

User Experience and Expectations of Streetscape: A Planning Framework for Urban Streets in India

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Abstract Streets are an integral part of the urban fabric which weave various functions like social space, commercial space, cultural space, as well as a channel of transportation for various categories of vehicles. In Indian scenario, rapid and uncontrolled growth of commercial activities on urban streets has led to traffic congestion, unorganized parking, lack of convenient space for pedestrians and lack of visual and spatial comfort for all users. This research focuses on the study of streetscape scenario in India, the expectations of users, identifying general issues related to urban streets and accordingly suggesting strategies for enhanced user experience. The aim of this research is to study the user experience, determine the expectations of citizens and formulate strategies for establishing the sustainable street system which enhances the user experience and keeps the city livable. The present scenario of urban streets is studied through a research survey in order to understand the user experience and their expectations of urban streets. The questionnaire comprising of twelve questions was prepared to collect responses from various age groups. User experience and expectations are compiled and analyzed on the basis of information provided by 454 respondents, and

recommendations are made accordingly on the basis of best judgement. A new framework for urban street planning and design of streetscape elements is to be formulated at the city level while considering user experience and expectations.

Keywords Streetscape, User Experience, Urban Streets, Urban Design, Street Lighting, Street Hierarchy, India

1. Introduction

Streets are an important element of urban fabric which weaves various functions like social space, commercial space, cultural space, as well as movement channel ways. In the Indian scenario, these also represent the culture and values of a particular locality or city. Indian streets are lively public areas that are used for a variety of activities, including sitting, eating, sleeping, conversing, and just hanging out as shown in Figure 1 and Figure 2. On its streets, India celebrates worships, works, eats, recreates, rests and sleeps [1].



Figure 1. Typical Urban Street illustrating the Street Character



Figure 2. Street illustrating mixed nature of traffic and facade features.

Specifically, in a city, town, or village, a street is a public roadway that includes all areas that are within the right-of-way, according to the Merriam-Webster Dictionary (as sidewalks and tree belts). Additionally, a street differs from an avenue or a boulevard by being bigger than an alley or lane but narrower than both [2]. The literal meaning of street form is the street space bounded by facades on both sides. So, there are few definitions or descriptions of the word Street. For the purpose of this research, street is defined as a channel of movement for the pedestrians and light motor vehicles which connects one place to another and provides a link between various localities in the city. In this study, Street is considered as internal urban road or passageway over which citizens commute from home to workplace or market and vice versa within a locality or from one locality to another locality within the urban areas, which corresponds to the Distributor / Collector Roads, Local Streets and Access Streets as per URDPFI Guidelines (MoUD Govt of India, 2015). Urban Expressways, Arterial and Sub-Arterial Roads are beyond the scope of this research work. User experience is considered in terms of travel time, visual perception, usability, convenience and facilities on the urban street.

Streetscape is a broad term to mean everything that makes up the scene on a street. For the purpose of this study, Streetscape is considered as the appearance or view of the street which includes but not limited to the street

surface, pathways, buildings, boundary walls, benches/furniture, advertisement hoardings, garbage bins, dividers, plantation, electric poles, signage, traffic signals etc.

The amount of pedestrian activity on the street does have an impact on its vibrancy. It is crucial to examine pedestrian activity on the street since users' needs and motivations for using the space depend on it. There are three types of outdoor activities that can be done in a public setting: necessary activities like going to work or school, waiting for a bus or someone, shopping, etc.; optional activities like walking, standing and taking in the scenery, sitting and chatting; and social activities like watching children play, chatting with others, and taking in other people's sounds and sights [4].

Indian streets occasionally serve as a transportation space and occasionally as an extension of private living space, in contrast to the primary role of a street, which is to act as a route of mobility. It exists as a plural space with a plural nature. The private inner area of the individual dwelling meets the public outer space in this transitional zone. The streets are crowded with a wide range of individuals wearing various costumes, not only walking and riding but also standing, sitting, squatting, and lying down; sleeping, cooking, eating, getting their hair cut or shaved; doing laundry, fixing bicycles or tyres, manufacturing things, sewing, playing, chanting, arguing, bargaining, and - even praying (Figure 3). Rapoport analyzes how the pedestrians and drivers view the same streetscape, which reveals that pedestrians are more likely to notice the finer details of the place than drivers are. [2].



