions brings about a distinctiveness in character in an interior space. Cultural directives that give a unique character to elements and become part of a personal history give clues in the mindset of individuals who have occupied the space, the craftspeople involved in its making and the community which surrounds these individuals. Human associations are built upon these cultural directives. They reveal an entire system of behaviour called Contextual systems, a system of behaviour that is unexplored, unexamined and very much taken for granted. Behavioural patterns that have been accepted as norms in and by the society without further questioning further give a view into the underlying issues of diversity, inclusion, discrimination, inequality and a peak into territoriality. Formal patterning of space can be linked to contextual systems that give clues about institutions and their structure.

Collated, the four aspects of interior history learning as shown in Table 1 answer the questions of how and why different parts have come together to form a whole - aspects such as spatial organisation, the structure and formation of different spaces, the quality of light, etc. Linearity of history should be forgone in favour of understanding the underlying directives and systems. The correlation between elements is further systematically found. Examples are chosen and studied with respect to elements present, with the understanding of styles evolving thereof.

The following section 'Haveli' takes the example of a haveli (mansion belonging to noblemen) and illustrates the four interpretations of interior history mentioned above.

6. Understanding Interpretations through Example of Haveli

Situated within the old fortified citadels of Rajasthan,

Havelis, as shown in Figure 1, were the townhouses belonging to the rich noblemen and merchants, each conveying a narrative about their owners, family traditions and relations amongst the members of the household as well as with the community. Figure 2 and Fig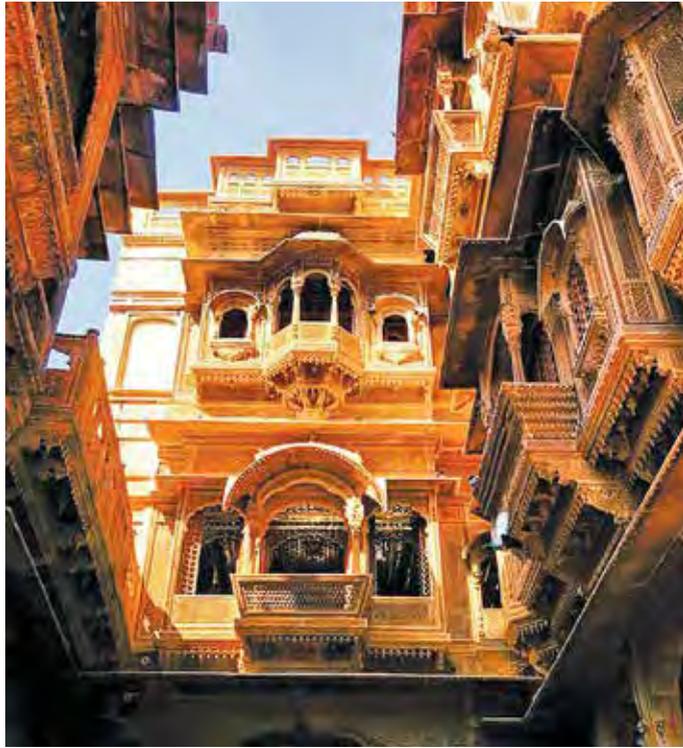ure 3 show the layout and section of a typical haveli. The way of living - its interior spatial organisation and their significance reflect the eclectic mix of Rajput and Mughal manifestation (Jain, 2004, p.10).

Figure 1: Haveli
Source: Author

Figure 2: Plan of a typical Haveli
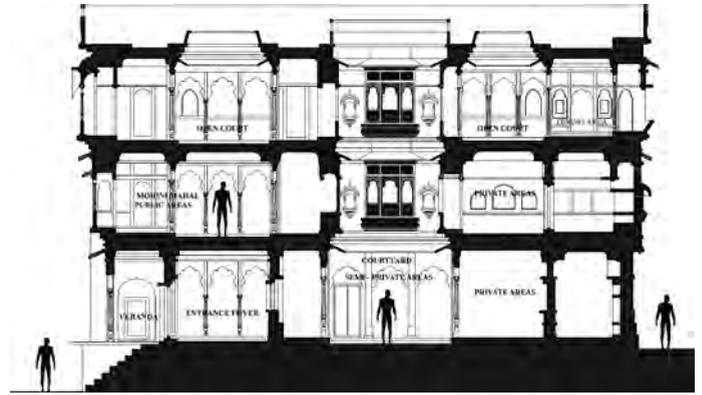*Source: Author*

Figure 3: Section of a typical Haveli
Source: Author

When the Haveli is evaluated according to the method of Interpretations, the spatial elements identified in the shell are as follows: jharokha (viewing gallery), wooden doors, wooden and mirrored ceiling, painted and mirror-work walls, jalis (partitions), formwork made of stone columns, brackets and beams. Object related furniture elements observed are chaukis (low seatings), chairs, sofa, beds and storages. Other objects include tapestry.

A rendition of the viewing gallery called the *jharokha* was placed on the external walls overlooking the main street and inner courtyards, where festivities of the family took place. These viewing galleries were intricately carved in stone. Placed at a height as shown in the elevation in Figure 4, they were seen from streets as well as surrounding buildings.
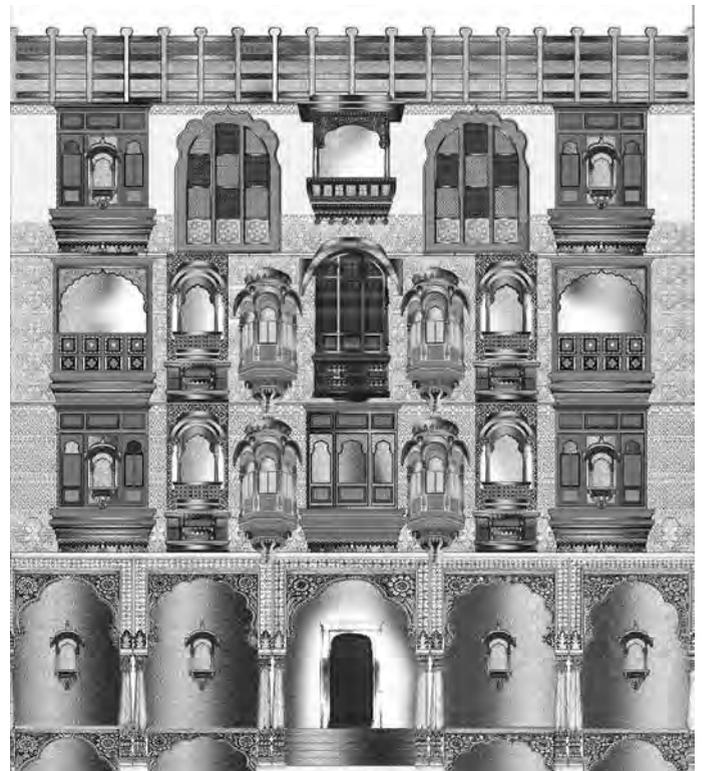
Figure 4: Elevation of a typical Haveli
Source: Author

They acted as a symbol of the family's wealth to the outsider and people coming to the house. The more intricately carved *jharokhas*, the wealthier the family. The motifs and patterns generally used in the viewing gallery were in a geometric pattern, which pointed to an Islamic craftsmanship, as no human figures were used. Entry to the haveli was through the intricately carved wooden door. The door, along with providing an entry, acted as an information board of the events taking place inside the haveli. Rituals related to festivals, birth of a son, marriage of a daughter or any other occasion considered auspicious were expressed symbolically on the entrance. The top of the entrance was reserved for the 'Kuldevi' (deity of a clan), thus informing outsiders of the caste of the family. The proportions, larger in its width as compared to its height, forced the visitors to bend and show respect to the homeowner. The heavily carved wooden door also gave a hint to the grandeur that awaited in the interiors of spaces. Geometric patterns suggested an Islamic influence. Extensively carved wooden ceilings were constructed in all the public rooms. Wood is not local to the desert area of Rajasthan, hence its use in ceilings in the interior was used as a showcase of wealth for the people visiting the haveli.

The entrance foyer (Figure 5) was traditionally used as a reception area for men to welcome visitors. The interior walls were adorned with mirror work and painted walls and friezes. Mirror-work on the walls was a smaller copy of the King's stateroom, pointing to the high status in the community. At the entrance of the foyer would be a peacock, a symbol of beauty and prosperity in India as shown in Figure 6. The peacock would have its feathers in full spread. The peacock also stood for a prayer for male birth,
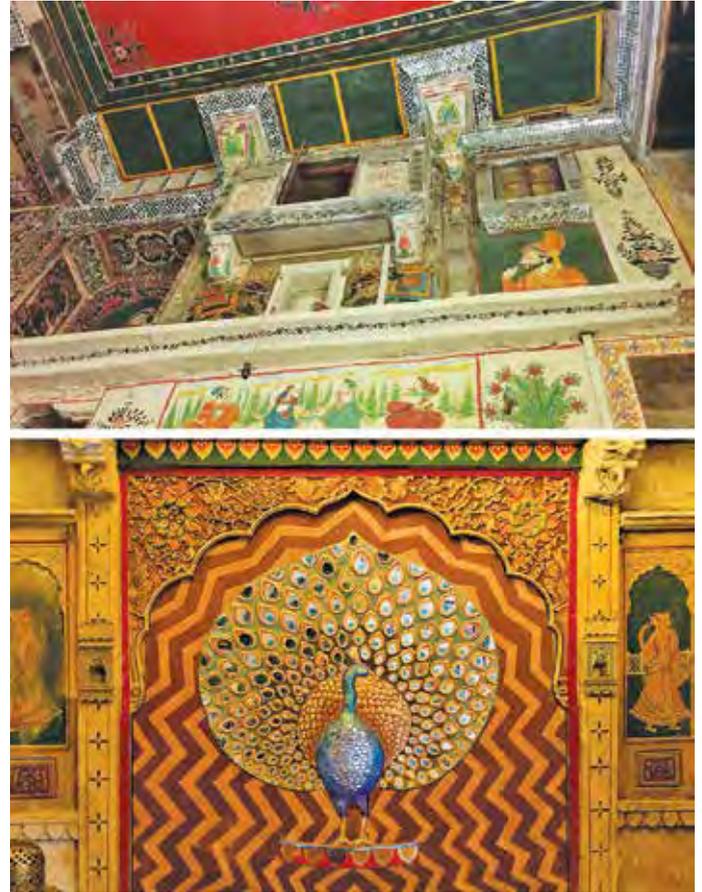
Figure 6: Elements of a Haveli – 02
Source: Author

an heir to the family business and wealth. Peacocks were also associated with royalty with its beauty and majestic grace. The expression of rebirth takes after the male bird dancing for the sake of female mate during courting, a remembrance of celebration of life. The idea of wealth and prosperity of the peacock is also associated with Goddess Lakshmi - the Hindu Goddess of wealth. Often elephants were also painted on the walls and considered a symbol of good luck and good fortune. Associated with the elephant headed Hindu God - Ganesha, they symbolised divinity and benevolence. They also symbolise wisdom, loyalty, strength, fidelity and longevity. Furthermore, elephants were how the elite travelled. To depict oneself on an elephant was a sign of power. Portraits of owners, scenes from the court, personal participation in local festivals and personal festivities such as wedding day processions would be painted to commemorate important days

Figure 5: Elements of a Haveli – 01
Source: Author

Table 1: Interpretations of Interior History - Flowchart
Source: Author

INTERIOR SPACES						
QUANTITATIVE INTERPRETATIONS	SPATIAL		Evolving Styles in Interior Design	QUALITATIVE INTERPRETATIONS	CONTEXTUAL NARRATIVES	Narrative behind the design of spaces, surfaces, and objects.
		Framework				Unique character to elements
		Floor				
		Ceiling				Part of personal history
		Wall				
		Screen			CULTURAL DIRECTIVES	Mindset of the individuals of designers, patrons, users and makers.
		Aperture				
	OBJECT RELATED					
		Furniture				Societal norms
		Tapestry				
		Textiles				
		Paintings				

and people of the family. They gave an insight into the lives of the previous generations to the next. The walls were sometimes also adorned by paintings of excerpts from the Hindu mythology and God figures, talking about the religious faith of the residents. Everyday lifestyle was also depicted in the paintings such as - women drawing water from the well, man enjoying leisure time, etc. Since, paintings and sculptures of human figures were not allowed in the Islamic faith, it also proves that Hindu painters also worked on the paintings.

Jali or screens were used as part of the windows. At some places they also form partitions. They were made mainly for two reasons. The first reason being from the point of view of the designer, to cut off the harsh sunlight during the day. The second from the point of view of the residents, to provide a screen that would allow the women of the household to see into the outer world, however forbidding the outside world to view the women of the household. The women were considered as the honour of the household. They were forbidden to go out into the world. It was considered an utmost disgrace to the family if the faces of the women of the family were seen by strangers. The brackets on the column providing support for the wall would be carved as the head and trunk of the elephants or lions, considered a symbol of power. The capitals of the columns were carved in floral patterns, sometimes with a banana flower. As banana flower is used in the Hindu religious ceremonies, it was considered as auspicious.

Storage chests, brought from the maternal home, were important for the women of the house; passed from generation to generation from mother to daughter during the wedding. Enclosures were created with the use of the tapestry. Often erected in the courtyards, these enclosures were used to accommodate the visitors during celebrations

(Thakkar & Shah, 2009). The richness of the fabric indicated the social status of the family, as these textiles were not made locally but imported from eastern countries such as Persia.

The interior of most of the havelis are planned in an introverted built form overlooking the central courtyard. The built form emphasised lack of visibility of the inside. The privacy of the houses was protected by high walls with hardly any opening on the outer side. Usually divided into two quarters, the 'Mardana' spaces were placed towards the outer side of the haveli and 'Zenana' to the interior parts. Mardana spaces were made exclusively for the men of the family and their male guests. Women of the household were not allowed to enter these spaces. The other quarters, 'Zenana' spaces situated towards the interior of the haveli, were made for the women of the family and female domestic help. Men who were not a part of the family were not allowed to enter zenana spaces. The central courtyard was a space for common celebrations and merriment. When the men occupied the courtyard, women were not allowed to come out into the open. Additions of physical medium such as the jali enforced the 'purdah' system - minimising the inclusion of women in festivities. The walls of the zenana spaces represented the limits of the woman's world. Her sole duty was to take care of the household, her husband's needs and also produce heirs to the family business. Women's access to common zenana spaces was prohibited at the time of menstruation. Birth of the son was considered to be an auspicious occasion and celebrated and showcased to the community. The eldest male member of the family was considered as the 'Head' of the family. His decisions were considered final. It was considered the duty of the men to go out into the world and earn a livelihood for the family. Symbols such as peacock were used as a prayer for male birth.
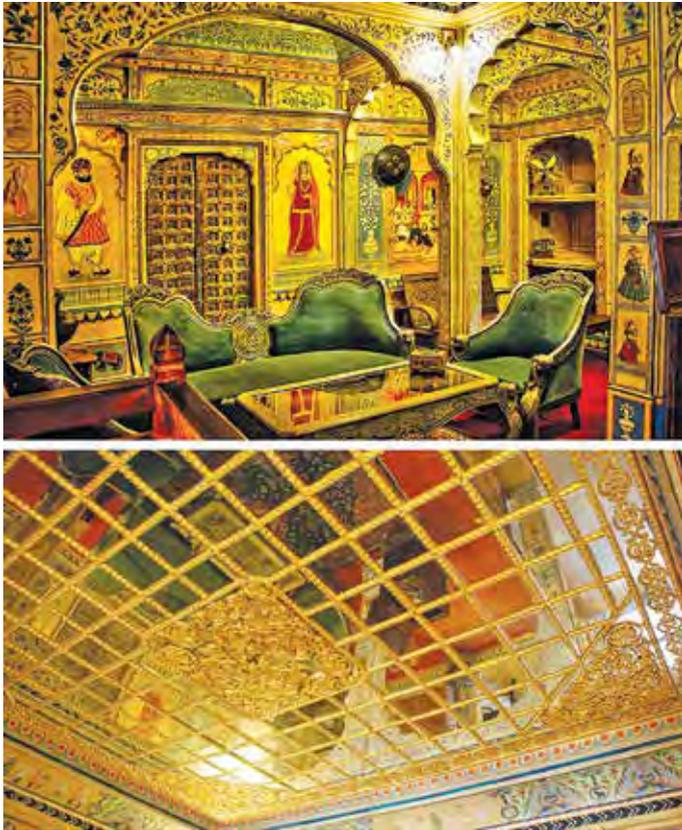
Figure 7: Elements of a Haveli – 03
Source: Author

Figure 8: Elements of a Haveli – 04
Source: Author

Table 2 shows the evolution of four interpretations based on the haveli. The belief systems here become the cultural directive for the formation of spaces and the design of interiors. They combine together to provide means to interpret the societal values, goals and concepts in a built form. In the haveli, the space making elements become a physical medium to express socio-cultural and political views. The spatial distribution points to the hierarchies within the family genders. The institutional and conceptual practices of the time and space cumulatively established the supremacy of male over female and pushed Indian women into dependency and subjugation. Not just this, but the conventions were accepted as 'normal' by women and the same ideals were taught to following generations. The intricacy in the ornamentation of the interior spaces showed a strong will to show a powerful social standing in the community.

7.   Conclusion - Applying the Interpretations to 'writing the history of present'

Fairly new, Interior Design as a field in its own right is evolving. Therefore, a systematic observational study of interior spaces is required. This research provides concise steps towards interpretative framework inferring interior spaces as reflections of cultural, social and personal narratives. It defines a perspective of looking at interior spaces, bringing the interior spaces and their meaning to focus. The framework is segregated according to its tangential and non-tangential aspects. These aspects are broken down to look at histories in layers – individual, community and a larger socio – political. It furthermore is able to co-relate the two extracting a meaningful relationship. Although structured, the framework is challenged by shortcomings of an interior space, such as its temporal nature and that they are transferrable in nature. Analysing contemporary interior spaces through interpretations can lead to a systematic generation of qualitative historical repository. Contemporary trends in interior design could be observed through them.

Quantitative studies conducted through the framework can lead to the documentation of interior spaces from a macro to a micro level. At the macro level, projects could be studied spatially - the layout, structure, and massing. Spatial studies could further be detailed out by documenting all the space making elements via a visual ethnographic study of all the areas divided under the heads of 'space-relational' or 'object-relational'. The observations should be made from element or object as a whole to all the ornamentation or lack thereof. Descriptive documentation of all the processes, materials and

Table 2 - Interpretations of a Haveli - FlowchartTable
Source: Author

QUANTITATIVE INTERPRETATIONS	SPATIAL			QUALITATIVE INTERPRETATIONS	CONTEXTUAL NARRATIVES
	Aperture	Jharokha	Acted as symbol to the family's wealth to the outsiders and people coming into the house to attend festivals.		The spatial distribution points to hierarchies in the family genders; an underlying issue of inequality among men and women. The eldest male member of the family was considered as the 'head' of the family. His decisions were considered final. It was considered the duty of men to of into the world and earn the livelihood for the family.
			The more intricately carved the jharokha, the wealthier the family.		The household was the limit of a woman's world. Her sole duty was to take care of the household, her husband's needs and also produce heirs to the family business.
			The motifs generally used in a jharokha were in a geometric pattern, which pointed to the craftspeople of Islamic faith involved in the making.		Birth of the son was considered to be an auspicious occasion and celebrated and showcased to the community. Symbols such as peacock were used as a prayer for male birth.
		Door	Rituals related to festivals, birth of a son, marriage of a daughter or any auspicious occasion expressed symbolically on the entrance.		Women's access in the house were limited to the most private spaces of the household. Furthermore, women's access to common zenana spaces were prohibited during the time of menstruation.
			Information board of events happening inside the haveli - joys and sorrows, festivities, etc. shared with the society by symbols painted on the wall.		The conventions were accepted as 'normal' by women and the same ideals were taught to the following generations.
			'Kuldevi' engraved above the door informed the outsiders of the particular clan of the owner, while also serving the purpose of a nameplate.		Institutional and conceptual practices of the time and space cumulatively established the supremacy of male over female and pushed Indian women into dependency and subjugation. Tradition demanded that women neither be seen nor heard.
			The proportions, larger in its width to its height, forced the visitors to bend and show respect to the homeowner.		
			Geometric patterns on the door suggest an Islamic influence.		
	Ceiling	Carved Wooden Ceiling	As wood was not local to the area, intricately carved wooden ceiling was used as a showcase of wealth for the people visiting the haveli.		
	Wall	Paintings	Portraits of owners, scenes from the court, personal participation in local festivals and personal festivities such as wedding day processions would be painted to commemorate important days and people of the family. They gave an insight into the lives of the previous generations to the next.		
			The walls were sometimes also adorned by paintings of excerpts from the Hindu mythology and God figures, telling about the religious faith of the residents.		
			Everyday lifestyle was also depicted in the paintings such as - women drawing water from the well; man enjoying leisure time, etc.		
			Since, paintings and sculptures of human figures were not allowed in the Islamic faith, it also proves that Hindu painters also worked on the paintings.		
			The elephant is generally considered a symbol of good luck and the animal is a symbol of good fortune. Elephants symbolise a kind of divinity and benevolence. They also symbolise wisdom, loyalty, strength, fidelity and longevity. Also, elephants were how the elite travelled. To depict oneself on an elephant was the sign of power.		
			Peacocks have been a symbol of wealth, beauty and rebirth since ancient times — and a symbol of prosperity, as well as royalty, associated with the beauty of the peacock and its majestic grace. The expression of rebirth takes after the male bird dancing for the sake of the female during courting, a remembrance of celebration of life. The idea of wealth and prosperity of the peacock symbol is associated with Goddess Lakshmi - the Hindu Goddess of wealth.		
		Mirror-work	Mirror work on the walls was a smaller copy of the king's stateroom, pointing to the high status in the community.		
			The wall in the entrance foyer is a peacock, a symbol of beauty, and prosperity in India. The peacock also stood for a prayer for male birth, an heir to the family business and wealth.		
	Screens	Jalis	To limit the visibility of the household women to the outside world.		
			The motifs generally used in a jali were in a geometric pattern, which pointed to the craftspeople of Islamic faith involved in the making.		
	Framework	Columns	The capitals of the columns were carved in floral patterns, sometimes with a banana flower. As banana flower is used in the Hindu religious ceremonies, it was considered as auspicious.		
		Brackets	Use of wood.		
		Beams	Carved as the head and trunk of elephants or lions, considered a symbol of power.		
	Floor				

	OBJECT - RELATED				CULTURAL DIRECTIVES	
	Furniture	Chaukis			Zenana Spaces	Specific spaces for women, restricting the entry of men to the space. Only the 'men of the house' could enter the space.
		Chairs			Mardana Spaces	Specific areas for men where women were not allowed.
		Beds				
		Storages	Storage chests were important for the women of the house brought from the maternal home; passed from generation to generation from mother to daughter during wedding.			
	Tapestry		Enclosures were created with the use of the tapestry. Often erected in the courtyards, these enclosures were used to accommodate the visitors during celebrations. The richness of the fabric indicated the social status of the family, as these textiles were not made locally but imported from eastern countries such as Persia.			

techniques can provide a further in-depth study giving an overview of who the users, designers and makers are. Together, documentation of all the elements can point to the style of visual language, material palette and construction techniques incorporated.

Qualitative study needs to be carried out via a contextual inquiry, by observing and interviewing. The interviews can be carried out to gain an insight into various perspectives. Interviews of designers can allow for an understanding of their design principles and influences. It can also point to challenges faced at the design and execution stages. Dialogue with the users can help estimate the design brief. They need to be conducted with all the users involved, sometimes in permutations of different ages. Most importantly, discussions should be inclusive of all genders. All of them (kinds of interviews) determine the dynamics of that interior space. They bring to the foreground the mindset and influences of the users. Next come the makers. Dialogue with the makers allows a further comprehension of material and techniques.

A correlational analysis between documentation and contextual inquiries that follow determines the association between the quantitative and qualitative aspects. To ascertain the relationship and infer how they affect interior spaces or Cultural Directives. Hypothesising the 'what?', 'where?' and the 'how?' leads to identification of underlying Contextual Systems. A comparative assessment of opposing directives and systems, keeping a constant (such as location or typology of the building), could be studied to realise the similarities and differences. Alternatively, a temporal analysis of the same space at different time spans can evaluate the evolving personal ideas - the ways cultural directives have changed from the past to the present and the future trend and how they have remained the same, diluted or changed with the change in the users.

Glossary

Rajput - Clans hailing from the north-western region of India, mainly the state of Rajasthan.

Mughal - Muslim dynasty of Turkic-Mongol origin that ruled most of northern India from the early 16th to the mid-18th century.

Jharokha - Stone window projecting from the facades of havelis looking into outer streets or into common courtyards.

Krishna - Hindu God.

Kuldevi - Female deity worshipped by a clan.

Jali - Perforated stone or latticed screen, ornamented with geometrical and natural patterns.

Mardana - Spaces allocated specifically for men.

Zenana - Spaces allocated specifically for women.

Purdah - The practice in certain Muslim and Hindu societies of screening women from men or strangers, especially by means of a curtain.

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ARTICLE

Building Self-Sufficient and Sustainable Cities:
A New Vision for Community-Centred Urban Development

By Prof. Ar. Mahesh Bangad and Miss. Sejal Tote

The Importance of Sustainable Urban Development

As we move into the "urban century", more and more people are referring to cities as "smart", "resilient", "sustainable", and "green."

Innovative solutions are needed to address urban problems like traffic, pollution, lack of green spaces, energy inefficiency, and subpar housing. With the development of information and communication technologies (ICTs), the idea of the "smart city," which was first centred on digital connection, has changed to enhance infrastructure and urban services. Presently, smart cities prioritise social, economic, and environmental sustainability, promoting long-term advantages including improved quality of life and resource conservation. These cities want to be more responsive and efficient by integrating smart energy, transportation, healthcare, and infrastructure. Technologies like the Internet of Things (IoT) and Artificial Intelligence (AI) increase their efficacy, and standards like ISO evaluate their performance in areas like energy efficiency, security, and environmental impact. Figure 1 refers to aspects of Sustainable Urban Development.

Knowing How Self-Sufficient Cities Work

Every city has its own distinct advantages, disadvantages, possibilities, and difficulties. Cities are dynamic, complicated, and ever-changing. Since no two cities are comparable, specialists restricted to office settings are unable to completely comprehend or resolve urban concerns. Walking across the city, interacting with locals, and understanding the actual, on-the-ground problems are all necessary for gaining true insight into urban challenges. Due to their limited exposure to the growth, history, and

evolution of a city, many urban planners lack this viewpoint. Furthermore, adhoc administration and inadequately prepared teachers and students are common problems in urban planning education. In order to tackle contemporary urban issues, curricula must be thoroughly reviewed and updated to reflect current demands. Cities evolve in layers, each with its own planning and expansion issues. To develop practical, workable solutions, planners need to comprehend and examine each of these layers separately. Sadly, a large portion of planning in the modern day is confined to paperwork and loses sight of the dynamic, liveable environments that cities embody. Instead than depending on foreign

Figure 1: Sustainable Urban Development
https://images.app.goo.gl/LgkgJkAzfUuZo8X46

models, India in particular needs to develop its own solutions that honour the country's distinctive cultural and environmental characteristics. Research and development in fields like master planning should be given top priority in order to increase the effectiveness and relevance of planning and make sure that experts and tools are prepared to serve urban populations in a sustainable manner. *Figure 2:* refers to the illustration How Self-Sufficient Cities Work

Figure 2: Self- Sufficient Cities
https://images.app.goo.gl/w96cZrUhTcmkvQ5G9

Resource Management and Green Infrastructure

Urban green infrastructure (UGI) has a positive economic and social influence on cities' climate, air quality, acoustics, and aesthetics. Through climate services, UGI helps control indoor temperatures and frequently lowers energy costs; deciduous vegetation provides special advantages. However, during warmer months, UGI's impacts on wind speeds can occasionally prevent heat from escaping from locations exposed to the sun, which affects air entry. UGI offers a sustainable mitigation solution that helps reduce urban temperatures and enhance thermal comfort as disaster threats like heavy precipitation and rising sea levels are increased by urbanisation and climate change. Figure 3 refers to the illustration urban green infrastructure (UGI)

Figure 3: Urban Green Infrastructure
https://link.springer.com/chapter/10.1007/978-981-16-6791-6_15

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By lowering flood risks, reducing urban heat islands, enhancing air quality, and promoting carbon storage, UGI—which includes urban forests, rooftop greenery, and street trees—improves ecosystem services. By creating social safety nets against food insecurity, urban agriculture enhances food security even further. Parks and other green areas have a positive impact on locals' quality of life, mental health, and general well-being. UGI techniques, such as urban forestry and green roofs, are essential for climate adaptation because they lessen the amount of solar radiation that buildings absorb, which helps to reduce severe temperatures. All things considered, UGI creates liveable, resilient ecosystems that are necessary for sustainable urban growth.

Renewable Energy in City Environments.

The research, Climate Change Mitigation Strategies: Evaluating the Effectiveness of Renewable Energy Policies in Urban Environments offers crucial insights into how renewable energy policies, such as subsidies, tax incentives, renewable portfolio standards (RPS), and carbon pricing, reduce urban carbon emissions. By promoting the use of renewable technologies, these policies greatly help reduce emissions. By encouraging energy efficiency and greener energy use, higher energy prices also play a role. Feed-in tariffs (FiTs) were less successful in the cities under study, nevertheless, indicating that regional and market conditions affect their effectiveness. The report also highlights the need to address emissions from industrial output and economic growth by pointing out that urban population expansion has an indirect impact on emissions reductions. The significance of all-encompassing policy frameworks that focus on energy-intensive industries like manufacturing and heavy industry is emphasised by a correlation study. Emissions can be decreased while promoting economic growth by combining renewable energy regulations with energy efficiency standards, industry decarbonisation, and technological advancements like energy storage and smart grids.

The study points out many drawbacks, including its limited policy emphasis and dependence on secondary sources. Future studies should look into emissions particular to a certain industry, the effects of long-term policies, and the contribution of public knowledge to the adoption of renewable energy. Broader insights for modifying renewable energy policy to various urban contexts for a low-carbon future can be obtained by extending research to cities in underdeveloped countries.

Intelligent Technology in Urban Design

Resource provision becomes more complicated as a result of urbanisation's predictable problems, which include pollution, global warming, crime, and waste. The idea of smart cities uses the IoT and ICT to solve these problems. It focusses on applications such as smart street lighting, air quality and pollution monitoring, and traffic and waste management. IoT solutions have a major impact on improving mobility, reducing pollution, and conserving energy, which makes cities more sustainable and raises the standard of living for citizens. Applications for smart cities can be divided into two categories: Urban IoT, which includes smart waste and traffic management, vehicle tracking, air quality monitoring, streetlight control, and data collection from traffic signals, and Industrial IoT, which covers topics like worker safety, machinery health, and toxic gas monitoring. However, there are issues with IoT in urban management, like cybercrime, where hackers could breach privacy and cause system disruptions. Security depends on the efficient identification of anomalous patterns. The ethical and legal issues surrounding the usage and storage of data, especially video footage, present another difficulty. IoT device maintenance and updates are also essential but resource-intensive because continuous care is needed to guarantee smooth operation. For the infrastructure of smart cities to support sustainable urban management, planning must address maintenance, security, and ethical standards. Refer Figure 4 for Smart City Technologies Driving Innovation illustration.

Figure 4: Smart City Technologies
https://images.app.goo.gl/xEvqRFTQVXrDH6RA9

Eco-Friendly Mobility and Transportation

Making the shift to sustainable transportation is a life-changing process that calls for more than just technical developments; it necessitates an all-encompassing strategy that incorporates innovation, infrastructure, policy, and behavioural change. The cornerstone is infrastructure development, which focusses on developing networks of Electric Vehicle (EV) charging stations, extending public transportation, and setting up facilities for the generation of alternative fuels. These improvements can be accelerated by strategic investment and public-private partnerships, with smart city technology improving the effectiveness and customer happiness of transport networks.

Government incentives like tax credits and subsidies are crucial to boosting accessibility and removing the financial hurdles associated with EVs and alternative fuel vehicles. Innovations in battery technology, alternative fuels, and autonomous vehicle integration are further supported by research funding. To propel these developments, collaborations between public and private sectors as well as research institutes are essential.

It's also critical to move away from a culture that is centred around cars and to encourage active travel, shared mobility, and public transportation through education and awareness-raising initiatives. Policies that promote sustainable choices can help governments guide this change. For all populations to benefit from sustainable mobility, social fairness must be ensured by giving accessibility top priority in policy and infrastructure. In the end, achieving sustainable transportation requires cooperation from the public sector, private sector, and citizens in order to build a more just and clean future where mobility and environmental stewardship coexist. *Figure 5* refers to the illustration of Eco-Friendly Mobility and Transportation.

Figure 5: Mobility and Transportation
https://reach.rw/blog

Issues and Remedies for Sustainable Urban Development

One of the most important ways to address urban ecological issues, promote sustainable cities and improve the quality of life for locals is to incorporate green infrastructure (GI) into urban construction. In order to achieve the Sustainable Development Goals (SDGs), especially SDG 11 (safe, resilient cities) and SDG 15 (sustainable use of terrestrial ecosystems), there is growing evidence that GI should be incorporated into urban planning. In order to achieve a comprehensive impact, scholars stress the necessity of a holistic approach to sustainability that integrates environmental, social, and economic aspects and aligns GI with all SDGs.

In their 2019 study, Liu, Fryd, and Zhang examined blue-green infrastructure (BGI) in Beijing and Copenhagen, highlighting its advantages for biodiversity, liveability, and stormwater management. Important takeaways include the significance of incorporating stormwater solutions with urban enhancements, planning for both minor and major rainfall events, and making sure BGI offers a variety of community advantages. Cities using GI to pursue sustainable urban development might use their findings as a model.

In Dortmund Marten, Germany, Schaefer's (2022) project looked into co-designed GI solutions that address environmental constraints such particle pollution and heat discomfort. The study emphasises the benefits of transdisciplinary GI planning, in which urban planners and scientists work together to provide practical, flexible solutions.

In conclusion, incorporating GI into urban planning promotes ecosystem services, improves urban quality of life, and is consistent with the Sustainable planning Goals. The knowledge gained from these research gives cities a road map for integrating GI and creating resilient, sustainable urban landscapes that will support future expansion. *Figure 6:* refers to aspects of Urban Sustainability Challenges

Prospects for the Future: An Idea for Sustainable and Self-Sustained Urban Areas

The idea behind smart cities is to improve urban efficiency and quality of life by combining technology, infrastructure, and governance. Important ideas like "Participatory Urbanism" and "Adaptive Infrastructures" imply that cities ought to operate as dynamic ecosystems in which people actively participate in governance and planning by having unrestricted access to data. Transparency, citizen

Figure 6: Urban Sustainability Challenges
https://www.researchgate.net/publication /323938792_Big_Data_ for_Urban_Sustainability

participation, and urban resilience are all promoted by this strategy. The transition to smart cities is both exciting and difficult; in order to stop increasing social and economic gaps, it will be necessary to integrate cutting-edge technologies with antiquated infrastructure and address digital inclusion. Creating governance structures that encourage cooperation between the public, commercial, and community sectors is crucial, as is modifying urban strategies to include sustainable and financially feasible smart city initiatives. However, comprehensive urban development is limited by the absence of a common definition for smart cities and the emphasis on technology solutions, which frequently ignore social, political, and cultural factors. Future directions include ideas like "Digital Citizen Engagement" to improve transparency, "Urban Flexibility" for quick adaptation, and "Adaptive Artificial Intelligence" for culturally sensitive, context-specific urban solutions. By incorporating nature into urban areas, "Biophilic Design" can also enhance well-being. For smart cities to reach their full potential for sustainable development, they must develop using an ethical, human-centred approach.

Conclusion: Adopting a Community-Centred Strategy for an Ecologically Sound Urban Future

The integration of cutting-edge technology, green infrastructure, and inclusive governance is essential to tackling today's urban challenges and creating self-sufficient and sustainable cities. The idea of "smart" must give way to "sustainable" and "resilient" identities in cities, where technology not only improves convenience but also tackles more general concerns like social justice, environmental effect,

and economic viability. Cities may empower citizens and improve transparency and responsiveness of governance by implementing participatory urbanism and adaptive infrastructures. Similar to how embracing renewable energy reduces emissions and promotes long-term energy independence, giving priority to urban green infrastructure enhances climate resilience, air quality, and general liveability.

Recognising cities as intricate ecosystems with distinct social, cultural, and environmental dynamics requires a comprehensive approach. Green infrastructure, sustainable transit, and intelligent technology can all be used by urban planners to create cities that are healthier and more flexible. Prospective avenues for developing human-centred urban environments that reflect and address community needs include biophilic design, digital citizen engagement, and adaptive artificial intelligence. In the end, creating inclusive, dynamic, and resilient communities that value natural resources and give people agency is what sustainable urban development is all about. This will establish cities as role models for advancement and sustainable living for future generations.

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ARTICLE

HUMAN-HERITAGE INTERLINK
A CASE OF VADNAGAR

By Ar. Peeyusha Raghunathan and Ar. Shruti Verma

Introduction

In today's rapidly evolving world, preserving cultural heritage is increasingly challenging. UNESCO defines cultural heritage as artefacts, monuments, a group of buildings and sites, museums that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance. It includes tangible heritage (movable, immobile and underwater), intangible cultural heritage (ICH) embedded into cultural and natural heritage artefacts, sites or monuments, industrial heritage and cave paintings (UNESCO, 2024). Cultural heritage is thus a precious asset that portrays our legacy. It represents the present, past and future ways of our lifestyle and gives value to society and the community. Heritage, thus becomes a 'palimpsest' that is defined by the superimposition of new material on remaining traces. New buildings, culture and technology are fresh layers on the palimpsest. The relationship between humans and heritage sites often becomes superficial, leading to the loss of cultural identity and significance. At this point, in an unpredictable world, it is the hardest to maintain cultural heritage as is evident from the condition of many historic places like Machu Picchu in Peru, The Great Wall of China, and The Acropolis in Greece. Erasure through city development and tourism as well as climate change ravage not only famous landmarks but even smaller heritage sites irrespective of their cultural and historical importance. Over the last thirty years, cultural heritage has gained increasing attention and complexity. Protecting and conserving pieces of collective social memory, such as monuments and sites, and intangible heritage, can be a delicate process that requires utmost care and understanding. This article explores the human-heritage interlink at Vadnagar in Gujarat, India, and tries to recommend a probable solution that can nurture a harmonious relationship between the public and their cultural heritage.

Factors affecting Human-Heritage Interlink

The human-heritage interface is mainly affected by urbanization and other factors such as tourism with climate change also contributing to the decline in heritage. With rapid urbanization being witnessed in small towns and cities, cultural preservation seems to be ignored in the transformation. Increasing urbanization around heritage buildings in the world is one of the major drivers for the changes and neglect of the built heritage. Rapid urbanization very often destroys heritage sites to make way for future development (De Noronha Vaz et al., 2011). This impact is evident in India, where historic sites of lesser importance are neglected to accommodate the new development. This neglect can also be seen in the historic town of Vadnagar in Gujarat, India.

Climate change is another factor that poses a significant threat to heritage sites. Extreme weather events, tectonic movements, and temperature changes are the major contributors to deterioration of unkempt cultural heritage sites. For example, the heritage group of monuments at Hampi, the erstwhile capital of Vijayanagara Empire, renowned for its intricate temples, palaces and waterworks, despite being a UNESCO world heritage site, faces significant deterioration due to salt weathering. This weathering of unmaintained porous stones of the structure causes damage that leads to loss of surface

detail, colour change, etc.

Tourism is like a 'spatha' (double-edged sword). It brings economic benefits, raises awareness, and brings recognition at the global level, but it can also leads to overcrowding, physical damage and erosion of cultural values. There is a loss of cultural identity and historical significance through the destruction and degradation of these heritage sites, owing to the issues outlined. The lack of understanding of our heritage and history poses a great threat to the loss of cultural identity, especially for the local indigenous communities for whom cultural heritage is deeply intertwined with their livelihood. Heritage sites are often the contributors to the upliftment of the local community but when these heritage sites are not valued enough and lack of outreach, the local community is not educated about its importance and benefits.

Inhabitants living around heritage sites are often unaware of the importance of heritage sites and the need for conservation. The heritage zone often includes the larger context like the deep structure of the surroundings, its cultural and historic characteristics and the relationship between local people, institutions and dynamic historicity. Often this negligence towards cultural heritage makes it difficult for heritage conservation as there would be a lack of funding and difficulties in establishing policies on effective preservation strategies. While some measures are being taken for preservation, it is relatively difficult to maintain the authenticity.

Case of Vadnagar

The ancient city of Vadnagar in Gujarat (see Figure 1) holds a unique record of human habitation which dates back to more than 4500 years and was revealed through seven distinct archaeological layers during excavation. This historical town is also known by the names Vridhnagar, Anandpur, Anartapur and Naagar. Unlike other ancient sites, this place has been continuously inhabited, making it one of the oldest living city within a single fortification, in India. Excavations revealed seven distinct cultural stages, each layer offering glimpses into the town's development from pre-Mauryan times to the present day. Historical geography indicates that Vadnagar was strategically located at the intersection of two major ancient trade routes, as seen in Figure 2. One route connected central India with Sindh and the northwest, while the other linked Gujarat's coastal port towns to northern India.

As seen in Figure 3, the L-shaped town of Vadnagar includes Sharmishtha Lake on its northeastern edge.

Figure 1: Location of Vadnagar in Mehsana district in Gujarat, India. *Source: Authors*

Figure 2: Illustrative map showing Vadnagar on the Silk Route *Source: Authors*

Figure 3: Map showing the historic town of Vadnagar with its fortifications, excavations, Sharmishta Lake and other sites of historical importance and different communities within Vadnagar. *Source: Authors*

The ancient settlement spanning over 2700 years now stands as a typical, late medieval western Indian introverted town. The town and the lake cover an area of approximately 85.57 ha, with an additional buffer area of nearly 597 ha. The heritage town of Vadnagar comprises several temples and mosques surrounded by *pols* of Hindu, Muslim and Jain families. The pols in Vadnagar are arranged in such a way that the houses are positioned in rows adjacent to each other with their front façades opening to the street. Figure 4 illustrates the various street patterns seen in the town.

Figure 4: The street patterns seen in Vadnagar
Source: Authors

To find out the cultural sequence of the site, excavation was carried out by the Directorate of Archaeology, Government of Gujarat, at different locations within and outside the fortified town from 2006 to 2012 (see Figure 5). Thereafter, the Archaeological Survey of India (ASI) excavated the town from 2016-17. Vadnagar is surrounded by a brick and partly stone fortification. Beyond the walls

Figure 5: The excavation at Vadnagar
Source: Authors

Figure 6: Collage illustrating Vadnagar
Source: Authors

lie mounded areas with archaeological remnants dating from the 1st to 8th century CE.

Current Issues
Cities and historical structures are facing significant challenges due to unplanned and chaotic growth and development. Majority of important heritage

sites are being lost due to rapid development and increasing unauthorized construction. The issues gripping the heritage town of Vadnagar (Figure 6) are broadly categorised into physical and social. Despite being a precinct of high cultural importance, the heritage town of Vadnagar has very limited policies that facilitate the maintenance of heritage houses. These heritage houses belong to various centuries, and are often dealt with disrespect and negligence or are even abandoned and demolished (see Figure 7). This brings about a collapse of the cultural built heritage in the heritage town. Vadnagar has been added to the tentative list of heritage sites at UNESCO and it requires protection efforts. The streets that mainly used to be pedestrian in nature are now accommodating activities of the people like the *bazaars*, heavy vehicle movement along with unplanned parking schemes, leading to the overall loss of character in the town's fabric. Town dwellers seem disconnected and inconvenienced by the rapid

Figure 7: Images of residential houses deteriorated without maintenance
Source: Authors

building activity that is being undertaken in Vadnagar at present. The new architecture in the town has a limited connection to its glorious past.

It is essential to prioritize the creation of a clear, logical and objective policy framework for heritage preservation. A well-designed heritage preservation has the potential to generate significant employment opportunities, bolster the economy, reduce poverty and preserve both tangible and intangible cultures, while also contributing to sustainability objectives for cities and nations. These policies must include the people living in the town to make these buildings get an effective conservation process.

Design Approach

1. Connecting culturally important landmarks:

   There are many heritage spots in Vadnagar, each of which has a unique story to tell. They are the Hatkeshwar Mahadev Temple, Tana Riri Memorial, Paschim ni Mehta Vav, Sharmishta Lake, Kirti Toran, Gauri Kund, the fortification gates and the excavation (see Figure 8). As all of these were built in the early stages of history, from the Greek period (325 B.C) to the Malwa period (1st century), from the Solanki period (947A.D) to the Maratha period (1737 A.D), they are not physically connected due to the development that took place in later years. These disconnected structures could be connected in

Figure 8: Important sites of Vadnagar (clockwise from top left) Hatkeshwar Mahadev temple, Tana Riri memorial, Paschim ni Mehta Vav, Gauri Kund, Kirti Toran, Sharmishta Lake
Source: Authors

   such a way that they show the missing design and heritage of the route (National Institute of Urban Affairs et al., 2022). The overlapping layers of day-to-day life, commercial streets and cultural heritage could also be portrayed for people to experience.