Figure 3. The evening activities of Sarafa Bazaar street in Indore, India

Although streets support social cohesiveness and the preservation of cultural heritage, their multiple uses and mixed traffic patterns result in traffic congestion, which has become a serious problem for Indian urban areas as well as for medium- and small-sized cities. There are four main causes of congestion: environmental, mechanical, human, and infrastructure-related [5]. Localized democratic values that advance the welfare of city residents should serve as the foundation of a new,

comprehensive strategy for reducing traffic congestion through the revitalization of the streets. [6].

Some cities have typical religious ambience on streets like Ayodhya, Haridwar, Mathura, Varanasi, Vrindavan, Madurai etc. Heritage zone is those where some Monuments of Importance (UNESCO world heritage sites and other Sites of architectural and Historical Importance) are located in the vicinity. This study is based on data collected from cities having modern development and infrastructure. Religious and Historic areas are beyond the scope of this study. Traffic congestion in urban or suburban areas leads to a wastage of time and energy, increase air and noise pollution, mental stress, as well as reduces productivity. The streets in India's urban fabric lack character, with the exception of those in some religious and heritage areas, and are dominated by automobiles. In many main streets, the street area is primarily a traffic area at the expense of the leisure, perception, and experience areas (Figure 4). There isn't really an alternative to a moderate concentration of cars on important routes, although many of these streets can be significantly improved even with heavy traffic [7].



Figure 4. The cattle pose challenges and hurdles in the flow of traffic

India is the most affected country by traffic congestion. Four of the ten most crowded cities in the world are in India, namely Bengaluru 71%, Mumbai 65%, Pune 59%, and Delhi 56% [5]. In Delhi, Mumbai, Bengaluru, and Kolkata, daily commuters spend an average of 1.5 hours or more during peak traffic hours, according to the Boston Consulting Group report-2018. Measurement of traffic congestion in 199 countries was included in a report on road accidents and deaths as of 2018 by World Road Statistics. India ranked first in the survey for the number of fatalities in traffic accidents. In order to choose the most effective solutions, it is thought that the first step in such efforts should be to determine the features of the congested section of the road [5]. Rapid and uncontrolled growth of commercial activities on urban streets has led to the traffic congestion, unorganized parking, a lack of convenient space for pedestrians and the lack of visual and spatial comfort for all users. All traffic management plans should

take streetscape concerns into account. The size, kind, and position of the scheme will all affect the weighting that is used [6]. It is crucial to keep track of how the architectural manifestation of an urban streetscape develops as part of its study and design. The character of the city and the quality of the urban environment are both reflected in the street corridor. The city should offer its inhabitants a consistently pleasing sensory and aesthetic experience [8]. The conventional street space scale and living environment have been disrupted due to the rapid development of motorized transportation, and urban streets are now receiving more and more study and attention. When creating urban streetscapes, it is possible to create better street planning regulations by taking into account the variables that affect the density of human activity [9].

This research focuses on the study of streetscape scenario in India, expectations of users, identifying general issues related to urban streets and accordingly suggesting strategies for enhanced user experience. The present scenario of urban streets is studied through research survey in order to understand the user experience and their expectations of urban streets. The aim of this research is to study the user experience, determine the expectations of citizens and formulate strategies for establishing the sustainable street system which enhances the user experience and keeps the city livable. Such a system will help in providing functional streets which will serve the users optimally. As an outcome of this qualitative research, we intend to recommend the strategies which systematically and comprehensively consider the expectations of the motorized and pedestrian users while planning and designing streets for better mobility, safety and livability of the users.

2. Research Methodology

The research has been carried out in a systematic manner with due consideration to the following points and sequence:

- **Understanding the Problem:** By public interaction, visual inspection, and news /media. Character of urban streets in India is diversified and many times transformed by the encroachment and hawkers. In some locations, streetscape features are planned where these are not required and at some locations, these are not provided where these are required. Such a scenario makes an adverse impact on user experience.
- **Research Question:** Can we decongest the streets and provide a better user experience to the citizens in metro cities / urban areas?
- **Hypothesis:** User experience can be enhanced by meticulous planning of street network and streetscape in urban fabric.