2. Involvement of local community:

   Any new development and construction that comes up in the surrounding context of this heritage town should consider the sensitivity of the area and bring in adaptive solutions and interventions that align to the cultural and social values of the residents of Vadnagar (see Figure 9). Making the residents a part of the proposal imparts a sense of oneness and ownership. Strengthening and unifying the community by creating enhanced public spaces at the *chowks*, recreating a sense of transparency within the later developments and improving the connectivity of the street to the building are some of the strategies that could be employed. This would help in blending the conservation attributes of heritage with the newer

Figure 9: Current situation of street elevation showing the blend of old traditional architecture with newer development.
Source: Authors

development. Engaging the local community in conservation efforts and educating them on its importance is vital. Organising workshops and educational programs to raise awareness for the local people and visitors could help maintain and preserve the heritage. The locals could also be trained as guides for the curated tour around Vadnagar's heritage paths. This fosters a sense of ownership and pride and gives them a source of income (Mekonnen et al., 2022).

Effective heritage conservation strategy must revolve around and involve the active participation of local communities on all issues related to planning, development, implementation and management of heritage. The absence of an effective mechanism of involving communities and participatory processes has been the root cause of damage and destruction of most of the valuable built heritage in India. Creation of heritage has its genesis in the efforts made by communities and accordingly, the onus of its preservation and conservation must also be shared by it. It is said, the honest inclusion of a community's representatives as "partners" in decision-making, ensures active citizen's participation and non-involvement of communities causes enormous loss/damage to heritage (Göttler et al., 2017).

3. Awareness and education activities:

   Voluntary agencies, NGOs and pressure groups have important role cast for them in safeguarding and promoting the cause of built heritage. The town authorities can bring out pamphlets, maps and brochures to make the community aware and proud of the heritage (Court et al., 2015). Effective and comprehensive participation of the local community in heritage planning and implementation will help in maintaining continuous dialogue between the government and community so that an integrated approach can be implemented and conflicts can get resolved.

4. Culturally sensitive design approach:

The design approach should look for sources that would answer the question —"what can be the sources of inspiration for the design of the new?" and "which features can one adopt from the historical context of the site?" The relationship between the buildings and their historical context must be examined. Thus, the first step in designing a building in the historical context is to examine the buildings in the context and the cultural ecosystem around them. This would bring forward a design intervention which is an original interpretation although they would all have the same approach; the results would be rooted. In the case of Vadnagar, the strategies can be developed as follows:

- Designing pathways and public spaces highlighting the connectivity of Vadnagar to other historic regions like Patan and Modhera with interpretive signage and exhibits that narrate the town's historical legacy.

- The skyline of Vadnagar is a blend of ancient temples, stepwells, lakes, and traditional houses. Preserving and enhancing the existing skyline by maintaining the height and forming new development similar to that of the historical buildings.

- Respecting and reflecting Vadnagar's distinctive architectural style is necessary to blend local traditions with modern design elements creating a harmonious architectural narrative. The new construction should complement the existing buildings making sure that the traditional structures and places of importance remain prominent.

- By using locally sourced materials and traditional building techniques with the help of new technology, one can adapt to the regional climate at Vadnagar and can also minimise the environmental impact and enhance the town's sustainability.

- Buildings in Vadnagar were constructed with specific functions including religious, residential, commercial, administrative and so on but at present, there are abandoned buildings and structures with no specific function. Ensuring that each building has a function, adaptive reuse of heritage buildings can provide modern facilities while keeping the historical character intact.

- Non-invasive technologies for construction and documentation must be employed. For example, studying the site with non-invasive techniques at a site near the excavation would help us to identify the key factors to keep in mind like the stability of the soil or the extent of the excavation etc. Adopting reversible construction techniques which allow us to do future repairs and modifications without damaging the original structures is key to the development in Vadnagar. This ensures that the historical authenticity of buildings is preserved while new developments are also brought in.

Conclusion

Cultural heritage has been known to be the definer of art and architecture of the city. Conserving the built heritage also helps us to retain the distinct identity of the community and preserve the old culture and thus calls for thoughtful and sensitive preservation. This can be done only by putting forward a people-oriented and heritage-focused design approach and policy. By focusing on community engagement, sustainable practices, preservation and conservation, education and awareness, one can create a harmonious balance between the heritage and the people.

By involving the community, heritage sites become a part of the local culture. This maintains a vibrant heritage and remains as part of our history, enriching our present and guiding the future generations. In efforts to achieve a balance between protecting its strong cultural heritage and fulfilling modern needs, good design strategies should focus on the aspects of highlighting the historic value of this town while at the same time promoting a sustainable and accessible environment for both residents and visitors. A good conservation strategy would involve having the regional and historical context in consideration, promoting sustainability, involving the heritage, involving the community and making it people-oriented. A good strategy should also identify risks, and barriers to the cultural heritage, creating further opportunities to remove the negative impacts while helping the city to grow.

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ARTICLE

Sustainable Architecture

By Ar. Vedula VLN Murthy

The word sustainability is generally found in production and architecture. Sustainability focuses on countering environmental problems, including climate change, loss of biodiversity, loss of ecosystem services, land degradation and air and water pollution. Sustainability seeks to prevent the depletion of natural or physical resources so that they will remain available for a long time. Sustainability in architecture addresses positive environment in buildings by utilising proper design methods, materials and energy sources that are not detrimental to the surrounding ecosystem or communities. Its aim is to ensure that the actions taken today do not have negative consequences for future generations and comply with the principles of social, economic and ecological sustainability.

The practices, principles and techniques used in ancient times were rooted towards sustainability as the degradable natural materials were used for all purposes. The consumer boom, commerce and the hike in gadgets and mass production starting from the industrial age has been causing pollution and depletion of natural resources. The key to sustainability is to work with nature rather than against it. A green building is the one that uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for the occupants as compared to a conventional building. Sustainability is the process of concentration on planning and use of materials to keep the buildings thermally comfortable by using passive energy sources.

About 36% of global energy is devoted to buildings and 8% of global emissions are caused by cement alone. Architects are responsible for the built environment as they are using the materials and energy sources that accelerate climate change. Hence, solutions to the crisis should also emerge from the same community. The built spaces should be eco-sensitive, energy-efficient, cost-efficient, people-centric and value-based. Without concern on sustainability in architecture, the survival of life on earth will be under threat.

Features of Sustainable Architecture

- Reduce human impact on environment

- Recycling and upcycling of materials

- Use of degradable natural materials that can be reused or recycled

- Water conservation systems, rainwater collection and recycling of used water

- Blending and integration of buildings into the adjoining landscape

- Incorporation of plants and nature via living walls, tree-covered residential towers, and green roofs to help cool the buildings

- Use of renewable energy sources, such as solar, wind and natural heating and cooling and ventilation systems

- Use the mix of hemp, lime and water or bio-plastics made from algae

- Use of old shipping containers or barges as homes

- Construction of floating buildings on waters that help the housing shortages in dense coastal areas

Upcycling is the process of transforming of waste materials or unwanted products into new usable products having artistic or environmental value. Most of the building facade designs are static solutions, using large amounts of energy to maintain internal comfort. The basic principle of sustainable design is to lessen the load on environment. The building should merge with natural landscape.

The time-tested inner courtyard in buildings that gives shade and keeps the inner spaces cool is a favourable feature in residential and office complexes. The courtyard loaded by trees and plants and creepers saves energy and generates oxygen and positive energy. The following are the general green roof coverings that can improve efficiency and sustainability in buildings.

• shades and louvres covering building facades

• pergola roofs, solar panels, wind energy systems over the roof tops

• trees, plants and creepers covering the building surfaces and roofs (figure 1)

• brick exposed walls with no plastering

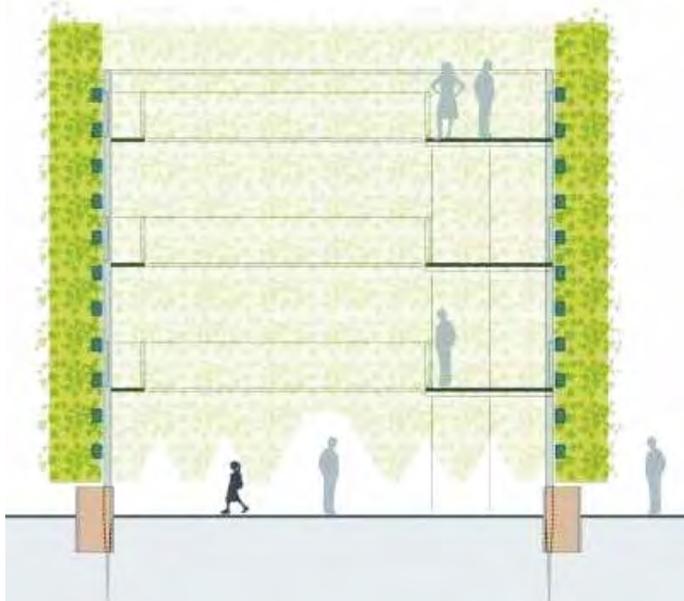• brick *jalis* or terracotta-cube screens to cover the corridors and surfaces

Figure 1: Cross section showing building facades enveloped in green cover
Source: www.architizer.com

The land lost by construction of buildings should be recreated on roof tops and terraces are to be covered by plants, shrubs, creepers, trees and variety of vegetable and fruit plants and solar electricity panels.

Plants are the living beings and are the lungs for life. Hence, plants should become an integrated part of building complexes. Biology, horticulture, architecture and energy production should go hand in hand to attain sustainability. The biological adaptation solutions are complex, multi-functional and highly responsive. The simple products made by straw and stubble can work in this process.

On the other hand, the city's garbage and waste need to be addressed properly as well. The plastic, wood, tyres and electronic wastes need to be recycled and reused in different ways. Building debris, timber, bricks and iron from the dismantled buildings can be reused or reshaped in city parks, children's parks, theme parks, park benches, compound walls and entrance pylons or so. Anything is a useful material to an artist, thinker or conservator. Imagination, opportunity and a helping hand can bring desired results.

Waste-to-Wonder or Waste-to-Art

Waste can be used to make useful products. New Delhi city's scrap material was effectively used and transformed into life-size models of seven iconic monuments of the world in the Waste to Wonder Park. State Bank of India in New Delhi has taken the initiative by creating two distinctive 3.81 meters art works called *Manasvi* and *Tapasvi* by utilising the electronic waste generated from its bank branches. Will can do wonders.

It was known that India recycles about 30% of plastic waste and recycles only 1% of construction and demolition waste and the rest goes to landfills. Recycled concrete aggregates are an alternative to natural concrete aggregates and they can contribute to environmental protection. Furniture is one of the important constituents that consumes and contains considerable material. Hence, unused and redundant furniture can be reused by distributing it towards charitable causes, saving the disposal costs and reducing environmental impact.

Humans utilize resources and hence they are responsible for the safety and sustainability of earth. The ultimate aim is to safeguard natural resources and save earth's environment. Government alone cannot do all the things; we are the government and we are a part of the government. Every citizen is a volunteer and has to take part in this movement and initiate even in a small scale. 'You must be the change you wish to see in the world' said Mahatma Gandhi.

Waste Reduction

Green architecture seeks to reduce waste of energy, water and materials while construction. The amount of construction material going to landfills is to be minimised. Waste can be reduced by providing on-

site solutions such as compost bins or collecting centres or so. Environment-friendly and low carbon emission products are the need.

Adaptive Reuse

Adaptive Reuse is a process that adapts old buildings for new uses, while retaining their earlier features. Adaptive reuse can prolong a building's life making it return from grave to life. This type of revitalisation of old, heritage or defunct buildings can postpone the usage of new material resources for some more time and reduces the waste going to landfills. The historical old Falaknuma Palace of 19th century in Hyderabad is now used as hotel.

Biophilic Design

Biophilic design is a concept used within a building to connect the occupant to the natural environment through the use of direct nature. This can extend health, environmental and economic benefits for the building occupants and urban environments. The indicators of biophilic design have been seen in architecture far back in the Hanging Gardens of Babylon.

Regenerative Design

Regenerative design is an approach to designing systems or solutions that aim to work with natural ecosystem processes for returning the energy from less usable to more usable forms. Regenerative design uses whole systems to create resilient and equitable systems that integrate the needs of society with the integrity of nature.

Water Conservation

Day by day, water is becoming a scarce element. If conservation and proper utilisation methods are not taken up, the future ends up dry making life on earth cease. Conservation of water is to be done by all means, right from rivers, streams, lakes, reservoirs and underground. Rivers are to be made to flow all the time. History has shown practical and scientific process of conservation and flow of water for irrigation and drinking. These are to be studied and applied keeping aside our ego, greed and selfishness. Water conservation methods are to be adapted invariably in residential, commercial, institutional and office buildings.

Strategies such as percolation pits on roads at regular intervals, water conservation parks, brick tile flooring with gaps, rain water harvesting, sustainable consumption, efficient water management systems, sustainable agricultural practices, soil conservation, check dams, reservoirs at regular intervals, flood management, reforestation, land use control, groundwater protection, waste management, pollution prevention are a few conservation methods to be put in practice.

Examples of Green Buildings

Pritzker Prize–winning Japanese architect Shigeru Ban had experimented by using recycled cardboard tubing which is low cost, low-tech, recyclable, replaceable and produces little waste. The Transitional Cathedral built in 2013 in Christchurch in New Zealand, as seen in figure 2, is a temporary A-frame structure made of steel, wood, polycarbonate and interior beams of cardboard tubes.

Figure 2: Christchurch Cardboard Cathedral
Source: Tony Hisgett

The roof structure in the Centre Pompidou museum (figure 3) of modern and contemporary art located in Metz city in France is a wooden structure containing glued laminated timber covered by a white fibreglass membrane with a coating of teflon.

Figure 3: Centre Pompidou, Metz, France
Source: Guido Radig, 2010

The Paper Bridge over the Gardon River in southern France was designed by Japanese architect Shigeru Ban in 2007 using a mixture of cardboard tubes, recycled paper and plastic steps with a foundation of wooden boxes filled with sand (figure 4). The bridge proved that cardboard can be a structurally sound building material.

Figure 4: The Cardboard Bridge, France
Source: Gettyimages

Liuzhou Forest City in China designed by Chinese architect Stefano Boeri in 2018 is a project of several vertical forest towers for a green city that would address China's air pollution problem (figure 5). It accommodates around 30,000 inhabitants and contains nearly 40,000 trees and about one million plants of different species. Spread over an area of around 175 hectares along the Liujiang River, it consists of offices, houses, hotels, hospitals and schools entirely covered by wide range of plants and trees.

Figure 5: Liuzhou Forest City, China
Source: Stefano Boeri

Huiini House in La Primavera, Mexico, was made in 2013 using shipping containers (figure 6). It is a composition of four stacked cubes, which come together to form a sustainable house. Because of its modular construction, the house can easily be expanded or adapted to new uses.

The world's second tallest building - Shanghai Tower in China designed by Marshall Strabala and Jun Xia (figure 7) is a sustainable building. It is designed to collect rainwater to generate electricity and it recycles some of its waste water for internal use. The design of the facade minimises the wind loads

Figure 6: Huiini Container House, Mexico
Source: wowowhome.com

Figure 7: Shanghai Tower
Source: vexcolt.com

that reduced the amount of extra material required to make it withstand for wind loads. It comprises numerous green architecture components. The tower uses solar and wind energy. The air conditioning system is controlled by artificial intelligence through sensors distributed throughout the building that optimises energy use.

Green Buildings Architects in India

Laurie Baker's (1917- 2007) initiatives in India were cost-effective, energy-efficient and space-efficient with ample natural light, ventilation and striking aesthetic sensibility. Rain water harvesting, exposed brick construction, brick *jali* walls, openings spanned by arches instead of lintels, terracotta roof tiles, built-in benches and stools, retaining site's natural character are a few features of Baker's architecture. Yatin Pandya, an architect, author, activist, academician and researcher, always considers environmental and socio-economic aspects while designing. Many of his projects use metal waste and plastic waste as

seen in figure 8. Made In Earth architects based in Bengaluru and Mysuru is an architecture studio and construction practice which promotes sustainable architecture advocates the use of local and natural building materials and techniques. Titan Integrity Campus in Bengaluru (figure 9) located on a 6.5 acre site was designed by Mindspace architects and is a unique one flooded by plants and greenery by the lakeside. Dustudio, a design studio based in Auroville and headed by Dharmesh Jadeja, is working on projects that reflect uniqueness and are culturally and environmentally appropriate. Benny Kuriakose, a Chennai-based architect has designed residential homes, resorts, disaster rehabilitation, restoration and conservation works, using locally-sourced and eco-friendly materials like earth, stone and timber. Jateen Lad made the entire structure of the Sharanam Rural Development Centre in Puducherry with unfired earth. Dhruvang Hingmire and Priyanka Gunjikar, Pune-based architects, build cement-free breathable houses that do not need air-conditioning or fans. The eco-friendly homes stay at a remarkable 25 degrees celsius inside even when it is 38 degrees outside!

Figure 8: Restaurant in Sanitation Park, Delhi by Footprints-EARTH
Source: re-thinkingthefuture.com

Figure 9: Titan Integrity Campus, Bengaluru
Source: ArchDaily

Some of the other architects in India working on green architecture are Stapati Bengaluru established by Tony Joseph, Jaisim-Fountainhead by Krishnarao Jaisim in Bengaluru, Trupti Doshi in Mumbai**,** Biju and Sindhu Bhaskar in Tirvannamalai, Eugene Pandala in Kollam and Chitra Viswanath in Bengaluru.

The Indian Green Building Council (IGBC) formed by the Confederation of Indian Industry (CII) in 2001, is working on green buildings to enable a sustainable built environment and facilitate India to be one of the global leaders in the sustainable built environment by 2025. The council closely works with the stakeholders of construction industry comprising architects, developers, product manufacturers, corporate, government, academia, nodal agencies, World Green Building Council and bilateral multi-lateral agencies in promoting green building concepts in the country. IGBC is located in the CII-Sohrabji Green Business Centre, Hyderabad, and is India's first Platinum rated green building and a net-zero energy building (figure 10). The vision of the council is to enable a sustainable built environment for all. The vegetated roofs cover 55-60% of the building's roofs and the remaining portion of the roof is covered by solar photovoltaic cells.

Figure 10: CII Sohrabji Godrej Green Business Centre, Hyderabad
Source: re-thinkingthefuture.com

Hyderabad International Airport is spread over an area of over 5000 acres and has half of the premises covered by a natural ecosystem supporting the life of various flora and fauna. It is a blooming expanse of sloped planters, curvilinear walls, palms, ground cover and xerophytic plants. The main access road of the airport offers a 12 km long four-tiered landscape on both sides. Infosys in Hyderabad, ITC Green Centre in Gurgaon and Patni (i-GATE) Knowledge Centre in Noida are other few examples of green buildings in India.

Conclusion

Despite so many theories and green building rating systems, sustainable architecture still represents a small portion of overall global construction. Much was spoken on sustainability and it is time to act. Green architecture needs to be proclaimed by the private and government, NGOs, religious and spiritual organizations to make use of degradable materials in daily use and also in construction. Strict rules and laws in planning and implementation are the absolute need.

All life on earth lives in harmony with nature except human beings. Saving the environment and life on earth is real reverence to Mother Earth. We have to realise that Earth too has right to live without pollution. Human beings cannot live without the Earth but Earth can live without human beings. Nature's fury cannot be encountered by human beings. Domination over nature leads to rejection of human beings by nature. The wrath of nature can obliterate large portion of living beings and human settlements in a short time. Hence, humans have to act for peaceful co-existence of all living beings. Being surrounded by beautiful nature secures our life. Love the nature and stay close to nature; it will never fail you.

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ARTICLE

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Identifying the Neuroaesthetics and Human-Centric Elements

A Multi-Method Analysis on Enhancing Experience in Urban Public Spaces

By Ar. Nikhila M, Ar. Karthik Mohan and Ar. Alok Dinesh

Abstract
This study employs a multi-method analysis to identify neuroaesthetics and human-centric elements in urban public spaces, with the goal of enhancing their emotional appeal and inclusivity. Through comprehensive literature reviews, case analyses, and empirical investigations utilising cognitive mapping and survey-based activity pattern evaluations, this research systematically identifies key components of these design paradigms. Moving beyond mere functionality, the primary objective is to identify the elements of neuroaesthetics and human-centric elements that enhance the public space experience. The case study of Kozhikode South Beach serves as a focal point for identifying successful elements that contribute to enhanced aesthetics, cultural vibrancy, and community engagement.

By emphasising their pivotal role in creating satisfying and emotionally enriching public environments, the study underscores the importance of these elements in contemporary urban design. Moreover, it underscores the future potential to replicate successful strategies across diverse urban contexts, advocating for a nuanced approach that considers the socio-cultural specifics of each space. This holistic strategy aims to identify adaptable elements that can enhance public spaces by balancing functionality with enriching human experiences, thereby fostering greater community engagement and satisfaction.

Keywords: Inclusivity, Comfort, Walkability, Cognitive, Lighting

1. Introduction
Urban public spaces play a critical role in fostering community engagement and enhancing the quality of urban life. Despite their importance, many urban spaces suffer from a lack of aesthetic appeal and human-centric design, which can lead to underutilisation and social disengagement. The concept of neuroaesthetics, which explores the impact of aesthetic experiences on the human brain, offers a promising avenue for improving urban design. However, there is a gap in the literature regarding the integration of neuroaesthetics and human-centric elements in urban public spaces to enhance their overall experience. This study aims to fill this gap by identifying key components of these design paradigms and assessing their effectiveness in enhancing urban public spaces, with a focus on Kozhikode South Beach.

1.1 Aim and Objectives
To identify and evaluate neuroaesthetics and human-centric elements that enhance user experience in urban public spaces.

Hypothesis: Urban public spaces that integrate neuroaesthetics and human-centric design principles will significantly improve user experiences compared to those lacking these features. The presence of appealing aesthetics and user-focused elements will enhance emotional satisfaction and cognitive engagement, leading to increased social interaction and overall space utilisation.
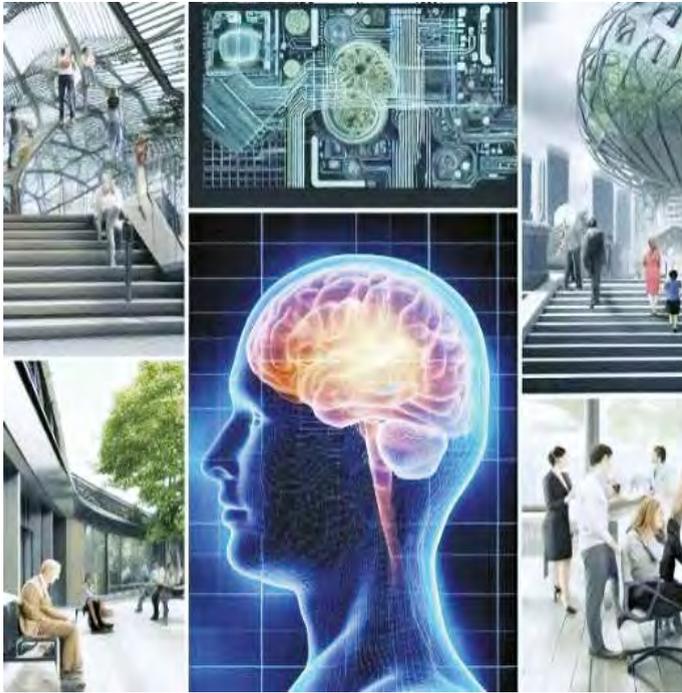
Figure 1: Introduction of Concept
Source: Ai generated BING

Objectives:

• To review relevant literature to understand neuroaesthetics and human-centric design elements.

• To conduct an empirical study on-site to gather data on user experiences.

• To identify specific design elements that significantly enhance user experiences in urban public spaces

Future Scope and Limitations: Future research can explore the application of identified design elements in various urban contexts and cultural settings to further validate findings, potentially incorporating interdisciplinary fields such as medical and artificial intelligence for enhanced analysis. Variability in user preferences and cultural differences may impact generalisability. Additionally, the subjective nature of aesthetic experiences can make standardising outcomes challenging.

2. Literature Review

2.1 Neuroaesthetics, Human-Centric Design, and Public Spaces

Neuroaesthetics examines how aesthetic experiences impact brain function, while human-centric design focuses on user comfort and functionality in public spaces. Together, they aim to create environments that are neurologically pleasing and user-friendly, enhancing both emotional and practical aspects of public interactions.

2.2 Differences Between Aesthetics and Neuroaesthetics

Table 1: Differences between Aesthetics and Neuroaesthetics
Source: Author

Aspect	Aesthetics	Neuroaesthetics
Definition	Study of beauty, taste, and art (I, 1790)	Study of how the brain processes aesthetic experiences (Zeki, 1999)
Focus	Philosophical and cultural views of beauty.	Biological and neurological basis of aesthetic experiences.
Key Concern	Artistic and personal value of beauty	Brain activity and emotional responses to art (Chatterjee, 2011)

2.3 Relation Between Neuroaesthetics and Human-Centric Design

Neuroaesthetics examines how the brain processes and responds to aesthetic experiences, focusing on sensory and emotional reactions. (Zeki, 1999). Human-centric design emphasises creating environments that prioritise human needs and well-being (Chatterjee, 2011). Integrating these fields involves aligning design principles with neural responses to enhance user experience. By understanding how people perceive and enjoy spaces, designers can create environments that not only look appealing but also foster emotional and

Figure 2: Relation between the elements
Source: Author

psychological comfort (Ramachandran, 2011).

Neuroaesthetics and human-centric design intersect in optimising user experiences by incorporating neurological insights into design practices. (Dewey) While neuroaesthetics informs us about how sensory inputs affect the brain, human-centric design applies

these insights to create spaces that enhance comfort and emotional well-being (Ramachandran, 2011)

3. Methodology

3.1 Study Setting and Case Study Selection

The study was conducted at Kozhikode's South Beach, chosen for its cultural, historical, and

Figure 3: Site Introduction
Source: Author

social significance, offering diverse activities and experiences ideal for examining neuroaesthetics and human- centric elements in urban public spaces.

3.2 Research Design

A mixed-methods approach was employed, combining qualitative and quantitative techniques. The design integrated literature reviews, case studies, and onsite observations to explore the interplay between neuroaesthetic and human-centric elements.

3.3 Sampling Strategy and Case Study Selection Criteria

- Literature Case Examples: Relevant literature and case studies were reviewed to provide a theoretical foundation.

- Onsite Selection: South Beach was selected for its diverse activities, cultural significance, and high accessibility and usage.

3.4 Data Collection Methods

- Onsite Observations: Conducted at various times to document spatial arrangements, sensory experiences, and user behaviour.

- Activity Analysis: Detailed mapping of movement patterns and interactions.

- Documentation: Field notes, photographs, and video recordings ensured accurate data capture.

4. Data Analysis and Findings

The first step in data analysis involves reviewing the literature to identify tools used and key parameters for evaluation.

4.1 Comparative Inference of Literature Study

The second step is to analyse diverse global case studies, focusing on scale and context to understand how different variables impact their effectiveness and design outcomes.

4.2 Analysis from case study

Integrating neuroaesthetics and human-centric design in public spaces enhances sensory experiences, emotional engagement, and inclusivity. Case studies demonstrate that vibrant, interactive elements and thoughtful environmental design foster community connections and well-being, while reflecting diverse cultural and aesthetic values. Such spaces effectively combine functionality with profound human impact.

4.3 Case Example – Kozhikode South Beach

The third step involves evaluating the South Beach in Kozhikode, Kerala, as a successful case study based on criteria such as diversity, accessibility, gathering spaces, inclusivity, pedestrian friendliness, and multifunctional cultural elements. This analysis helps in understanding how these factors contribute to its effectiveness and success in urban design.

Kozhikode South Beach is a vibrant coastal area in Kerala, known for its scenic beauty and cultural richness. Featuring a diverse range of activities, it offers accessible, pedestrian-friendly spaces that host community events and cultural activities. The site's design emphasises inclusivity, making it a popular gathering spot for locals and tourists alike.

4.3.1 User Groups

Based on activities and age, Kozhikode beach draws a wide variety of users, such as families taking leisurely strolls, kids playing in the sand, young adults participating in water sports, and senior citizens

Figure 4: User Group
Source: Author

Table 2: Comparative Inference of Literature Study
Source: Author

Study Title	Aim	Tools Used	Parameters	Conclusion
Visual Perception of Public Open Spaces in Niksic, Svetlana Perovica, Nadja Kurtovic Folic (Svetlana Perovica)	Design desirable public open spaces	Gestalt psychology, Mental map, Surveys/ Interviews, Comparative analysis	Experience, Diversity Visual factors, psychological experience	Emphasised the need for revitalising public spaces with natural elements for inclusivity and authenticity
Human Emotion Recognition: Review of Sensors and Methods, Andrius Dzedzickis, Artūras Kaklauskas, Vytautas Bucinskas (Human Emotion Recognition: Review of Sensors and Methods)	Review sensors and methods for emotion recognition	Literature review, CNN model	Types of sensors, Emotions, Sensory recognition	Compared the effectiveness of different sensors and methodologies for emotion recognition
Urban Comfort: Physical and Social Determinants of Urban Outdoor Thermal Comfort, Thorsson, S. Lindberg, F., Eliasson, I. (Thorsson)	Identify factors influencing outdoor thermal comfort	Environmental sensors, Surveys	Human activities, Population density, Temperature, Wind speed, Humidity, Greenery	Physical and social factors interact to influence urban comfort, emphasising the role of green spaces
The Influence of Colour on Cognitive Functioning: Review, Ravi Mehta, Rui Juliet Zhu (Ravi Mehta)	Examine the relationship between colour and cognition	Literature review, Data analysis tools	Cognitive functioning, Visual perception, Behaviour changes	Summarised findings on how colour influences cognitive processes, providing evidence- based conclusions
Universal Design: Principles and Models, Ronald L. Mace (Ronald)	Define principles and models of Universal Design	Literature review, Case study analysis, Comparative analysis	Inclusivity, Accessibility, Flexibility, Simplicity, Equitability	Emphasized the importance of Universal Design for equitable access in diverse settings
How Neuroaesthetics and Design Affect Our Health	Understand the impact of built environment on well-being	Surveys, Contextual analysis	Tone, Colours, Lighting, Spatial design	Discussed how neuroaesthetics promotes well-being and suggested practical applications for design
How Neuroaesthetics Brings a Human-Centric Approach to Design	Bridge the aesthetic and human experience divide	Psychological and physiological tests, Behavioural research	Natural material, Lighting, Sensory experiences, Comfort	Found that integrating natural elements reduces stress, improves mood, and enhances cognitive function
Contextual Analysis on the Psychology of Colour in Open Public Spaces	Examine colour's impact on mood and behaviour in public spaces	Colour measurement devices, Mood/emotion scales, Physiological monitoring	Colours, Emotion, Mood, Lighting, Spatial design, Comfort, Safety	Found that colour significantly impacts mood and behaviour in public spaces

Table 3: Case Study Analysis
Source: Author

Public Space	Design Features	Neuroaesthetics Elements	Human-Centric Elements
Superkilen, Copenhagen	Three zones, global items, unique furniture, accessible, sustainable	Multicultural design, sensory engagement	Inclusive design, diverse cultural artifacts
Gardens by the Bay, Singapore	Super Trees, Flower Dome, Cloud Forest, themed gardens, art installations	Vertical gardens, immersive environments	Technology and nature integration, accessible features
High Line Park, NYC	Vibrant plantings, winding pathways, art installations, biophilic design	Sensory stimulation through art and nature	Historical repurposing, interactive spaces
Maggie Daley Park, Chicago	Playful designs, winter Skating Ribbon, diverse plantings, interactive features	Colourful visuals, seasonal changes	Group and individual activity spaces, inclusive play structures
Millennium Park, Chicago	Cloud Gate, Lurie Garden, Jay Pritzker Pavilion, interactive features	Reflective surfaces, diverse plant life	Accessible design, social engagement
The Wave Organ, San Francisco	Recycled materials, sound creation with waves, interactive design	Auditory and tactile stimulation	Encourages exploration, immersive experience
Bright Crosswalks, Reykjavik	Vibrant colours, adaptive lighting, interactive features, natural integration	Emotional response from colours and patterns	Inclusive design, community involvement

finding peace by the sea. This creates a lively and welcoming recreational environment. Because of the beach's many attractions, people of all ages may enjoy a dynamic mix of activities that suit a range of tastes.

4.3.2   Visual Study

The interactive play area at Kozhikode South Beach incorporates equitable amenities, ensuring adaptability for diverse users. It features dynamic elements like kite flying, sandcastle building, and celebration walkways. The design focuses on safety, abundant green spaces, and dedicated elderly seating. Educational and recreational components

Figure 5: Visual Study
Source: Author

foster cognitive development, while festival spaces and artistic sculptures enhance community engagement and tranquillity. This thoughtful integration of aesthetics and functionality creates a vibrant, inclusive environment, positioning Kozhikode South Beach as a model for innovative public spaces.

4.3.3   Survey

A set of 50 questions was crafted to evaluate user perceptions regarding factors that impact experiences in public spaces, focusing on neuroaesthetics and human-centric elements. Drawing insights from literature and case studies, these questions assess various aspects such as sensory experiences, safety, emotional perception, accessibility, and overall design. The aim is to understand how these elements influence user satisfaction and enhance the overall experience. By capturing diverse perspectives, the study seeks to identify key factors that contribute to a more engaging, comfortable, and inclusive public space, ultimately guiding improvements and innovations in urban design.

5.   Results and Discussion

5.1   Result from Visual Study

The visual study of Kozhikode South Beach reveals a robust connection between design elements and user experience. The interactive play area for children, featuring amenities like kite flying and sandcastle

Figure 6: Visual Observation
Source: Author

building, integrates educational and recreational opportunities, enhancing engagement for diverse users. Designed with safety in mind, the area is strategically positioned near seating to ensure easy monitoring, fostering a safe and vibrant environment for all age groups. The design incorporates abundant green spaces, promoting well-being, and includes dedicated seating for the elderly. Festival and event spaces enhance community engagement, while strategically placed sculptures and wave-themed elements contribute to an artistic and tranquil atmosphere. This thoughtful integration of aesthetics, functionality, and inclusivity underscores Kozhikode South Beach as a model for creating dynamic, enriching public spaces that facilitate social interactions and cater to diverse needs.

5.2   Survey Based Analysis

The collective experiences at public spaces highlight the crucial role of neuroaesthetics and human-centric design. Positive ratings across various elements reveal that integrating design, sensory experiences, and environmental features fosters

Table 4: Summary - Kozhikode South Beach Evaluation
Source: Author

Aspect	Findings	Ratings (0-5)	Key Insights
Overall Comfort	High ratings for art installations, signage, colour schemes, lighting, and ergonomics. Challenges include lack of green spaces and poor acoustics.	Good to Very Good (4-5)	Positive overall comfort; improvement needed in green spaces and acoustics.
Overall Safety	Good visibility, effective lighting, and comfortable ergonomics. Challenges include insufficient shade	Mixed (3-4)	Safety is well-regarded but requires better shade provisions.
Colour Levels	Positive impact on visibility, safety, psychological impact, and overall environment.	Good (4)	Colours enhance the public space experience positively; effective use of calming hues.
Emotional Perception	Favourable ratings for cultural events, food, visual experience, historical identity, and interactive installations. Challenges include high traffic congestion and pollution affecting acoustics and smell.	Good to Neutral (3-4)	Positive emotional impact overall; needs improvement in managing traffic and pollution.
Overall Accessibility	High ratings for smart and equitable access, restrooms, ramps, signage, and pedestrian facilities. Challenges include smart technology and safe crosswalks.	Very Good (5) Good (4)	Excellent accessibility; challenges noted in technology integration and crosswalk safety.

Figure 7: Results from Visual Study
Source: Author

a holistic and enriching experience. Factors such as well-being, aesthetics, and ease of navigation are pivotal in enhancing public space interactions. By prioritising these neuroaesthetic principles, spaces can better cater to diverse user groups, creating environments that are both engaging and supportive, thereby improving overall user satisfaction and experience.

Comparative Analysis Summary Elements that create Positive Impact:

• Sensory Experience: Positive ratings, with high emphasis on lighting and comfort.

• Safety: Rated as "safer" with high importance placed on effective lighting and visibility.

• Colour Levels: Consistent positive impact on visibility and safety, with preferred calming colours.

• Emotional Perception: Strong correlation with cultural and interactive elements; challenges in acoustics and smell.

• Accessibility: Positive feedback on pedestrian-friendly design; areas for improvement in technology and shade.

Elements which Lack

• Green Spaces: The lack of green areas affects overall comfort and ambiance. Increasing greenery could enhance relaxation and visual appeal.

• Acoustics: Poor acoustics negatively impact the sensory experience. Improving sound management could contribute to a more pleasant environment.

• Technology Integration: Underdeveloped tech spaces limit the functionality and modern appeal of the area. Integrating more technology could enhance user engagement and convenience.

• Shade: Inadequate shading reduces comfort and safety. Improving shade provision is crucial for better protection and comfort.

• Smell: High traffic congestion and pollution contribute to poor smell, affecting the overall experience. Addressing environmental factors can improve the sensory quality.

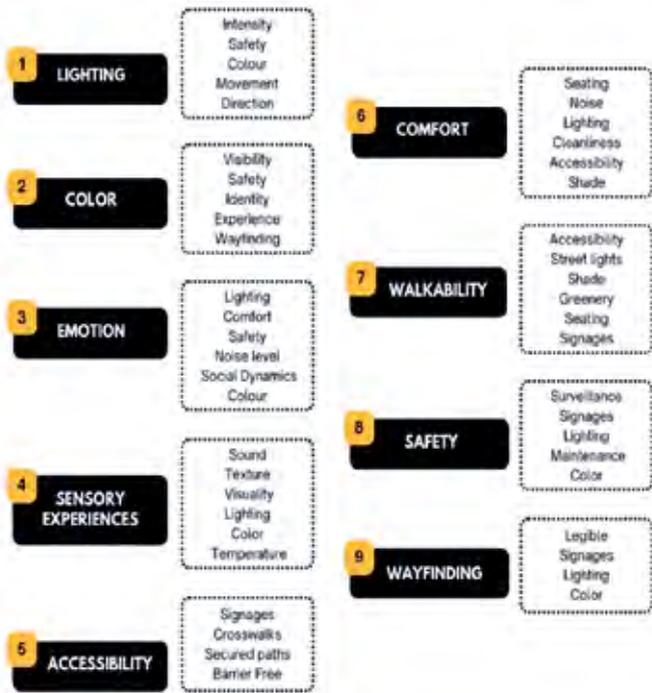Figure 8: Overall Experience in Kozhikode South Beach
Source: Author

Figure 9: Elements of Neuroaesthetics & Human-Centric Elements
Source: Author

- Technical Aspects and Safe Crosswalks: Challenges in these areas impact accessibility. Enhanced design and safety features are needed for better pedestrian experience.

Addressing these shortcomings could significantly enhance the public space, making it more appealing, comfortable, and accessible for visitors.

6. Conclusions

In general, the elements identified in Kozhikode that significantly contribute to enhancing public space experiences are:

- Lighting: Improves visibility and safety, creating a welcoming atmosphere.

- Comfort: Ensures a pleasant environment through well-designed seating and amenities.

- Colour: Affects psychological impact and visibility, with preferred calming tones enhancing the experience.

- Emotion: Correlates with cultural, interactive elements, and overall ambiance.

- Sensory Experience: Includes visual, auditory, and tactile elements that contribute to a positive perception.

- Accessibility: Facilitates ease of movement and access for all users.

- Walkability: Ensures that spaces are easy to navigate on foot.

- Safety: Enhances overall user confidence through effective design and security measures.

- Wayfinding: Improves navigation and orientation within the space.

This study underscores the significance of neuroaesthetics and human-centric elements in shaping positive public space experiences. Key factors identified at Kozhikode South Beach, such as effective lighting, comfort, and colour will demonstrate a strong correlation with enhanced user satisfaction. Lighting and comfort notably improve safety and overall ambiance, while colour and emotional elements contribute to a calming and engaging environment. Accessibility and walkability further facilitate ease of use, promoting a positive experience for diverse visitors.

However, challenges such as limited green spaces, inadequate acoustics, and poor technology integration highlight areas for improvement. Enhancing these aspects could further elevate the public space, making it more appealing and functional. Addressing these issues will be crucial for creating a more inclusive and enriching environment.

Overall, this study supports the hypothesis that integrating neuroaesthetics and human-centric design principles significantly improves user experiences. By focusing on elements that enhance emotional satisfaction, cognitive engagement, and social interaction, urban public spaces can better serve their communities, fostering a vibrant and welcoming atmosphere. Future research could explore advanced solutions for the identified shortcomings and investigate the impact of specific design interventions on diverse user groups.

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ARTICLE

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The Ancient Indian Science to Solve the Architecture of a River Edge City
Haridwar, an Old Indian City

By Ar. Anu Singh

Traditional architecture of India has evolved on the principles of science. The architecture of a city derives its design from the natural setting. The nature-driven factors are air, water, earth, fire and ether. The design patterns narrate the appropriate design solutions. These architectural design solutions are passed on from one generation to the next. The designs are methodologically adaptive to nature-driven factors. The adaptive natural setting in architectural design reciprocates to regional architecture, socio-cultural beliefs, climate, site context, cardinal directions and other minor factors. This also leads to the personification of architectural design solution to individual or group of people. The built environment of cities were created on monumental scale and detailed at miniature scale. The objective of the study is to scientifically study the spatial science of traditional architecture along the river edge city of Haridwar city in Uttrakhand, India. Most of the river cities of India are developed along the water's edge. The flow of river is based on geology of the landform. The economy of the city also generates from the in-built capacity to survive its inhabitants. Haridwar is located along a middle age river flowing to merge with the sea at Kolkata. The sacred aspect of flowing water i.e. river is considered auspicious in the belief system of Hindu religion. The urban form and architecture is very contextual to the religion. The juxtaposition of temples, ghats, streetscapes and spatial design is well woven in the inside and outside of spaces held in these zones. The architectural drawings of the selected historic Indian city will be derived on the natural setting on climatic and cardinal directions, movement patterns on circulation connectivity, myths and iconography of exterior and interior envelops, the philosophy of ancient science of the omnipresent. The scope of study will be limited to an academic exercise. The conclusions are drawn on the research methods adopted for justification based on logical argumentation, co-relational, drawing documentation, symbols and semantics and regionalism and natural setting.

1. Introduction

The present town of Haridwar was also known as Mayapur, Kapilsthan, Gangadwar and Mokshpura. The city layout of Haridwar evolved from the natural setting i.e. geography, topography and hydrology. The most important aspect of urban design of the city is its linearity along the banks of holy river Ganga. This river originates from the melting of glaciers in the Himalayas at Gangotri. The city matures to a stream of prime age at Haridwar, a town of religious character. As seen in figure 1, the river travels on pebbles at Rishikesh, where we can hear the murmur of water. The location of Haridwar and Roorkee are marked with a subtle change in character because of smoother sand and clay mud in area. The middle age of river is found at the ghats of Varanasi. Finally, it culminates at Kolkata and merges into the Bay of Bengal. The cardinal directions define the birth in northeast zone i.e. an auspicious corner and southeast being the transformation into the sea. In 1958, a river named 'Neeldhara' led to a channelized water canal movement by a manmade intervention. The construction of dam on the natural river divided
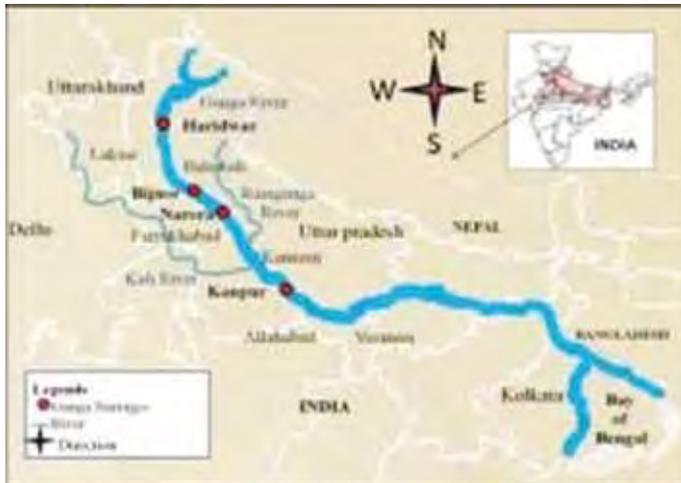
Figure 1 : The route of River Ganga
Source: Author

the water flow into parts termed as 'nadee' (river) and 'nahar' (canal). This channelization of water gave shape to city form. The development matured to an edge that speaks volumes about water-land interface, architecture of streetscapes and courtyards.

2. Aim and Objectives

The aim of academic exercise is to study the architecture at the water-land interface. The interaction of the river to the edge is in the form of built fabric, ghats, courtyard and streetscapes. The theoretical background of Spanish steps, piazzas and temple courts are a derivative of design in this study.

3. The City Layout in the Natural Setting (figure 2)

The natural topography of the city site demonstrates a dip in north-south direction. The northeast and southeast corners are bound by Mansa Devi and Chandi Devi temples. The auspicious goddesses reside in the temples dedicated to them in Hindu

Figure 2 : The city in the natural setting
Source: Author

mythology. The rivers flow between the mountains of Shivalik ranges. The river slows down at 9 km – 10 km from the beginning of its journey to Haridwar. The barrage gates dam the water and the collected water seeps through mechanism in the canal. The canal is named as 'The Ganga'. The rest of the river water follows the natural terrain and flows through barrages to be named here as 'The Neeldhara'. The cardinal direction are 29°58' north and 78°10' east (figure 4). The city is 300 m above the sea level. The natural contour of site is higher in the north and lower in the south, higher in east and lower in the west. This site in termed in ancient science as 'Jalvidhi' and 'Yamvidhi'. The north and northeast have the highest mountains. The southwest is lower and northeast is higher, making it 'Dhanvidi'. The landform is auspicious for Goddess Lakshmi.