- Literature Review: Exploring all material relevant to the subject and positioning our efforts in relation to other researchers, which is presented in this work?
- Data Collection: Literature reviews, on-site documentation/photographs, visual assessment, and majorly the questionnaire survey)
- Analysis and Interpretation: In order to determine the key issues and associated aspects, data obtained from the research survey is analyzed and interpreted.
- Inferences and Recommendations: Key Insights and Arguments are presented in the paper.

2.1. The Survey Questionnaire

According to survey findings from Kuala Lumpur, Malaysia, four primary factors—attractions on the street, activities, travel distance (proximity), and congestion—are responsible for individuals using the streets [10]. These are duly considered in our research. The contextual characteristics that affect user experience on streets, however, might vary depending on the situation, particularly in places with diverse climatic and cultural conditions. In contrast to earlier studies, this may be related to the local environment, climate, or culture.

The questionnaire was circulated using social media platforms and personal WhatsApp messages to the people in selected Metro Cities in India. A Metro city is defined as a city having a population of more than 1 Million. Although Indian cities comprise old and new development areas, however, our focus was to collect data for the localities having new/modern infrastructure. In old township areas, streets are narrow and the majority remains in the No Vehicle Zone, whereas our motto was to understand the problems associated with the streets facilitating vehicular movement.

The Questionnaire comprising of twelve questions was prepared and shared in various groups on social media platforms in the month of June 2022 in India to collect the responses randomly. We intended to reach more than 1000 people of diverse strata and the return rate was expected as 25%. The questionnaire was composed of three parts comprising total of 12 questions. In the first part, information was collected about the respondent (Age Group, Gender, Mode of Travel, and Travel Time). Through the second part, data related to users' perception and experience, likings and dislikes about streetscape features were collected. In the third part of the survey form,

users were encouraged to provide their suggestions on various aspects of urban streets. The outcome of the second part of the questionnaire is presented in this paper. Micro-level analysis based on Gender, Age Group and Travel Time shall be carried out in the next stage of research and not included in the scope of this paper.

Out of total 12 questions, the early nine questions were having multiple choices and respondents were having the flexibility to choose more than one option, objectively collect the information of user experience/likings and dislikes about the streetscape features. Three questions in the third part of the questionnaire were of short answer type in which respondents were asked to provide information and opinion about the issues related to urban streets in their locality, subjectively. Age groups of respondents were considered for a segment of 15 years and slabs were formulated as below 15 years, 16 to 30 years, 31 to 45 years, 45 to 60 years, and 60 and above. This way we also intended to determine age group-wise user expectations for our second stage research, which is not in the scope of this research work. We received total 454 responses through the questionnaire. Summary of this is presented in Figure 5.

Out of total 454 respondents, 290 respondents (63.9%) used to drive their own vehicle through the urban streets. In Figure 5, the travel time of daily commuters is illustrated, which they spent on urban streets while commuting between home and office.

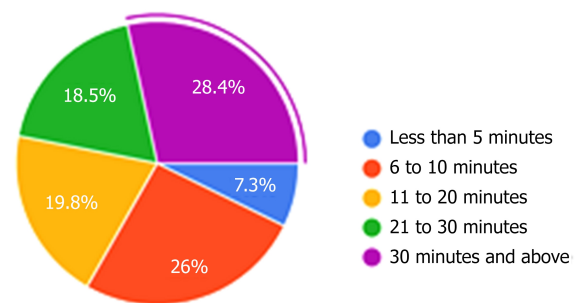


Figure 5. Travel time spent on urban streets by daily commuters.

3. Results and Discussion

The outcome of the research survey is presented in Figure 6, Figure 7 and Figure 8 in this section.