The vegetation has a good cover of dense forests. The deforestation on the hillsides leads to increase in landslides. The principal vegetation types can be classified as moist tropical forests located in a few places in Shivaliks and dry mixed deciduous forest. They consist of Sal, Sissoo, Ber, Kadam, Amaltas, Harsingar etc. Bamboo forests are mainly found along the riverbanks and on the slopes of Sivalik Hills.

Haridwar's climate is composite hot during summers, cool to cold during winters and warm and humid during monsoon season. The humidity is as high as 70% - 85% in the rainy season. The movement of wind is affected by the river and hence there is no dedicated wind direction.

3. Methodology

The methods adopted to carry out the study site are collection of authentic drawings of the Haridwar, selection of zone under study, photographic documentation, field notes and study of activities related to spatial architecture.

3.1 Authentic Drawings Data

The site of Haridwar city is linear in plan. The city profile is developed along the water canal. The city is divided into wards by the Municipal Corporation/ Nagar Nigam (figure 3). The holiest or most religious ward is ward number 07 named as 'Har kee Poari'. The ghats are Subash Ghat, Ram Ghat and Ganesh Ghat. The development continued on this pattern along the canal area.

3.2 Transportation – Vehicular and Pedestrian

The transportation in the city runs along the city profile parallel to the Ganga canal. The railway line lies in the northwest part of the city and national highway in the southeast direction. Ganga canal

Figure 3 : The city layout plan with municipal boundary
Source: Author

Figure 4 : Haridwar city along cardinal directions
Source: Author

Figure 5 : The bridges across the river —old and new
Source: Author

Figure 6 : The jharokha window/balcony overlooking the flowing water
Source: Author

flows between these two corridors. The city roads are well-connected by bridges (figure 5). These bridges are laid across the water stream connecting the southeast to the northwest.

The city roads are well connected by the bridges across Ganga and Neeldhara. This transportation system marks or defines the wards of the city. A pedestrian road runs between these two major traffic roads in the city. This pedestrian road demonstrates the activities of shopping and spaces related to the rituals of the ghats. The minor roads form a loop around the well-connected zones on the city landform. This pattern of loop formation is repetitive in the core city and makes this a walkable city in the real sense. The pedestrian road further connects to the smaller subdivisions with the help of a cul-de-sac design. In this design, the dead-end comes alive to the built fabric of buildings.

3.3 Spaces and Spatial Activity

The day and night activities make the pedestrian street active. The day activities are different from night activities. The plan of a long stretch of the ghat is marked by temples at both ends. These temples are dedicated to gods and goddesses (figure 7). The images, idols and praying related vendor shops are spread in the religious zones. These are the most active areas for a holy dip in the waters of the Ganga. The in-between spaces are varied in architectural use such as a bifurcated staircase leading to water surface to feel and touch the water surface. This design typology leads to the sensory connect with a spatial activity i.e. tickling water. The 'jharokha'

Figure 7 : The temple zone in the ghat area
Source: Author

Figure 8 : Building with terrace formation in the facade
Source: Author

is an arched balcony space for standing and sitting along the water edge (figure 6). This space usually overlooks the flowing water. As you walk along this pedestrian street spaces, cow worshipping, shopping, eating etc. are also integral part of the design. The narrowing and widening of streets, chowks (cross roads) and service lanes are there to add a sense of drama to walking. These kind of spaces enhance the overall walking experience.

3.4 Built Fabric / Building Typology
The building typology of the city is a derivation of traditional Hindu architecture. Most of the building plots are having maximum ground coverage. The verandah/courtyard are an important feature of 'haveli architecture'. The temples designs are based on matured design with fully developed shikaras, sanctum, gaushala, tulsi area and gateways. The riverside buildings' architectural characteristic are terraces, jali, arcade, parapets and symmetry in facade design (figure 8).

4.   Data Analysis and Findings

- The drawings are well documented by the Municipal Corporation of Haridwar. The plans are very detailed to the core city zone. The city boundary is defined by Urban Development Department, Uttarakhand.

- The transportation of the city is highly tourist-friendly. It provides a restricted entry to the core city required in times of high tourist influx.

- The multiple activities are dotted in the city plan. The spaces listed above are making the city alive.

- The building typology is Indian in architecture vocabulary, but influence of Renaissance and Baroque are important part of the design.

5.   Results and Discussion
The study of city opens a result-oriented discussion of a historic Indian city. The various parameters of discussion are evolved from the core city design. The photographic documentation and drawings are the data collected for carrying out this discussion further to conclusion. It can be concluded that the city of Haridwar is a river city with Indian ethos. The river makes you travel a journey of architecture along the flow.

Notes
Ghat is a stepped area along the river edge where the land touches the water surface in an inclined plane.

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STUDENT WORK

Sustainable Urban Renewal
Analysing Embodied Energy in Rasta Peth, Pune

By Ar. Anushka Rudrabhate and Dr. Prajakta Dalal-Kulkarni

1. Introduction

The built environment currently consumes significant energy resources and permanently affects the planet's environment. The largest energy consumer throughout a building's life is its operational energy, not its embodied energy (EE) (Holtzhausen, 2007). Throughout the building's lifespan, EE is used in the extraction, production and transportation of goods used in construction. Embodied carbon (EC) emissions, which comprise about 10% of all CO_2 emissions worldwide, are the associated CO_2 emissions. EC emissions, in contrast to operational carbon emissions, are challenging to monitor, quantify and control (Sudhakar, 2022). Urban centers are both "a cause of and a solution to" climate change and are well-positioned to reduce future emissions (Renard et al., 2019). In Indian cities, redevelopment has become a popular trend for residential buildings in the core areas. One reason for redevelopment is that buildings are dilapidated or uneconomical to repair, or tenants need more usable floor area (Vanvari & Mhaske, 2018). Urban renewal schemes aim to revitalise urban areas by renovating existing buildings or constructing new ones. However, the construction and renovation of buildings also have environmental impacts, including the consumption of energy and resources. This project aims to evaluate the EE energy of building construction under urban renewal schemes in cities, with Pune as a case. It investigates the relationship between urban renewal schemes and the EE of building construction and identifies strategies to reduce the environmental impact of building construction in urban renewal projects. Introducing Urban Building Energy Modeling (UBEM) for redevelopment projects of the neighborhoods, this project iterates various building layouts to help eventually reduce EE. The insights into the environmental impact of urban renewal schemes will contribute to developing sustainable building practices in the context of urban renewal.

1.1 Embodied energy

Construction and rehabilitation projects are energy-intensive, which highlights the importance of considering embodied emissions in the lifecycle emissions analysis of buildings. The concept of addressing initial EE within the industry is crucial (Brás, 2017). Due to the multitude of emission sources, greenhouse gas emissions are typically reported as carbon dioxide equivalents (CO2e) and the embodied component of these emissions can be abbreviated as eCO2e (Simonen et al., 2017).

Research indicated that primary construction materials contribute to about 98% of the building's total EE. Besides, the type of construction materials used in the buildings significantly impacted the EE (Rauf, 2022). However, an emerging argument is that EE is more important over the life cycle of a building as operational energy can be reduced post-construction, unlike EE. But EE has received significantly less consideration than operational energy in practice and academia (Davies et al., 2015).

1.2 Urban building energy use

About 36% of final energy use and 39% of energy-related carbon dioxide emissions are attributed to the building sector (International Energy Agency, 2019). Currently, both percentages are increasing. Naturally, the fastest-growing energy source in residential and commercial buildings is electricity, used for space conditioning, lighting, appliances and equipment.

Future building stock models must be integrated with the current energy supply, distribution and transmission infrastructure to ensure long-term sustainability and stability (Holtzhausen, 2007).

1.3 Urbanisation and redevelopment trends
Rapid urbanisation is taking place in developing countries at an unprecedented rate, with most of the world's population projected to live in urban areas by 2050 (Cohen, 2006). The redevelopment aimed to revitalise deteriorating inner-city neighborhoods by demolishing substandard housing, commercial buildings and other structures (Gotham, 2001). Dense neighborhood redevelopment has become a popular strategy for addressing urban sprawl and improving urban liveability. Research suggests that this approach can increase economic, social and cultural diversity in urban areas (Allen, 1980).

2. Carbon neutral neighbourhoods
Carbon-neutral redevelopment is a process that aims to reduce carbon emissions associated with buildings by improving their energy efficiency and using renewable energy sources. In the case of the redevelopment of residential buildings from low-rise high-density to high-rise high-density in the core area of a city, it is necessary to reduce the carbon footprint of the buildings by using sustainable and energy-efficient building materials, implementing green building technologies and utilising renewable energy sources. Transforming these neighborhoods into sustainable, carbon-neutral districts can significantly reduce energy consumption and CO_2 emissions (Janssens et al., 2017). Several studies have explored the potential of transforming social housing neighborhoods into sustainable, carbon-neutral district. Many cities worldwide invest in neighborhood-level redevelopment projects, affordable housing and sustainable development (Gotham, 2001).

In Indian cities, redevelopment has become a popular trend for residential buildings in the core areas, increasing the housing supply (Vanvari & Mhaske, 2018). The redevelopment of residential building stock from low-rise high density to high-rise high density in the core area of a city is a typical urban planning strategy to accommodate the increasing population and urbanisation (Alotaibi et al., 2022). The EC emission associated with the redevelopment can be significant and it is essential to minimise it through sustainable construction practices. Using low-carbon emitting materials and recycled materials can significantly reduce EC emissions (Rauf, 2022). Besides, using prefabricated construction methods can also reduce EC emissions by minimising waste and transportation emissions (Arslan et al., 2023).

3. Study Context
The core of Pune was a planned city with six quarters named Peths. Rasta Peth is one such quarter of the old core developed by Sardar Raste in 1780. Rasta Peth has mixed-use typology buildings and a grid-iron road network segregating access and service roads (Figure 1). Rasta Peth is selected as a representative case where a mix of historic buildings, old and new residential buildings and various functions is found architecturally. In contrast, demographically, a cultural and economic mix is observed (Figure 2).
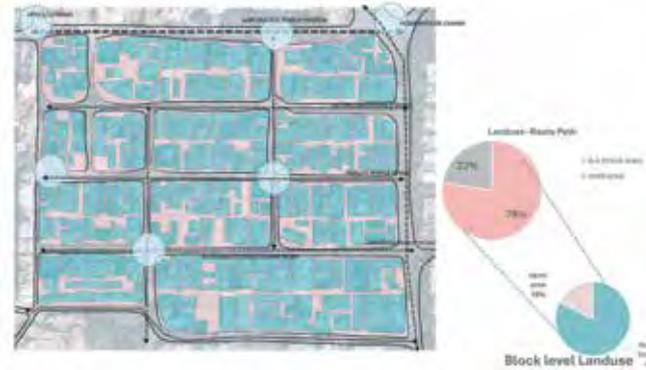

Figure 1: Existing scenario with area distribution- site plan- Rasta Peth
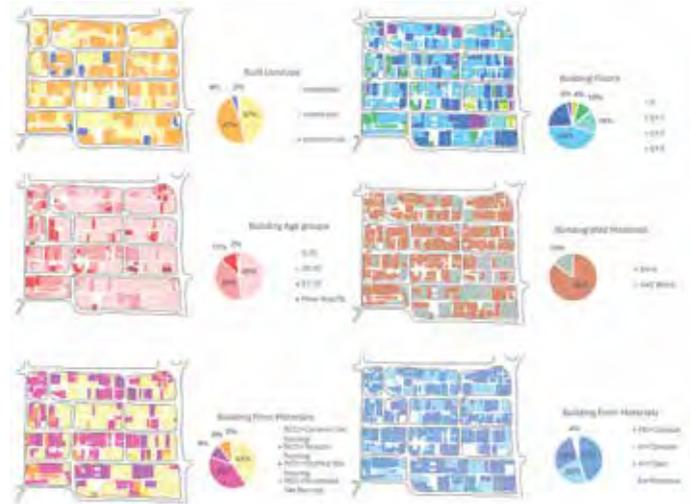

Figure 2: Existing scenario

4. Methodology
The primary data collection method was field survey mapping with the Kobo tool application in QGIS software. The mapping attributes include building use, number of floors, building age and construction material for walls, floor, roof and windows. Three design cases were designed and redeveloped scenarios were set up - conventional 2030, low carbon 2030 and low carbon 2050. Existing systems refer to products and systems available today in the given context. In contrast, Conventional 2030 refers to a scenario where products and systems still use conventional techniques and technologies for redevelopment. The design modules are taken

from the Handbook of Replicable Designs for Energy Efficient Residential Buildings, BEE and modified to suit the design requirements. To assess the effects of three design cases on environmental performance, simulation modeling and analysis in the Cove tool and Vayu Pravah is performed—the analysis performed for EE, radiation, sun hours and wind.

5. Findings and Discussion

The details of the area are as follows:

Building use: Most buildings are residential and mixed-use, with 47% of the total mix occupied by residential buildings. Seven % of the buildings are commercial, while 2% cater to socio-cultural infrastructure.

Age: As this is one of the oldest areas of core Pune city, some structures are over 50 years old. Around 50% of buildings are in the 1-25 year old, 38% are 26-50 years old and 11% are 51-75 year old.

Floors: Most structures are G+3, which accounts for around 44% of the total buildings, followed by G+4 structures with 22%. Some older religious and residential structures are ground, or G+1 and G+2 structures with relatively lesser shares of 4%, 10% and 16%, respectively. However, some newer structures are up to G+5, around 4% of total structures.

Wall Materials: For wall material, the majority of the structures used clay bricks, with a share of 85%. The remaining 15% is concrete or AAC (Autoclaved Aerated Concrete) block construction used in newer constructions.

Floor Materials: The newer constructions have ceramic and vitrified tile flooring, with around 41% and 9%, respectively. The constructions aged between 26 and 50 have terrazzo tile flooring, with

39% of the total buildings. The older residences have Shahabad tile flooring, which shares around 9%, while Kota stone flooring is used in 2% of the total buildings.

Windows Materials: MS steel frames with opaque glass share 45%. About 28% and 23% are Aluminum framed with transparent and opaque glass windows, respectively. However, 4% of the structures, generally old religious structures, have no windows. The details are presented in Figure 3. The EE analysis done with modeling simulation using existing material (Table1) are presented in Figure 4.

Building Template legend

- RCC+ Shahabad Tile+ Brick
- RCC+ Kota Tile+ Brick
- RCC+ Terazzo Tile+ Brick
- RCC+ Ceramic Tile+ Brick
- RCC+ Ceramic Tile+ Conc. Block
- RCC+ Vitrified Tile+ Conc. Block

Figure 3: Existing material inventory

Table 1: Existing building materials
(Source: Authors)

Elements	Material	Embodied energy	Embodied carbon
Wall	Bricks	3.6	0.32
	Concrete block	1.3	0.16
Slab/ Roofing	RCC	2.12	0.24
	Reinforcement	30	2.6
Flooring	Terrazzo Tile	4.6	0.51
	Shahabad Tile	0.44	3.6
	Kota tile	0.79	3.9
	Ceramic Tile	7.8	0.67
	Vitrified tile	9	0.59
Windows	MS frame	280	26
	Aluminum Frame	51	3.5
Glass	Single glazed opaque glass	191.8	10.1
	Single glazed clear glass	191.8	10.1
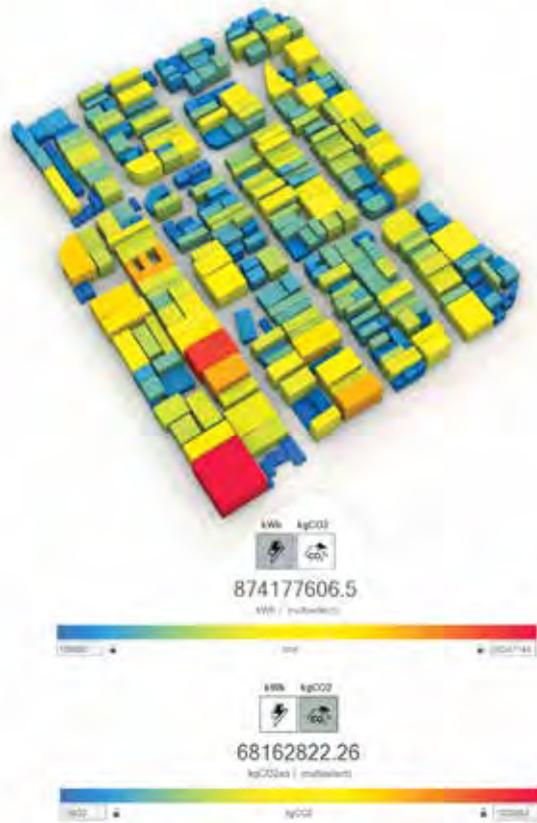
Figure 4: Embodied energy and Embodied carbon for Existing scenario

Figure 5: Conventional EE 2030 Scenario

Analysis indicated that the building assemblies with more significant footprints have high EE. The conventional building with red brick has a relatively higher EE than concrete block. The conventional terrazzo tile flooring with RCC construction has relatively lower EE than ceramic tile flooring with a similar building footprint area. The relatively newer constructions with more than G+4 height structures have more EE. The results of UMI (Urban Modelling Interface) simulations for the existing scenario of low-rise high-density options are shown in Figure 5.

5.1 Redevelopment scenario
The mixed-use development consists of mid to high-rise buildings grouped in clusters of varying heights and shapes, with retail and commercial space on the lower floors and residential units above found suitable. Based on UDCPR (Unified Development Control and Promotion Regulations) Guidelines and cluster policy rules in core city areas, three options are considered for analysis.

Case 1 – It features a mixed-use development with a mid-rise, high-density, small footprints and heights ranging from 8 to 13 stories. The development consists of mixed-use units, where the lower levels are dedicated to retail and commercial space, while the upper levels are for residential apartments.

Case 2 – It features a mixed-use development with a mid-rise high-density block. The building footprints of the blocks are comparatively wider and rectangular, amalgamating 37 blocks from option 1. The blocks have a height ranging from 7 to 12 stories and consist of a combination of residential and commercial units.

Case 3 – The third case also features a mixed-use development with a mid-rise, high-density range from 8 to 11 stories and a combination of residential and commercial units.

5.2 Conventional EE 2030 scenario:
The conventional scenario for embodied energy analysis is modeled and simulated based on the material used in the current redevelopment projects in Rasta Peth, as shown in Table 2. The simulation results are shown in Figure 5.

5.3 Low carbon EE 2030 scenario
In this scenario, low-carbon materials like recycled metals, materials with some percentage of waste content and bio-based materials are increased (Table 3). The low carbon future EE scenario seeks to reduce product EC and EE energy by at least 20% from current levels by 2030. The simulation results are shown in Figure 6.

Table 2: Material inventory for conventional 2030
Source: IPCC

Elements	Material	Embodied energy	Embodied carbon
Walls	AAC blocks (200 mm)	3.7	0.50
	AAC blocks (100 mm)	3.7	0.50
Slab/ Roofing	200 mm rec slab	12.2	1
	Steel reinforcement	31	2.6
	Cement	2.11	0.24
Flooring	Vitrified tile flooring	8.2	0.68
	Ceramic tile flooring	7.8	0.67
	Cement mortar	3.4	0.44
Windows	Single glazed clear glass	160	10.1
	Al. Frames	280	26

Table 3: Material inventory for low carbon EE 2030
Source: IPCC

Elements	Material	Embodied energy	Embodied carbon
Walls	FaLG blocks with flyash content 30% (200 mm)	0.83	0.2
	AAC blocks with flyash content 30% (100 mm)	0.97	0.28
	Concrete blocks Flyash content 30%	0.97	0.28
Slab/ Roofing	Prefabricated 200 mm RCC slab	12.2	1
	reinforcement 50% recyclable content	14.8	1.05
	Cement 30% Flyash content	1.87	0.11
Flooring	Ceramic tile flooring	7.8	0.65
	Cement mortar with 30% fly ash content	1.87	0.11
Windows	Single glazed low E glass	96	5.06
	UPVC Frames	61	3.7
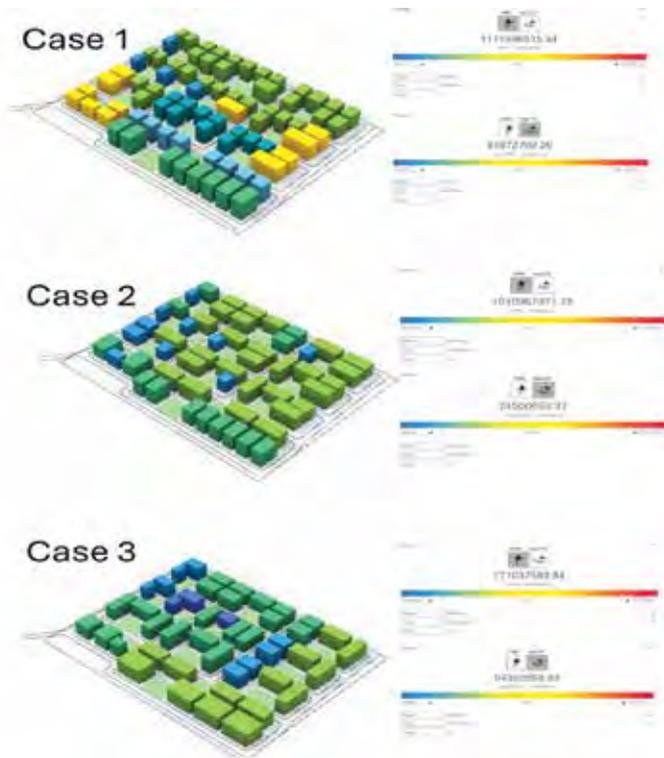
Figure 6: Low Carbon EE 2030 Scenario

5.4 Low Carbon EE 2050 Scenario

This option uses materials produced using renewable energy sources to lessen the manufacturing process's carbon footprint. Electric vehicles and improved supply chain logistics will also help lower the energy needed for transportation (Table 4). The simulation results are shown in Figure 7.

5.5 Comparative Analysis:

The simulation results of the four options present a significant difference as shown in Figure 8. The EE and EC are compared and the result indicated that the most embedded carbon is found in the conventional 2030 scenario. The EE of low carbon 2030 and 2050 scenarios have 31% and 84% lower average EE than Conventional 2030 scenarios. EC of Low Carbon 2030 and 2050 scenarios have 58% and 70% less average EE than conventional 2030 scenarios. Variations in the total amounts of EC can be observed with changes in the materials. Overall, the findings imply that, compared to the Conventional 2030 scenario, switching to a Low carbon 2050 scenario would significantly reduce the EE and EC. However,

Table 4: Material inventory for low carbon EE 2050 scenario
Source: Authors

Elements	Embodied energy (mJ/kg)	Embodied carbon (kg co_2 /kg)
Walls	0. 45	0.15
Mortar	0.23	0.1
Slab/ Roofing	0.75	0.12
Flooring	0.44	0.056
Windows	17	1.2
	31	3.9
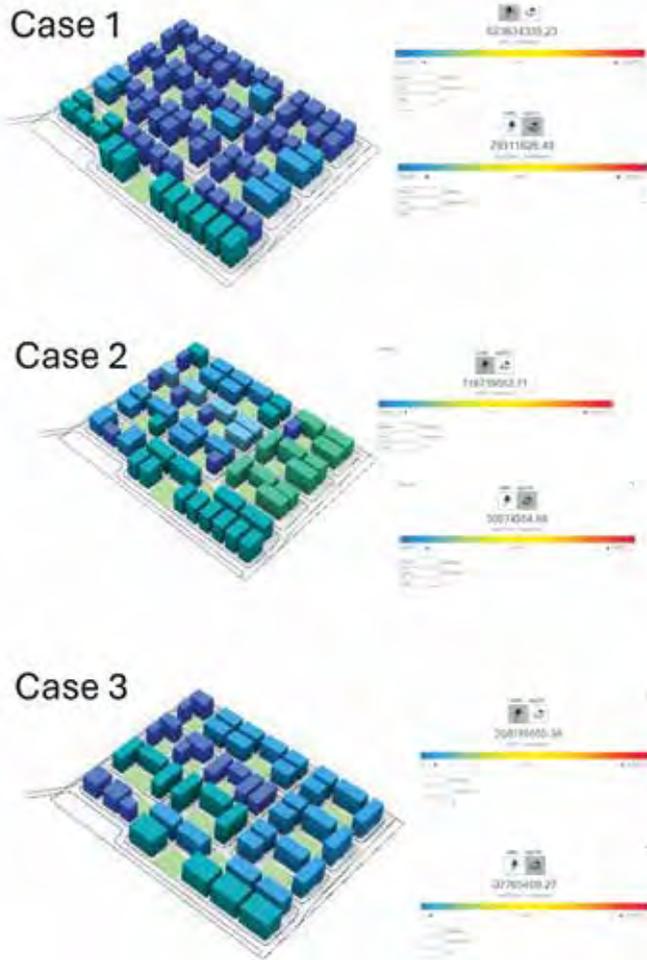
Figure 7: Low Carbon EE 2050 Scenario

Figure 8: Simulation Output
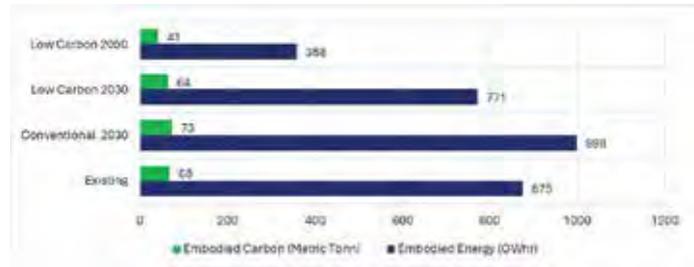
Figure 9: EE and EC intensity

compared to the Low carbon 2050 scenario, the Low carbon 2030 scenario offers a partial reduction in EE and EC (Figure 9).

5.6 Analysing Integrated Environmental Performance at Neighborhood scale.
Sun and Wind – Integrated Environmental Performance Analysis for Building and Pedestrian Comfort: The next step includes examining the effectiveness of direct solar access in relation to pedestrian wind comfort and daylight standards. For the Radiation and Sun Hours analysis Cove Tool is used and CFD (Computational Fluid Dynamics)

analysis is performed with Vayu Pravah. The outcome of the Radiation, Sun Hour and CFD Analysis is presented in Figure 10.

Radiation :

1. Due to small building footprints, the average radiation on surfaces ranges from 70-100% on roof areas. The radiation potential on vertical surfaces ranges from 30- 50%. In some areas, it is up to 25%.

2. Due to bigger building footprints, the average radiation on the roof ranges from 90% to 100%. The vertical surfaces have a radiation potential of 30% to 70%.
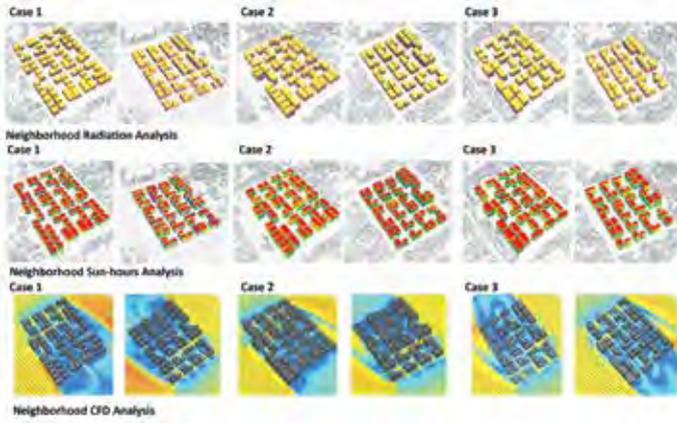
Figure 10: Integrated Environmental Performance at Neighbourhood Scale

3. Due to more significant building footprints, the average radiation on the roof ranges from 90-100%. Due to the increase in height, mutual shading occurs, which prevents the Sun from reaching the west and south. The vertical surfaces have a radiation potential ranging from 40-75%.

Sun Hours Analysis

1. The Sun hour ranges from 80% to 0%. For lower residential floors, the sun Hours are only 2-3 Hours, while the average annual sun hours are below 40% throughout the year.

2. The Sun hour ranges from 80% to 0% for lower residential floors up to 2-8 Hours. The longer facades are on the N-S axis; hence, there is no direct sunlight on wider facades.

3. The Sun hour ranges from 80% to 20%. There is no direct glare, but the sun hours range from 2 to 8 Hours. The longer facades are on the N-S axis; hence, There is no direct sunlight on wider facades.

CFD Analysis

1. The annual wind direction is 270 degrees from the North, with an average wind speed of 1 m/s. Due to the planning of open spaces, the wind flow is equally spread across the site. The average wind speed at the other end reduces to 0.39 m/s. Due to linear pathways, wind can easily pass through the site.

2. The wind velocity is above 0.78 m/sec and the average wind speed at the other end reduces to 0.39 m/s. Due to linear pathways, wind can easily pass through the site.

3. The wind direction is from west and southwest, with a velocity above 0.78 m/sec. The average wind speed at the other end reduces to 0.78 m/s. Due to linear pathways, wind can easily pass through the site.

The outcome of the analysis is summarised in Table 5.

6. Conclusions

The analysis revealed that a thoughtful consideration of a building's orientation, shading and natural ventilation can greatly enhance occupants' thermal and visual comfort. It is noticed that a compact and tall building provided the least amount of pedestrian comfort due to its ability to block wind and provide shade and lower radiation levels, causing discomfort for building occupants. A spread-out building with open spaces demonstrated a balanced performance

Table 5. Case summary
Source: Authors

Cases	Case 1	Case 2	Case 3
Embodied Energy and Carbon Analysis	998 GWhr and 73 m tonn carbon	771 GWhr and 64 m tonn carbon	358 GWhr and 47 m tonn carbon
	🟥	🟩	🟩
Radiation Analysis	Ranges from 30-50% on south and west facades of max. solar potential	Ranges from 30-70% on south and west facades of max. solar potential	Ranges from 40-75% on south and west facades of max. solar potential
	🟩	🟩	🟩
Sun Hours Analysis	Below 20% of total sun hours	Ranges from 2-7 hours of total sun hours	Ranges from 2-8 hours of total sun hours
	🟥	🟩	🟩
CFD Analysis	Avg. velocity - 0.39 m/sec	Avg. velocity - 0.56 m/sec	Avg. velocity - 0.78 m/sec
	🟥	🟩	🟩

Scale

Poor		Good

regarding radiation and wind. However, there is moderate pedestrian comfort because of the wind and sun exposure. Combined spread-out and compact buildings demonstrated a fair amount of pedestrian comfort and environmental performance. It offered a good balance between the analysis of wind, radiation and sun hours. The radiation analysis revealed that the least exposed glazing performed the best in reducing heat gain and ensuring thermal comfort. Sun-hours analysis found that careful design of shading systems, such as overhangs and louvers, can significantly reduce the amount of direct sunlight entering the building, improving thermal comfort and allowing for natural light. The wind analysis indicated that the highest levels of natural ventilation are best to ensure air quality and reduce reliance on mechanical ventilation systems. This project demonstrated the role of building design, layout and material in achieving low carbon and low energy status in redevelopment projects, contributing to attaining energy efficiency at the neighborhood level and leading to a sustainable future in Indian cities.

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All images Courtesy: Authors

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PEDAGOGUE'S PERSPECTIVE

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Pedagogical Approach to Conduct Urban Planning Studio for Students of Architecture
Case of Mumbai Infrastructure Mapping

By Prof. Khudeja Z. Patel and Prof. Suneeta Samant

The city of Mumbai has been growing at an alarming rate. To respond to this phenomenal growth, the infrastructure of the city has been going through constant upgradation. It thus becomes imperative for students of architecture to develop an understanding of urban issues and gain a basic introduction of urban planning that inculcates a sense of responsibility towards their role as architects. The aim of this article is to understand the pedagogical approach and the process of content development to be adopted for conducting the Urban Planning Studio for Semester 9 for undergraduate students of architecture. For the purpose of the study, the methodology developed has been divided into two parts. The first part is the development of theory content and the second part is the studio content. The theory content is developed by referring to multiple syllabus and drawing conclusions. The studio is based on various different typologies. One such example of mapping infrastructure in Mumbai has been discussed in detail. The first step in understanding is by creating awareness of projects of similar nature which requires extensive mapping of these proposals and understanding their correlation with each other. The article discusses the details from studio methodology, scheduling and key outputs. Taking cues from the NITI Aayog Report on Reforms in Urban Capacity India*, which has prepared a table to discuss the skill-sets required for urban planning, an evaluation system has been devised. This evaluation helps assess the course outcome and the extent to which it has been achieved. India is bracing itself to prepare for huge urban level interventions the current finance minister Smt. Nirmala Sitharaman stated that "Working with states, our government will facilitate development of cities as 'growth hubs'. This will be achieved through economic and transit planning, and orderly development of peri-urban areas utilising town planning schemes". Architecture education needs to understand and align with growing needs of urban planning and lay groundwork for the same.*

1. Introduction

India is the second largest urban system in the world with almost 11% of the total global urban population living in Indian cities. In fact, if one were to look into the absolute numbers, the urban population in India is more than most highly urbanized countries across the globe. Urban Planning as a profession is soon gaining momentum. As stated in the *NITI Aayog report on Reforms in Urban Capacity, India* 'the principal the basic genesis of urban (or town and country) planning is in physical planning that is seen as an extension of architecture.' However, along with physical design-oriented planning, non-spatial public policy perspective has become equally important. It therefore becomes imperative to look into modules for teaching urban planning at various levels in architecture education. Additionally, most students joining postgraduate programmes in

planning are from an architecture background, which further emphasis the need to conduct such studios. The NITI Aayog formulated an Advisory Committee to prepare a report focused on devising measures to strengthen the three pillars of cumulative urban planning capacity in the country: public sector, education/ research sector and private sectors; and on identifying ways to create a robust feedback loop that helps one pillar strengthen the other.

The architecture course is paced in a manner that the focus of architectural design in the elementary years is mainly on single unit dwellings, basics of anthropometry, ergonomics, then slowly increasing scale to projects with multiple blocks and large-scale projects, housing and finally mega scale projects at an advanced level. This gradual growth in scale is what dictates the growth of other subjects as well. The University of Mumbai's syllabus has provided for individual institutes to develop subjects and course contents in subjects like Allied Design, College Projects (CP) and Electives. The syllabus states that 'The course content will be developed by the individual colleges as per their choice of Allied Design/ CP scheme'. It reserves its directives to providing just a list of suggested topics. The article covers the study conducted under the subject of Allied design on Semester 9, whereby the list provided by the Mumbai university states: Town planning, Urban Design, Housing and Environmental design. The IES College of Architecture (IES COA), Mumbai based the development of these subjects upon the overarching idea of a gradual growth. The subject of Allied Design in semester 9 was hence developed with an aim of introducing the students of architecture to the basics of urban planning. Additionally, the physical, statutory and socio-economic setting for architecture has been created by the Urban Development Plan. Therefore, a basic understanding of Urban Planning among the students inculcates a greater understanding of urban issues and inculcates a sense of responsibility towards the role of an architect. The Studio also prepares a sound base for post-graduate studies in Planning for interested students.

1.1 Aim and Objectives
The aim of this study is to understand the pedagogical approach and the process of content development to be adopted to conduct a Semester 9 Urban Planning Studio for students of architecture.

Primary learning objectives of urban planning studio were:

- To understand the significance of regional context and linkages

- To understand the role and potential of the city as economic growth center

- To study historic evolution of urban areas and assessing growth trends

- To understand the legal framework and study the process of master planning

- To study planning standards for social and physical infrastructure

- Exposure to urban issues of Indian cities, government policies and initiatives

- Exposure to global challenges, new concepts in planning and urbanism

1.2 Methodology
The overall course content development included two parts. The first part was to develop the theory content of the subject. The second part included planning of a studio exercise and the deliverables that help achieve the course objective and are in sync with the theory content. The first part (theory) was largely fixed with only addition of feeder lectures for supporting the studio project and the second part (studio exercise) to be different for every academic year (see Fig. 1).
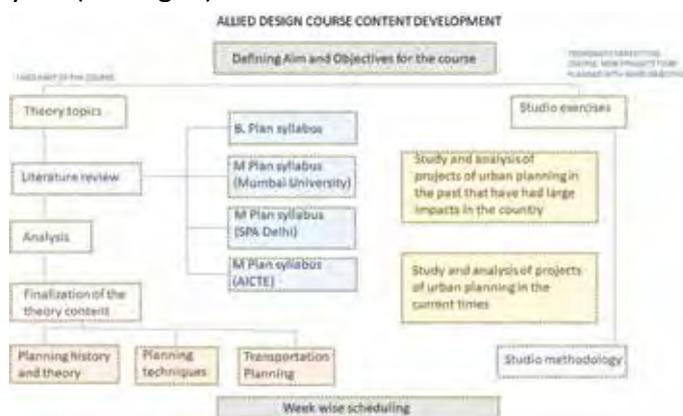

Figure 1: Methodology Flow Chart
Source: Authors

Part A: Theory topics development

Literature Review
A literature review was conducted of the syllabi of the Master's in Urban and Regional Planning (Semester 1) of various universities (See Table 1).

Data Analysis and Findings
The comparative study of the above-mentioned syllabi reveals the wide scope and the broad spectrum of objectives of the Post-Graduate Courses in Urban and Regional Planning in India.

The Institute (IES COA), therefore designed an Introductory course in Urban Planning to be taught at the Fifth Year level of under-graduate course which would expose students to the technical, professional,

Table 1: Syllabus comparison table
(Source: Authors)

M.Plan. (Mumbai University)	M.Plan. (AICTE)	M.Plan. (SPA New Delhi)	B.Plan. (SPA, Bhopal)	Remarks
Planning Theories and Techniques	*Planning History and Theory*	*Planning History and Theory*	*Planning History and Theory*	
Evolution of City Building:	Ancient and Medieval Cities in India	Planning History		Proposed to be included in the theory content
Planning History: Ancient to Post Industrial period	Mughal and Colonial Built Environment	Definitions and Rationales of Planning Theory		
Definitions and Objectives of Planning	Urban Theories		Introduction to Planning	
Theories of City Development and Planning Theories	Theories of Planning		Planning Theory, Contemporary planning practices	
Socio - Economic Planning	Economic And Sociology	Socio - Economic Base For Planning	Socio - Economic Base For Planning	
Nature and Scope of Sociology	Culture and the City	Nature and Scope of Sociology		
Community and Settlements: Issues, Government Policies and Initiatives	Economic Resources	Community and Settlements	Sem.1:Introduction to Human Settlements	Topic contents covered in sem. 6 Humanities
Elements of Micro and Macro Economics	Economic Analysis	Elements of Micro and Macro Economics	Sem: Elementary Urban Economics	
Development Economics and Lessons from Indian Experiences	Land and Real Estate Markets	Development Economics and Lessons from Indian Experiences		
	Planning Techniques	Planning Techniques		
	Scales and Preparation of Maps Data for Planning and Socio- Economic Surveys	Survey Techniques and Mapping Analytical Methods	Sem 3: Techniques of Planning – I Sem 4: Techniques of Planning – II	Proposed to be included in the theory content
Survey Techniques and Analytical Models: physical surveys, Survey techniques, Land use classification, Mapping, Map Interpretation and Preparation	Physical Surveys	Planning Standards	Qualitative and Quantitative Techniques in Planning	
Demographic methods and Planning Standards	Analysis and Presentation of Data		Introduction to Demography	
Traffic and Transport Planning	Transport Planning	Infrastructure and Transport Planning		

Introduction to Basic Concepts	Transport System:Types, characteristics of transport systems, Transport infrastructure planning and design	Role of Infrastructure in Development		Proposed to be included in the theory content, partially
Design of Urban Road Infrastructure: Elements, standards and parameters of road design,	Land use – Transport Integration	Physical Infrastructure	Sem 3:Utilities and Services Planning	
Design of Intersections	Traffic Impact on Land Development	Social infrastructure		
Traffic Management Systems and Safety	Transport Planning Policies and Projects	City Development and Transport		
Transport Infrastructure Planning, Management and Design		Transport Infrastructure Planning and Design Principles	Urban Mobility Planning	
		Urban Transport Planning Process and Studies		
		Transport Management		
Housing, Resettlement and Rehabilitation	Housing And Environment Planning	Housing And Environmental Planning		
Concepts and Definitions	Problem of Housing: Socio- economic Significance	Concepts and Definitions		Topic contents covered in sem 6 humanities, semester 7 housing studio and sem 9 EVS
Urban Housing	Housing Policy and Finance	Social And Economy Dimensions	Housing and Community Planning	
Housing policies and programs in India	Ecosystem, Urban Ecosystem and Quantitative Ecology	Housing and the City		
Land Development and Resultant Resettlement	Resource Planning and Management	Planning for Neighbourhoods		
Impact of Resettlement and Rehabilitation (R and R) Plan			Sem 5: Planning for Urban Informal Sector	
Participation as an Important Tool for Resettlement and Rehabilitation				
Environmental Planning and Management				
Concepts of Ecology, Ecosystem and Environmental Planning				
Resource Analysis and Conservation				
Environmental Zones				
Environmental Policies, Significant Conventions, Conferences				Topic contents covered in sem. 9 EVS
Environmental Management, Appropriate Technologies and Management				
Alternate Energy Technologies				

ethical and interpersonal skills expected to be acquired in the Post-Graduate Course in Urban and Regional Planning (URP) (See Table 2). The course content was broadly divided into the three segments described below:

i) Urban Planning Systems, Procedure and Methodology

- The first module of this segment focuses on studying the scenario of settlements in India, need for urban studies, definition and comparison of rural and urban settlements, understanding the concepts of urbanization, sub-urbanization, peri-urban and fringe areas, satellite towns and various types of regions.

- The second module looks into planning legislation, hierarchy of planning bodies from national level to local level, three tier-governance framework in India, MR and TP Act: background, scope and provisions of the Act, Regional Plan, MMRDA's roles and responsibility

- The third module includes the procedure of the Development Plan (DP), role of planning authorities, the multidisciplinary nature of DP preparation, the interpretation, implementation and execution of development plans and its components.

- The fourth module looks into the key urban policies of India, like ULCRA, the 73rd and 74th Constitution Amendment Act, JnNurm, Rajiv Awas Yojana, Smart City, Amrut, Swachh Bharat Mission, etc.

ii) Planning Theory

- The first module in this segment looks into the world overview of urban planning history and evolution of cities from the ancient period to the 21st century.

- The second module includes significant planning theories such as the traditional *Neighbourhood Theory, Garden City theory, New Town Theory,*

Transit Oriented Development and *New Urbanism* exposing students to the socio-political context of the theories, their objectives and examples to better illustrate the theories.

- The third module focuses on the theoretical understanding of urban form, structure and morphology.

iii) Planning Techniques

- The first module in this segment includes the planning framework outlined by the Urban Development Plans Formulations and Implementation (URDPFI), the guidelines and planning techniques adopted for various city typologies, methodology of planning and the standards of planning.

- The second module deals with transport planning, understanding the role and need of transport planning, classification and hierarchy of roads, functions and design elements and parameters of various types of roads.

Part B: Studio Exercise Development
Each year, the Faculty of Planning experiments with a new theme with the view to expose students to current global trends in Urban and Regional Planning. Case studies and the methodology to conduct the studio are predetermined by the faculty with in-depth research. The Studio is supported by theory lectures which help provide the basic theoretical framework. Documentation of studio work done in the end of the Semester serves as a valuable source of reference for the College Library.

There have been various types of projects undertaken in the studio in the past. A study and research methodology of each project is worked out separately before the start of the project. A brief description of each typology with one example is as follows:

i) *Case study based projects:*
This studio exercise comprises of various case studies of towns designed with similar theme and scale and

Table 2: Course Outcomes of Allied Design (Urban Planning) Semester 9, Fifth Year Arch.
Source: Authors

CO 1	Understand Planning Systems Hierarchy, Legal Framework, objectives, procedure and methodology of Urban and Regional Planning in India
CO 2	Understand the evolution and timeline of Urban Planning developments in the world and learning about future responsibilities of planners to address various global challenges.
CO 3	Learn about traditional and contemporary planning theories and their application through case studies
CO 4	Acquire knowledge about mapping techniques and map interpretation, use of advance softwares and applications for mapping, data collection and documentation
CO 5	Become aware of urban issues of Indian cities, Government policies and initiatives

typologies such that a comparative analysis could be attained:

Interpretation of city structure with special focus on 'city to region' relationship

Urban areas, particularly the Class I, Small and Medium towns are closely inter related to their surrounding village economy. As the economic development of rural India is closely related to this category of urban areas, it was proposed to study a few of such towns to understand their role and potential in relation to their rural hinterland. Emphasis was laid on studying the following:

- Historic evolution of urban area

- City form and relation between core– town– region

- Regional context and linkages

- Influence of region on functions and economy proposed master plan for the region

- Role of infrastructure and amenities in boosting regional economy

- Image and character: transect

- S.W.O.T analysis

The cities studied during this studio were Aligarh, Bikaner, Cuttack and Guwahati.

ii) Design based projects:

In some years, the studio experiments with project study and certain components of design of towns or portions of towns. Here the students understand the difference between architecture design and urban planning and the difference in the scales that they operate at:

Samruddhi Mahamarg and Krushi Samruddhi Nagars

This planning studio focused on a live infrastructure project of the Samruddhi Mahamarg, which is the 'Super Communication Expressway' between Mumbai and Nagpur, being executed in Maharashtra, which offered an opportunity to study planning at different scales– from a wider geographic region to the scale of urban planning. The Mahamarg envisaged as an 'investment corridor' with the Krushi Samruddhi Nagars (new greenfield towns) proposed along the Mahamarg to function as catalysts for development of the rural hinterland, was an ideal setting for theoretical and practical learning from macro to micro levels.