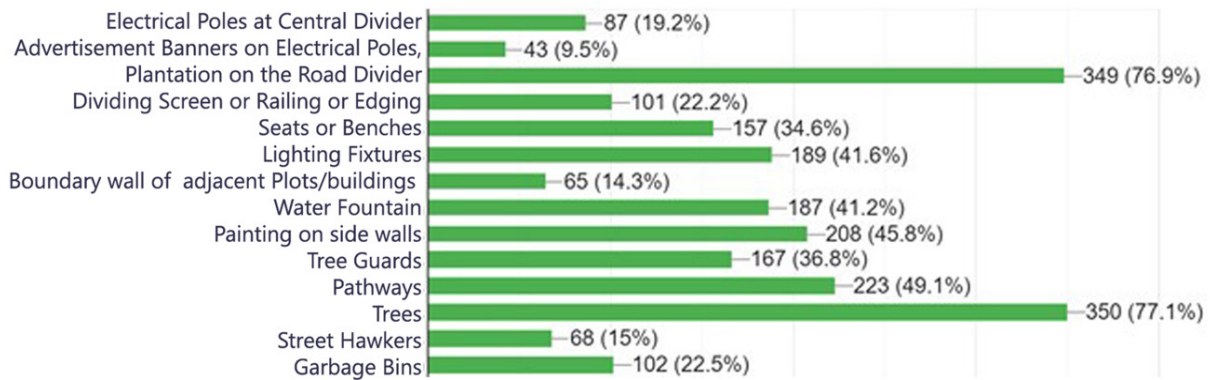


Figure 6. Streetscape features that people want to see.

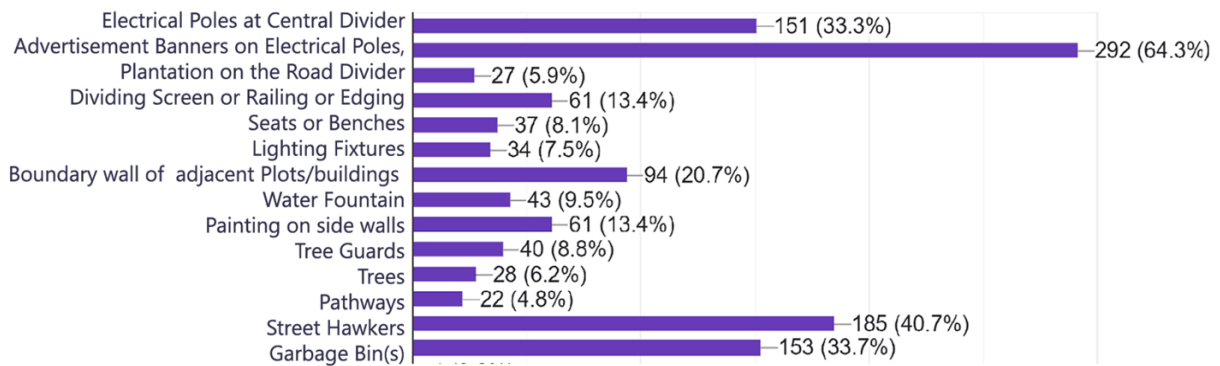


Figure 7. Streetscape features that people don't want to see.

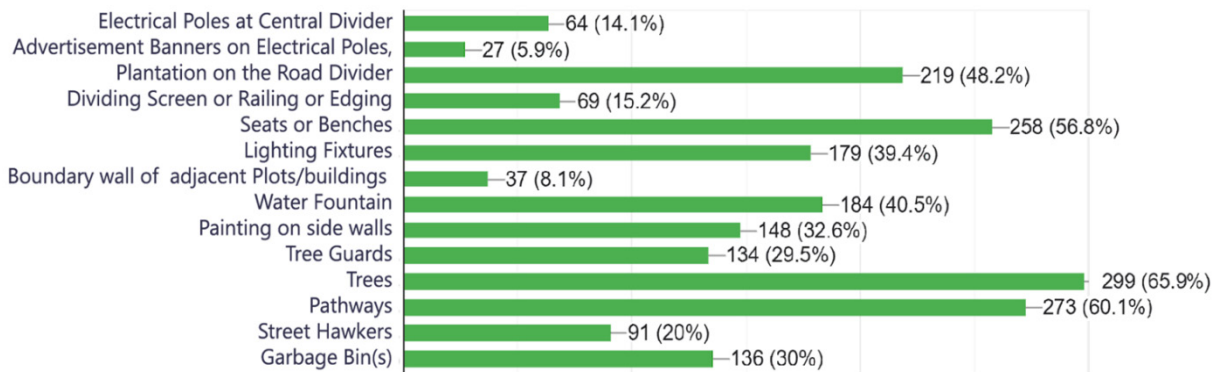


Figure 8. Streetscape features that people want to see/use as a pedestrian.