The Krushi Samruddhi Nagars chosen for detailed study were Virul (Wardha), Dattapur (Amravati), Sheh (Washim), Savargaon Mal (Buldhana), Jamwadi (Jalna), Hadas Pimpalgaon (Aurangabad), Dhotre (Ahmednagar and Aurangabad) and Hivras Lenad (Thane).

iii) Mapping and analysis based projects:

Large scale infrastructure mapping and their city level interventions act as a good starting point to certain projects. This can be followed by analysis of the same:

Mapping infrastructure

The city of Mumbai has been growing at an alarming rate. To respond to this phenomenal growth, the infrastructure of the city needs constant upgradation. At present, the city is experiencing the execution of multiple transport infrastructure projects ongoing simultaneously. These not only act as physical linkages but also economic, employment and social linkages impacting overall development of the city. A need was felt to view these comprehensively in relation to the city's structure. The scope of mapping was extended to Greater Mumbai, Thane and Navi Mumbai.

Emphasis was laid on the following:

- Creating awareness about the city and its infrastructure

- Studying the timeline of infrastructure projects and their role in shaping the metropolis

- Mapping of Infrastructure for comprehensive overview of various infrastructure projects and their inter-relationships

- Understanding the validity of the infrastructure project

- Impact assessment: physical, social, environmental, economic and visual impact

- S.W.O.T. analysis of each transport project The mega infrastructure projects studied were:
  - Coastal Road Project
  - Metro Project
  - Monorail Project
  - Trans Harbour Link Project
  - Navi Mumbai Airport Project

For the purpose of the article a detailed study of the pedagogical approach and the outcome of this project has been explained here: The methodology for this studio was starting with research problem definition. This was the first step and it was done by the team of mentors after a thorough study. The next step was data collection. This study although conducted

by the students, a detailed framework of study and the sources was provided by the mentors. Lastly the data analysis was jointly done by the students and mentors. This was a weekly, full-day studio. A week-by-week meticulous planning was done to make sure the methodology charted was achieved within the given time frame. The students were divided into groups within which they conducted their research (see Figure 2) and present their work according to the given list of deliverables at the end of the Studio (See Table 3).

Figure 2: Research methodology of mapping infrastructure studio project
Source: Authors

Key output of the studio:

a) Comprehensive map of all infrastructure projects
A single steering group was formed which comprised one representative from every group. This steering group was responsible for the creation of a base map and a compilation of all the infrastructure on a single map, this being a first-of-a-kind map, as nothing similar was available on the public forum. (See Fig. 3).

b) SWOT analysis
A SWOT analysis was done for each infrastructure project with respect to the common pointers of analysis provided by the mentors. For the purpose

Figure 3: Comprehensive map of upcoming infrastructure projects in Mumbai
Source: Compiled from the Studio Projects by students

of this study, two SWOTS have been mentioned in Table 4.

5.   Results and Discussion
The NITI Aayog Report on *Reforms in Urban Capacity India* states the skill-sets of urban planners as: 'An urban planner, ideally, possesses skills for solving complex multi-sectoral challenges, moderating the competing pressures on land posed by market forces, environmental considerations, and social

Table 3: Week-wise schedule and deliverables of the studio project
Source: Authors

Table 4: SWOT analysis of Metro and Monorail projects
Source: Compiled by Authors

Mode/ Aspects	Strengths	Weaknesses	Opportunities	Threats
Physical Alignment & land use	• Metro Network aims at last mile connectivity within eastern & western suburbs, strengthens east west connectivity and links important commercial hubs to residential areas	• Most Metro alignments coincide with already congested roads, reducing effective carriageway widths and creating dark & dead spaces under the stations	• Increased Connectivity opens up avenues for new developments & redevelopment, planned distributions of more job centers possible in future	• Degeneration of congested localities if not planned comprehensively
Traffic & Mobility	• Faster, safer, environment friendly mode of transport, reduction in travel time, decreased dependence on private vehicles expected	• Hefty structural members of Metro corridors reduce effective carriageway widths in congested areas, compromising the local traffic volumes below the Corridor	• Improved walkability, safer & convenient last mile connectivity can be achieved with sensitive planning approach	• Adverse impact on revenue of Existing Mass transit (BEST) likely.
Socio Economic Aspects	• Increased employment opportunities due to development of commercial centers • Savings in Fuel consumption • Accessibility addressed	• Increase in travel expenses for commons • Businesses at lower levels adversely affected due to lack of physical & visual access	• Increase in land value of properties may boost development & redevelopment trends. • Creation of public recreation & amenity areas below corridors	• Land speculation
Environmental Aspects	• Non polluting mass public transport • Reduced dependency on private vehicles would lead to reduction in carbon emission	• Light & ventilation of lower floors of buildings along the Metro corridor is seriously affected. • Loss of vegetation, extreme pollution and traffic congestion caused during execution	• Promotion of pedestrian friendly walkable streets leading to healthy lifestyle	• Planning voids created below the station areas, may become dark, dingy, unsafe and unhygienic areas if unmaintained. • Informal hawking & parking may create conflict with local traffic.
Visual Aspects	• Smart & trendy mode of transport	• Forms a visual barrier • Buildings flanking the metro corridor lose their privacy and visual openness.	• Creates opportunity for urban art & landscape	• Creation of several unpleasant voids along the corridor may damage the image of the City.
Physical Alignment & land use	• Alignment of monorail is important as it provides mass transit opportunity to congested parts of the island city • Provides accessibility to important medical & educational institutions	• Monorail receives lesser footfall than expected • Lost opportunities of modal interchange at many locations • No significant boost for development to adjoining lands	• Improved connectivity & modal interchanges may improve ridership on monorail in future	• The infrastructure may suffer losses and head towards closure
Traffic & Mobility	• Provides improved accessibility between prime institutional zones of Island City	• No significant reduction in vehicular traffic on ground due to negligible ridership on monorail		
Socio Economic Aspects		• Unaffordable mode of transport for commons		
Environmental Aspects	• Non polluting mass public transport	• Station areas poorly designed & maintained dissuading commuters to opt for this mode		
Visual Aspects	• Smart & trendy mode of transport	• Dark & dingy areas created below stations • Informal hawking & parking create chaotic conditions.		

needs, and take a balanced approach in a citizen-centric approach'. It further elaborates with a table the type of technical skill and the type of managerial skill needed to be acquired for the profession. As stated earlier, physical planning is an extension of architecture. Thus the focus at the under-grad level of architecture could be to further enhance those skills. As a method of evaluation, we went through the part of technical skills and derived a simple grading system to assess the level of achievement based on the total course content, including both lectures and studios. The description of the grading system is shown in Table 5.

1. Topic introduced: In this the topic was introduced and its importance highlighted to

Table 5: Skillset possessed by urban planner and the author derived evaluation process overlapped
Source: Compiled by Authors from NITI Aayog

Quantitative and qualitative research	Project structuring	Strategic planning	Consensus building and moderation
Surveying and mapping	Critical thinking	Financial modelling	Leadership and team management
Policy development	Problem solving ability for multi- sectoral issues	GIS and Remote sensing	Project Evaluation and monitoring
Documentation and visual presentation	Multi-disciplinary awareness	Regulatory and legal frameworks	Communication and persuasion

Note 1: The rows and columns marked in Table 5 in these two colours are suggested in the NITI Aayog report.		Note 2: The rows and columns marked in the above four colours are as per the authors grading system derived)	
Technical skills		Topic introduced	
		Skillset achieved at elementary level	
Managerial Skills		Skillset achieved at intermediate level	
		Skillset achieved at advanced level	

students through lectures, studio discussions, external vivas, etc.

2. Skill-sets achieved at elementary level: After introduction of the topic, the students worked on it during their studio project and have attained an elementary level understanding of it.

3. Skill-set achieved at intermediate level: After introducing the topic and the studio project's emphasis on it, the process resulted in an intermediate level understanding of it. This made the students largely confident of applying it further.

4. Skill-set achieved at advanced level: After introduction of the topic, and the studio laying maximum emphasis on achieving it, it was seen that this helped students achieve an advanced level understanding of the topic and could utilize it easily in other projects of the same scale.

6. Conclusions and Recommendations

Architecture is a multidisciplinary field that needs different subjects to be introduced at various levels.

Urban Planning is one such subject that holds acute importance in contemporary times as India is bracing itself to prepare for huge urban level interventions in terms of infrastructure development, smart cities, industrial corridors, etc. Students not only need a generic understanding of the subject but also awareness of these projects and the massive impact on the country as a whole. The current budget also laid an acute emphasis on planning whereby the current Finance Minister Smt. Nirmala Sitharaman stated that:

Working with states, our government will facilitate development of cities as 'growth hubs'. This will be achieved through economic and transit planning, and orderly development of peri-urban areas utilising town planning schemes.

The allocation of the budget for the Ministry of Housing and Urban Affairs saw an increase from ₹ 76,431 crore for 2023- '24 to ₹ 82,576.57 crore for 2024- '25. Architecture education needs to understand and align with growing needs of urban planning and lay groundwork for the same. The transport infrastructure project was one such

example whereby the ongoing projects were documented and studied for better understanding.

Acknowledgements

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SKETCHES

Sketching on the Touchscreen of a Cell phone

By Ar. Laxman Thite

This reminds me of my staying at Nashik with my grandfather, Shri V.G. Kulkarni, who was a great artist. I used to watch him, all the time, in his studio, making paintings and statues, clicking photos. His art continually fascinated me.

This also takes me to my school days. I was fond of painting landscapes with water colours. Over a period of time, that hobby was forgotten during the days of my architectural education. Rendering with Rotring ink pens was more in vogue then.

During my career as a practising architect, sketching was, and still is, the soul of my imagination. And that's how sketching of *anything* at all, is my hobby. CAD was introduced in my architectural practice much later. Until then, paper and pencils or pens were the mediums for sketching. Frankly, the prevalent use of AI is something unimaginable to me.

In the recent past, cell phones were introduced and everyone including me was busy putting them to their maximum use. As a reflex action, I started playing with the stylus upon the touchscreen of my cell phone. Aha! I found a treasure and I was happy to know that at anytime, anywhere, while sitting, while travelling I could make sketches of many things on my mobile, without paper and pencil.

And that's how my old hobby of sketching was blessed with an easy reincarnation.

This hobby continues . . .

Laxman

Vision
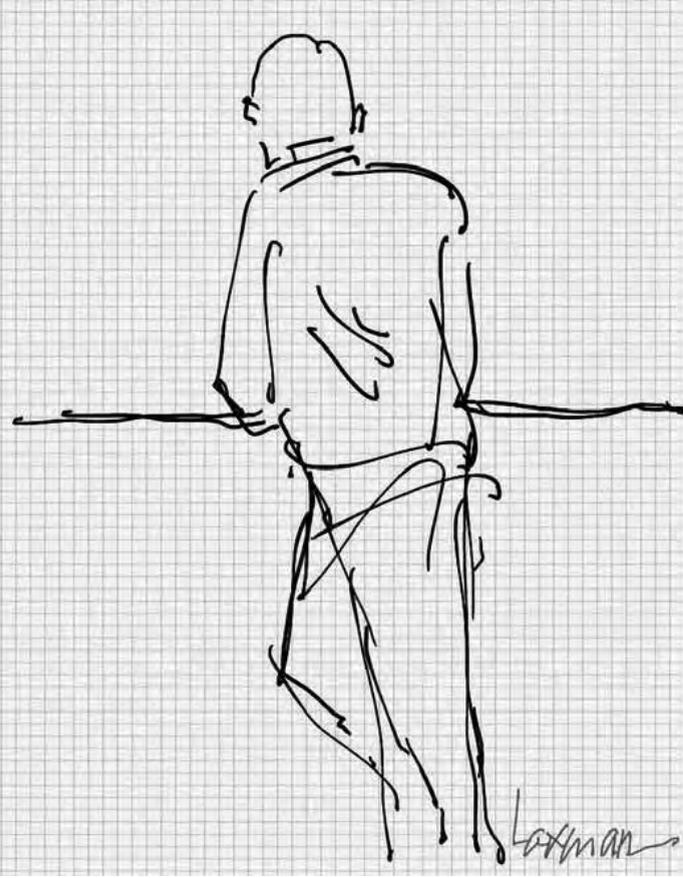
Lean

Waiting for Green

तुरंग

मी

निनावी

विचारमग्न

रिक्षा

प्रतीक्षा

खेळ सावल्यांचा

Ar. Laxman Thite (F-09352) started his practice since 1979, after acquiring his Govt. Diploma in Architecture (G.D. Arch.). He is a Registered Valuer by the Income Tax Dept. He has successfully completed many residential complexes as well as commercial buildings in in and around Pune and Mumbai. During his career he has won many accolades. He has served with the Executive Committees of IIA Pune Centre and Architects Engineers and Surveyor's Association (AESA), Pune. He has been a Juror for many colleges of architecture in Pune and of BAI's Well-built Structure Competitions and AESA Awards
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Great Expectations
Notes to an Architect

Christopher Benninger's Last Book Released Posthumously
Author: Ar. Christopher Benninger
Reviewer: Ar. Sarbjit Singh Bahga

ISBN: 978-93-83184-88-0

Genre: Narrative: Theory of Architecture

Language: English

No of pages: 295

Year of publication: 2024

Publisher: CEPT University Press

Christopher Charles Benninger (23.11.1942 - 02.10.2024) was an American-born Indian architect who contributed significantly to the field of critical regionalism and sustainable planning in India. He studied urban planning at MIT and architecture at Harvard University, where he later taught. Despite his illustrious career in the USA, Benninger chose India as his *karmbhumi* and worked here for over five decades. Recently, he left this world on 2nd October 2024 at the age of 82. Before his passing, Benninger was working on the book **"Great Expectations: Notes to an Architect,"** which was published and released during the memorial prayer held for him on 22nd October 2024. The book is thus a last gift to all architects, planners and students.

"Great Expectations: Notes to an Architect" is a sequel to Christopher Benninger's bestselling book, "Letters to a Young Architect". This book is a chronicle of his life's journey to find the spirit of architecture, replete with anecdotes and experiences from his pursuit spanning more than half a century. It captures his concerns about architectural education, design and practice. Like "Letters to a Young Architect", this is a collection of autobiographical narratives and ideas from his articles and lectures over the past two decades. It is his story of self-discovery and a testament to his search for truth.

"Great Expectations: Notes to an Architect" reflects on contemporary architectural practice and its role in improving human conditions. It gives directions
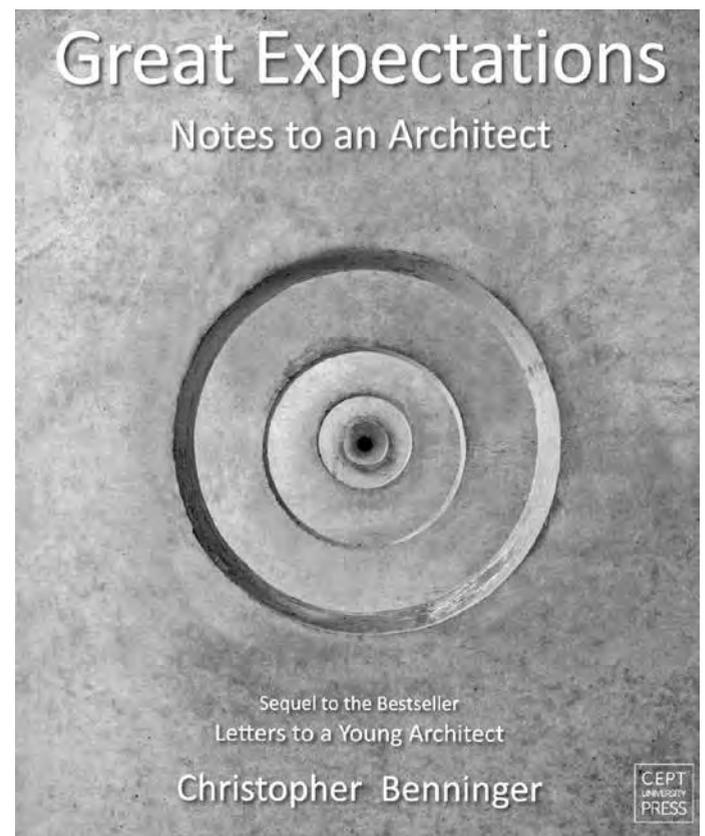
Great Expectations: Book Cover
Source: Reviewer

to students and practitioners alike. Benninger notes his encounters with his gurus and how their passion for humanity shaped the lives of others. He firmly believes in the *guru-shishya* tradition, a lineage of values, ideals, principles and practices that have matured from generation to generation. In this vein, he calls the spirit of architecture the spirit of continuity.

Edited by Karan S. Gandhi and published by CEPT University Press, Ahmedabad, *"Great Expectations"* is a sizeable treatise of 295 pages comprising about

90,000 words. It is dedicated to Ramprasad Akkisetti, a long-time associate of Christopher Benninger. The entire text has been subdivided into four sections, i.e., 1. Architect in the Making, 2. Architect in the Studio, 3. Architect in the Labyrinth, 4. Architect in History. It is followed by Postscript: The Spirit of Architecture. A noted Indian architect, Bimal Patel has written the Foreword to the book.

In the first section, 'Architect in the Making', the reader will get a sense of the incredible people Benninger has met, conversed and worked with. One will understand who his great teachers were and what early travel taught him. In the second section, 'Architect in the Studio,' readers will understand his architectural philosophy and his thoughts on practice. If one reads this book along with his "Christopher Benninger: Architecture for Modern India", one will get a sense of the fascinating problems he has tackled and his vast body of work. The third section, 'Architect in the Labyrinth,' contains his musings on architecture - streams of thoughts about architecture and life. The fourth section, 'Architect in History,' reflects on his legacy and his thoughts on Indian Architecture.

"Great Expectations: Notes to an Architect" echoes Gio Ponti's famous book "In Praise of Architecture". It is replete with numerous quotable quotes on architecture and architectural education. Reproduction of some of them will give the readers a sufficient idea about the contents:

"Creative attempts, exploratory acts and discovery processes are modes to search for the self".

"We must learn from the past to formulate actions in the present that change the future".

"A sustainable building is also poetic, uplifting, and a statement of hope".

"Architecture is an experience of a place and not the built form".

"Continuity and harmony should be achieved through consistency in the architectural language and the environment".

"In aesthetics, there are no issues of right or wrong, but there are issues of balance, harmony and the golden mean".

"Architecture is a curious craft. One structure may follow all the laws of design yet be worthless, while another may break all the principles and be profound!"

"Architecture finds its relevance by addressing the contemporary societal problems of its time."

"The marriage between poetry and technology sets architecture aside from plain old engineering!"

"Great Expectations: Notes to an Architect" manifests Christopher Benninger's lifelong quest for innovation and excellence. All architects and architecture students are strongly recommended to have a personal copy of this book as a lifelong companion for inspiration and motivation.

Author

Ar. Christopher Charles Benninger (23.11.1942–02.10.2024) was an American-born Indian architect who contributed significantly to the field of critical regionalism and sustainable planning in India. He studied urban planning at MIT and architecture at Harvard University, where he later taught. He has worked in India for over five decades. He founded the School of Planning at CEPT University and the Centre for Development Planning and Activities in Pune. He left for his heavenly abode on October 2, 2024, at 82.
Email: admin@ccba.in; communication@ccba.in

Reviewer

Ar. Sarbjit Singh Bahga (A 11822) is a Chandigarh-based architect and author. He has 44 years of experience designing various types of buildings, complexes and large campuses. A monograph on his selected works, "Modern Regionalism: The Architecture of Sarbjit Bahga" has been published. He is also a keen researcher and a prolific architectural writer, having 12 books to his credit.
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REPORT

PURVODAY
EASTERN REGIONAL CONFERENCE 2024

The IIA Jharkhand Chapter hosted the Eastern Regional Conference (ERC) 2024, themed PURVODAY *Reawakening of the East* on 20-21 December 2024 at the Hotel Chanakya BNR at Ranchi. The theme was intended to celebrate the resurgence of art, culture and design in the architectural context of Eastern India. The Conference, a biennial event, witnessed the participation of architects from Bihar, Odisha, West Bengal, and the Host Chapter, IIA Jharkhand.

The Council of Architecture collaborated as the Knowledge Partner, while Birla Institute of Technology, Mesra, was associated as the Institutional Partner for the Conference.

The Conference was preceded by the meetings of the IIA National Office Bearers and of the IIA National Council on 19 December. The noted dignitaries at the Conference were Ar. Vilas Vasant Avachat (President, IIA), Ar. Abhay Vinayak Purohit (President, COA), Ar. Jitendra Mehta (Vice President, IIA), Ar. Gajanand Ram (Vice President COA), Ar. Tushar Sogani (Jr. Vice President, IIA), Ar. B. Sudhir (Treasurer, IIA), Ar. Akshaya K. Beuria, Ar. Sandeep M. Bawdekar and Ar. Rani Vedamuthu (Jt. Secretaries, IIA), Ar. C.R. Raju (Immediate past-President, IIA), Ar. Atul Saraf (Chairman, IIA Jharkhand Chapter), Ar. Swopnadutta Mohanty (Chairman, IIA Odisha Chapter) and Ar. Abhishek Sharma (Chairman, IIA Bihar Chapter).

The Inaugural Day commenced with an emotional moment of silence to honour the memory of the late Ar. Nirmal Sharma, a member of the IIA Jharkhand Chapter, who tragically passed away at a young age, earlier in the month.

Ar. Atul Saraf (Chairman, IIA Jharkhand Chapter) then began with the Welcome Address, followed by Ar. Apurb Minz (Convener, ERC '24), outlining the schedule of events for the next two days. The event had sessions lined on the sub-theme *Engage – Evolve – Encode*.

The Special Guests for the inaugural event were Shri Sunil Kumar (Principal Secretary, Urban Development and Housing Department, Govt. of Jharkhand) and Smt. Anjali Yadav (Director, Department of Tourism, Govt. of Jharkhand). Shri Sunil addressed the architects to work towards energy efficiency, push for new alternative materials and technologies that are environmentally sustainable, and promised support from the government towards the architects' fraternity. Smt. Anjali spoke on the correlation of tourism and architecture, and emphasized on the rich natural forest resource of the state. She proposed for documentation and conservation of architectural heritage and suggested working towards building on the eco-tourism potential of the state.

Ar. Vilas V. Avachat (President, IIA) and Ar. Abhay V. Purohit (President, COA) gave their inaugural addresses highlighting the relationship between IIA and the COA.

Day 1: Session Engage
The Conference sub-theme *Engage* was intended on reinterpreting the urban built form, blending traditional wisdom with modern urban needs, focusing on *Urban Public Infrastructures* and *Reinventing the New Urban*.

The speakers for the session were Ar. Madhup Mazumdar (Design Accord), Ar. Sujata Hingorani (Oasis Designs) and Ar. Anuj Kale (Leewardists). The Keynote master speaker was Ar. Biju Kuriakose (Architecture RED).

11th IIA National Council Meeting

Dignitaries welcomed at the event venue

IIA President, Ar. Vilas Avachat and the CoA President, Ar. Abhay Purohit welcomed at the event venue

Inauguration of the Conference by IIA President, Ar. Vilas Avachat and IIA Vice President Ar. Jitendra Mehta.

Dignitaries on stage at the ERC Inaugural Address

Lighting of the lamp

CoA President, Ar. Abhay Purohit, Principal Secretary, Shri Sunil Kumar (UDHD, Govt. of Jharkhand) and IIA President, Ar. Vilas Avachat at the ERC Inauguration

Felicitation of Shri Sunil Kumar (Principal Secretary, UDHD, Govt. of Jharkhand) by Ar. Atul Saraf (Chairman, IIA Jharkhand Chapter)

CoA President, Ar. Abhay Purohit at the ERC Inaugural Address

Inauguration of the Building Material Exhibition by the CoA President, Ar. Abhay Purohit and the CoA Vice President, Ar. Gajanand Ram

Dignitaries of IIA and COA at the ERC Building Material Exhibition

Ar. Biju Kuriakose, ERC Master Speaker

IIA Jharkhand Chapter performing the play 'Vastukaar ki Vyatha Katha' at the Inter-Chapter Cultural Competition

IIA Odisha Chapter performing a play, about Dharmapada's sacrifice during the construction of the Konark Temple, at the Inter-Chapter Cultural Competition

Delegates at the ERC

Delegates at the Fellowship Dinner

Renowned Landscape Architect Madhup Mazucoamdar, leading Design Accord, delivered the first address. He emphasized the importance of blending aesthetic finesse with environmental sensitivity in landscape architecture. His presentation highlighted the firm's work on Bangalore Airport Terminal 2, serving as a testament to the harmonious integration of nature and design.

Ar. Sujata Hingorani, Co-Founding Partner in Oasis Designs Inc., followed with her insights on retrofitting best practices into existing cities. She underscored the importance of creating better urban public open spaces and streets, and on restoration and revival of water systems.

Ar. Anuj Kale of Leewardists, an innovative urban forum utilizing comics and visual narratives, presented an engaging session on the power of storytelling in architecture. Ar. Kale showcased how this unique approach can effectively communicate complex architectural ideas to a wider audience.

Ar. Biju Kuriakose, co-founder, Architecture RED showcased their design approach as an exercise in place making, focussing on human centric expression in the built environment. He presented their works across various geographies in institutional, residential and public space design.

Lastly, a presentation from K.M. Dastur was organised to elaborate on COA's welfare schemes and insurances for architects.

The engaging session of speakers culminated with a light hearted inter-Chapter Cultural Competition with theatrical performances by architects, followed by a performance of the band *Re-Do*, consisting of students of architecture from BIT Mesra, and lastly popular singer composer Gaurav Raj, ending with the fellowship dinner for the night.

Day 2
Keeping up with the momentum of packed sessions of Day 1, Day 2 began with an early morning guided spiritual walk at the Yogoda Satsang Ashram on what was coincidentally the World Meditation Day. The YSS Ashram of Ranchi is of historic significance as Parahamsa Yogananda himself began the teaching of Kriya Yoga at this campus.

Session Evolve
The second sub-theme Evolve was focussed on amalgamating traditional and vernacular construction materials with modern materials and methodologies, creating a harmonious balance between past and future architectural practices.

The speakers for the session were Ar. Vivek Singh Rathore (Salient Design) and Ar. Khushru Irani (LocalGround).

Ar. Vivek Singh Rathore, founder of *Salient*, a multidisciplinary studio in Kolkata, presented his design philosophy centred on creating spaces that are deeply rooted in cultural context and community needs. He highlighted his firm's commitment to sustainable practices, showcasing their projects across various contexts and typologies.

Ar. Khushru Irani, founder of *LocalGround*, shared his insights on creating contextually appropriate architecture inspired by place and culture. His practice emphasizes social impact, evident in the work of the *LocalGround Foundation*, a non-profit organization dedicated to providing design-build services for a more equitable world.

Session Encode
The final sub theme *Encode* was focussed on the role of AI, data analytics, Smart Building Software and sustainability in modernizing architecture and the built form, leveraging technology for an environmentally sustainable Architecture. The speakers for the session were Ar. Sahil Tanveer (RBDS ai Lab) and Ar. Monish Siripurapu (Ant Studio and CoolAnt).

Ar. Sahil Tanveer, founder of RBDS and RBDS ai Lab, presented his work at the intersection of philosophy, technology, and design. He demonstrated how AI tools can be integrated into architectural design, balancing function, emotion, climate consciousness and cultural narratives.

Ar. Monish Siripurapu, founder of *Ant Studio* and *CoolAnt*, captivated the audience with his innovative approach to sustainability and computational design. He showcased how Ant Studio seamlessly blends art, nature, and technology to redefine architectural possibilities, while *CoolAnt* focuses on developing nature-based, low-carbon cooling systems.

The final master speaker presentation for the Conference was by Ar. Rukmini of *Abin Design Studio*, Kolkata. The presentation showcased their multi-disciplinary approach to architectural design and their finesse across projects of varying scales, with close attention to detail.

The formal event concluded with an Address by the Chief Guest, Smt. Alka Tiwari (Chief Secretary, Govt. of Jharkhand). She spoke of her experience with the architects' fraternity and her understanding of the impact of the built environment on the general public, and praised IIA Jharkhand on the successful organisation of the Conference.

Delegates at the spiritual morning walk at the Yogoda Satsang Ashram on World Meditation Day

Delegates at the Yogoda Satsang Ashram on World Meditation Day

Ar. Vivek Singh Rathore of Salient Design

Ar. Khushru Irani of LocalGround

Ar. Sahil Tanveer of RBDS ai Lab

Felicitation of Smt. Alka Tiwari (Chief Secretary, Govt. of Jharkhand) by Ar. Atul Saraf (Chairman, IIA Jharkhand Chapter)

IIA ERC Trophy Winners 2024 : IIA Odisha Chapter

Delegates at IIA Fellowship Dinner

Performance by the Eklavya Band

Tribal villagers at Sarwada welcome the ERC Delegates at the church

Outbound trip to Sarwada Church, Murhu, Khunti on Day 3

The newly-initiated PURVODAY *Ratna Awards* were presented to Ar. Akshaya K. Beuria (IIA Odisha Chapter), Ar. Ramendra Nath Baishya (IIA Assam Chapter), Ar. Chandra Shekhar Sinha (IIA Bihar Chapter), Ar. Saibal Kar (IIA West Bengal Chapter) and Ar. Mayukh Dhar Virnave (IIA Jharkhand Chapter) for their lifetime contribution to IIA and the architectural fraternity.

Along with the Conference sessions, an inter-Chapter competition was held on *Engage, Evolve* and *Encode*, where the various IIA Chapters presented their works on the three sub-themes. Simultaneously, informal competitions on photography, paper model making, sketching and ad-mad were also held.

A building material exhibition of the industry partners of the event was also put up at the venue, which saw a good footfall of delegates and general public.

IIA Odisha Chapter was adjudged the winner for the rolling ERC Trophy, based on the scores across all competitions. IIA Bihar Chapter was announced to be the host for the next ERC in 2026.

The day concluded with the vote of thanks by the Jt. Hon Secretary, Ar. Anupam Deb, which followed with the high energy performance by locally popular band *Eklavya* along with the Fellowship Dinner.

Day 3

On the final day, a relaxing outbound trip to the Jharkhandi countryside was arranged for the delegates, visiting the historic Sarwada Church at Murhu, Khunti district, followed by an authentic tribal lunch at the *Open Field.* The IIA Jharkhand Chapter donated hockey sticks to the children of the village school at Sarwada, hoping to inspire them to perform at the state and national levels. It needs to be noted that tribals of Khunti are gifted hockey enthusiasts and are represented in the men's as well as women's national hockey teams.

ADVERTISE WITH JIIA

SR. NO	TYPE	1 ISSUE	3 ISSUES	6 ISSUES	12 ISSUES
1.	BACK COVER	NIL	9,00,000	15,00,000	24,00,000
2.	FRONT AND BACK				
A	INSIDE COVER (1 PAGE)	NIL	6,00,000	10,00,000	18,00,000
B	INSIDE COVER (2 PAGES, FULL SPREAD)	NIL	9,00,000	15,00,000	24,00,000
3.	FULL SPREAD INSIDE (2 PAGES)	2,00,000	6,00,000	10,00,000	18,00,000
4.	FULL PAGE	1,00,000	3,00,000	5,00,000	9,00,000
5.	HALF PAGE	50,000	1,00,000	1,50,000	2,50,000

NEWSLETTER DECEMBER

IIA MAHARASHTRA CHAPTER

IIA Pune Centre

60 Years Celebration of IIA Pune Centre: A Mega Event
On 13 December 2024, IIA Pune Centre celebrated its 60th Foundation Day at Pandit Farms. It was attended by 700 members, including academicians, professionals and students. The celebration was graced by distinguished guests like the Hon. Secretary of the IIA National Council, Ar. Sandeep Bawdekar and IIA Trustee Ar. Prakash Deshmukh.
Awards and Felicitations: As part of the Teachers' Day 2024, IIA Pune Centre honoured outstanding educators with the *S.J. Contracts IIA Excellence in Teaching Awards.* These were presented to Prof. Fatema Kabir, Prof. Arti Patil, Dr. Sujata Karve, Dr. Abhijit Natu and Dr. Swati Sahasrabudhe. In addition, as part of the World Architecture Day 2024, IIA Pune Centre recognized the contribution of three senior professionals with the *S.K. Belvalkar's IIA Excellence in Profession Award*. The awardees included Ar. Anil Hatkar, Ar. Zuber Shaikh and Ar. Iqbal Chany.
Speakers and Presentations: The event featured presentations by two eminent architects, Ar. Vivek Bhole and Ar. Biju Kuriakose, who showcased their remarkable work.
Special Announcements and Launches: A special moment came with the publication of the IIA Maharashtra Chapter Souvenir *Smaranika* 2023-24, released by the Chief Guest, Ar. Sandeep Bawdekar, in the presence of the Editor, Ar. Mrinalini Sane. This souvenir is a tribute to the significant milestones of the IIA Maharashtra Chapter and its contribution to the architectural community. Additionally, the IIA Pune Centre Trophy for Box Cricket Session 2 was unveiled, and a new sports event, *Design Incredibawl Session 1* was launched, promising to become a unique annual fixture in the Centre's calendar.
Honouring Past Chairpersons: The IIA Pune Centre also honoured the past Chairpersons who were present - Ar. Prakash Deshmukh, Ar. Laxman Thite, Ar. Satish Mane, Ar. Sandeep Bawdekar and Ar. Ajit Bhagat.
The evening concluded with fellowship dinner, enhanced by a live Sufi performance. The 60th Foundation Day celebration of IIA Pune Centre was a grand success, reflecting the Centre's rich history, dedication to the profession and commitment to the architectural community. Here's to many more years of growth and excellence in the field of architecture.

IIA Pune Centre: *S.J. Contracts IIA Excellence in Teaching Awards* presented to Prof. Fatema Kabir, Prof. Arti Patil, Dr. Sujata Karve, Dr. Abhijit Natu and Dr. Swati Sahasrabudhe in the presence of IIA Pune Centre Office Bearers, Shri Saurabh Jangle and Ar. Pitkar and Chief Guest Ar. Sandeep Bawdekar, Jt. Hon secretary, IIA National Council

IIA Kalyan Dombivali Centre
35th Foundation Day
IIA Kalyan Dombivli Centre was established on 11 November 1990. This year, on the occasion of the 35th Foundation Day, the *Arch Cup Cricket Tournament Season 2* was organized on 15 November 2024. In addition, an event titled *Aavishkar- Magova Vatchalincha Vedh Bhavishyacha* meaning 'Review of the past and looking forward to the future' was held. on 30 November Ar. Sandeep Patil who exposed the RERA scam was felicitated. It was followed by a cultural programme by the Centre members.

Drawing Competition (Second Edition 2024)
Every year, the IIA Kalyan Dombivli Centre organizes a drawing competition on the occasion of World Architecture Day coined as the *IIA Kalyan Dombivli Centre's Art and Architecture Festival* for school students. This second edition was held in the memory of late Ar. Arvind Ramchandra Chikodi. The idea behind conducting the competition is to create awareness about architects, architecture, IIA and our rich architectural heritage and its conservation amongst young children and society. There is a tradition of creating clay models of forts by young children of Maharashtra as a mark of respect towards Chhatrapati Shivaji Maharaj. So, the topic of this year's competition was 'My favourite fort in India and why'. 275 students from 19 schools 0f Dombivli, Kalyan and Badlapur participated in the competition held from 23 to 27 November. The jury were eminent artists - Shri Unmesh Inamdar and Shrimati Mrinal Gokhale. The exhibition of the drawings held on 14-15 December was inaugurated by the Commissioner and Administrator of KDMC, Dr. Indu Rani Jakhar. The award ceremony held on 15 December was graced by the IIA National President, Ar. Vilas Avachat and the jury members. This initiative was lauded

IIA Kalyan Dombivali Centre Drawing Competition

by our President as well as the jury members. This competition was made possible due to hard work and active participation of our various members – young as well as experienced, who worked enthusiastically under the able guidance of Chairperson Ar. Keshav Chikodi and his team.

IIA ODISHA CHAPTER

Thanksgiving Party to Celebrate Pinkprint Success and Cricket Triumph

IIA Odisha Chapter organized a Thanksgiving Party on 4 December 2024 at Hotel Pipul Padmaja, Bhubaneswar as a joyous occasion to commemorate the success of two significant achievements: the successful organization of the *PINKPRINT International Conference of Women Architects* (ICWA) and the remarkable cricket victory by the Chapter's team, the *Kalinga Warriors*.

The PINKPRINT Conference, held on 8-10 November 2024, in Bhubaneswar and Puri, brought together women architects from across the globe. The event was hailed as a milestone in highlighting the contributions of women in architecture and fostering international collaboration. To express gratitude for the success of this landmark event, the Chairperson of IIA Odisha Chapter, Ar. Swopnadutta Mohanty and Vice-Chairperson Ar. Mousumi Nanda led the evening's proceedings. Executive members of the Chapter, along with the leadership, felicitated the industry partners (sponsors) and the hardworking members of the organizing committee. Each was presented with a token of appreciation for their unwavering support and dedication, which ensured the event's grand success.

Adding to the celebratory spirit, the IIA Odisha Chapter cricket team, the *Kalinga Warriors,* was also honoured during the evening. The team emerged victorious with a clean sweep (3-0) in the IIA cricket tournament, UTSAV- An Archifest, hosted by the IIA Vizag Center. Their stellar performance brought pride to the Chapter and showcased the versatility and talent of its members.

The Thanksgiving Party was a blend of recognition and revelry. Following the formal felicitation, the attendees were treated to a lively musical night,

creating an ambiance of camaraderie and celebration. The evening concluded with dinner.

The IIA Odisha Chapter continues to inspire and unite architects through such initiatives, fostering a sense of community and celebrating excellence in both professional and extracurricular endeavours.

Felicitation of Organising team and Kalinga Wariors by Chapter Chairperson Ar. Swopnadutta Mohanty.

Purvoday 2024

The Eastern Regional Conference (ERC) 2024, *Purvoday,* organized by IIA Jharkhand Chapter on 20-21 December 2024, at Hotel Chanakya BNR in Ranchi, brought together architects from the eastern region, with IIA Chapters from Odisha, Bihar, West Bengal and Assam participating in a celebration of professional excellence and cultural camaraderie.

A delegation of 14 architects represented the IIA Odisha Chapter, led by Chairperson Ar. Swopnadutta Mohanty and Vice-Chairperson Ar. Mousumi Nanda. The Conference featured a mix of technical sessions, cultural events and informal competitions designed to promote creativity, technical skills, and teamwork. The IIA Odisha Chapter delivered an outstanding performance, excelling in various categories. They captured the top two positions in the photography competition. They also secured third place in model making and demonstrated excellence in cultural presentations, securing first place with their vibrant and engaging performance.

The Chapter's innovative thinking shone through in the ad-mad competition, where they clinched second place, while their contributions to the technical sessions earned them the top position overall.

These collective achievements crowned IIA Odisha Chapter as the overall champion of the event, a recognition of their teamwork, talent, and dedication to excellence.

IIA Odisha Chapter Team with the ERC Rolling Trophy

11th COUNCIL MEETING OF THE TERM 2023-2025
AT RANCHI, JHARKHAND ON 19-12-2024.

Sr. No.	Associate to Fellow	Chapter	Membership No.
1	Ar. Monolita Chatterjee	Karnataka	F16602
2	Ar. Zia Ur Rahman	Jharkhand	F21652
3	Ar. Nikhil Jain	Jharkhand	F21659
4	Ar. Akshat Mishra	Jharkhand	F18609
Sr. No.	Direct Fellow	Chapter	Membership No.
1	Ar. Abhishek Bij	Haryana	F29605
2	Ar. Arun Kumar Bij	Haryana	F29606
3	Ar. Raghunanda Srinivas A	Karnataka	F29607
4	Ar. Ajit Pai	Northern	F29608
Sr. No.	Associate Members	Chapter	Membership No.
1	Ar.Danish A	Kerala	A29609
2	Ar. Sharvari Saurabh Danait	Maharashtra	A29610
3	Ar. Ankita	Karnataka	A29611
4	Ar. Haroon Rasheed	Karnataka	A29612
5	Ar. Mohammed Yasar Arafath M	Punjab	A29613
6	Ar. Mohd. Faheem	Punjab	A29614
7	Ar. Anurag Daharwal	Madhya Pradesh	A29615
8	Ar. Muhammed Anfal P	Kerala	A29616
9	Ar. Manoj Manoharlal Virwani	Maharashtra	A29617
10	Ar. Rushikesh Kishor Rane	Maharashtra	A29618
11	Ar. Soham Prasad Munshi	Maharashtra	A29619
12	Ar. Kaushal Shriram Jajoo	Maharashtra	A29620
13	Ar. Mansi Abhishek Deshmukh	Maharashtra	A29621
14	Ar. Vaidehi Niket Pathak	Maharashtra	A29622
15	Ar. Rishikesh Balasaheb Adhikari	Maharashtra	A29623
16	Ar. Vinish Vithal Desai	Maharashtra	A29624
17	Ar. Praffulla Pramod Pradnya Chavan	Maharashtra	A29625
18	Ar. Satyendra Sharma	Madhya Pradesh	A29626
19	Ar. Prakash Chand Arya	Madhya Pradesh	A29627
20	Ar. Rajesh Sharma	Madhya Pradesh	A29628
21	Ar. Amol Kumar Jain	Madhya Pradesh	A29629
22	Ar. Mishal M A	Kerala	A29630
23	Ar. Jay Prashant Sushma Satpute	Maharashtra	A29631
24	Ar. Uttara Diwakar Athavale	Maharashtra	A29632
25	Ar. Amol Lalchand Wanjari	Maharashtra	A29633
26	Ar. Mitali Amol Rangankar	Maharashtra	A29634
27	Ar. Shivani Chandrashekhar Idhol	Maharashtra	A29635
28	Ar.Udit Mittal	West Bengal	A29636
29	Ar.Sajila O P	Kerala	A29637

30	Ar.Sulaikha Hiba	Kerala	A29638
31	Ar.Aswami O P	Kerala	A29639
32	Ar.Nisamudheen M P	Kerala	A29640
33	Ar.Gaurav Verma	Punjab	A29641
34	Ar.Noel Sebastian E	Kerala	A29642
35	Ar.Dhruv Vijay Chaliawala	Gujarat	A29643
36	Ar.Arun Mozhi Varman K	Tamil Nadu	A29644
37	Ar.Aswin Chand A	Kerala	A29645
38	Ar.Parthiban M	Tamil Nadu	A29646
39	Ar.Akshat Goyal	Madhya Pradesh	A29647
40	Ms.Kawaljeet Kaur	Punjab	A29648
41	Ar.Navaneeth A	Kerala	A29649
42	Ar.Tharish Majeed	Kerala	A29650
43	Ar.Muhammed Ziyad	Kerala	A29651
44	Ar.Basith Ali	Kerala	A29652
45	Ar.Bharath J Warrier	Kerala	A29653
46	Ar.Eros Abdussamad Hassan	Tamil Nadu	A29654
47	Ar.Shubham Dagdu Vandana Barne	Maharashtra	A29655
48	Ar.Ruchit Sharma	Rajasthan	A29656
49	Ar.Tariq Fazili	Jammu & Kashmir	A29657
50	Ar.Roshin Thankachan	Kerala	A29658
51	Ar.Shobana Devi M	Tamil Nadu	A29659
52	Ar.Archana Patil	Karnataka	A29660
53	Ar.Mrigakshi Hazarika	Assam	A29661
54	Ar.Hirak Protim Borah	Assam	A29662
55	Ar.Farzana Shaji	Kerala	A29663
56	Ar.Minha M Sagith	Kerala	A29664
57	Ar.Rani Renish	Kerala	A29665
58	Ar.K P Muhammed Zidan	Kerala	A29666
59	Ar.Puneet	Haryana	A29667
60	Ar.Swathy S	Kerala	A29668
61	Ar.Juel Antony	Kerala	A29669
62	Ar.Nihal	Karnataka	A29670
63	Ar.Anshul Rawat	Tamil Nadu	A29671
64	Ar.O Deva Priya	Kerala	A29672
65	Ar.Bhaskar Agarwal	Madhya Pradesh	A29673
66	Ar.Mahesh Parshotambhai Patel	Gujarat	A29674
67	Ar.Malini Venkatesh	Tamil Nadu	A29675
68	Ar.Dawn Martin	Kerala	A29676
69	Ar.Krishna Kini	Karnataka	A29677
70	Ar.Aravinda Babu H N	Karnataka	A29678
71	Ar.Adarsh Sreesan	Kerala	A29679
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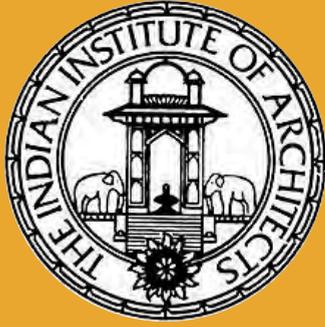
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