After a critical study of the user experience and expectations illustrated in Figures 6, Figure 7 and Figure 8; the following inferences are derived from the survey outcome.

1. Majority of the people want to see plants/shrubs on the road divider and trees on road sides.
2. Pathways, Painting and Lighting Fixtures are also liked by the people (about 50% of respondents).
3. Majority of the people do not want to see advertisement banners and street hawkers on the roads.
4. Electrical poles at the centre of the street and garbage bins are also not liked by the people.
5. Trees and plantation along the roads, pathways, seats and benches, water fountains, garbage bins and lighting fixtures are liked by the pedestrians on streets.
6. Painting on Side Walls and Tree Guards is also liked by the people (about 30% of respondents).
7. Street Hawkers and Kiosks are liked by only 20% of the respondents only. Although, these are to be avoided on the commuter roads, however, these may be allocated a separate lot off the commuter street,

where people can park the vehicle for a short duration and can avail the facility without disturbing the flow of commuters on the road.

8. Although garbage bins are necessary, however, their use and maintenance are a matter of concern. Animals like street dogs, monkeys and cows scatter the bin garbage around and hence, people may not like the bins installed roadside.
9. People are liking wall paintings, hence blank walls must be treated with the features like vertical green, paintings or other forms of visual art.

These findings represent that there is a need of improvement to create a better quality streetscape in the urban environment. Urban areas are under continuous transformation and upgradation. In India, the majority of urban streets serve the residents in multiple ways, one as the mode of transportation and another as the market area. In view of prevailing urban areas, it is becoming necessary to de-link the markets from the commuter streets. We need to revisit the present hierarchy of streets and we must re-organize our streets to match user expectations. The hierarchy of roads is dependent upon the function(s) that the street is required to perform, the kind of movement and the way users want to use them. The speed limits, right of way/road width and other neighborhood characteristics are to be considered for deciding the road network and transportation system in the urban areas.

According to other studies, population growth is a factor in the deterioration of both the urban environment and the standard of living of its residents. As a result, the public will increasingly rely on the streets, which must be managed effectively and efficiently in order to foster a welcoming, sustainable, and healthy environment for everybody [10]. In summary, it can be concluded that related to user experience in general; people feel very comfortable with the trees and plantation alongside roads, whereas people feel very uncomfortable with the advertisements and garbage bins as an element of the streetscape. Future investigations may look further into the effects of spatial and visual comfort, two factors that influence one another.

Professionals and the general public are realizing how important streets are to the quality of life in urban areas and how they affect issues of social inclusion, economic vibrancy, high-quality urban realm, and urban sustainability. However, it is no longer valid to consider all urban streets as multifunctional entities. We must consider and assign priority to the various functions of streets whether it has to act as a channel of movement or a marketplace. Accordingly, we can categorize urban streets and amend town and country planning byelaws to match user expectations while formulating strategies for a new framework of urban streets. Researchers [11] mention that it is possible to evaluate the entire space requirements for all relevant Link and Place activities on a street segment

by determining the demands of the various kinds of Link and Place street users, particularly in cross-section.

4. Inferences and Recommendations

On the basis of the survey outcome and discussions, the following recommendations are being made for consideration by the town planning authorities and related professionals.

- (1) Trees and plantation are inevitable and these must be planned as an integral part of the road network and transportation system in urban areas. At present concept of green belt is very much practiced, however, adequate width must be reserved alongside roads and as road divider patches for plantation.
- (2) Advertisements / Banners / Hoardings must be discouraged on or alongside roads and strict byelaws must be formulated by town and country planning authorities.
- (3) A transformation plan must be formulated for urban areas, in which roads are to be categorized on the basis of the functions they are supposed to perform. This can be done at the city level for the entire area under the town and country planning jurisdiction.
- (4) Streets are to be analyzed and categorized on the basis of functions and accordingly bye-laws can be amended accordingly in various zones in a city. No commercial activity is to be allowed on some of the streets, whereas, separate space is to be allocated for necessary commercial activities with parking lots. Provision of such spaces is given in the master plan; however, uncontrolled growth and encroachments denature the character of various streets and the urban fabric;
 - a. Purely Commuter Streets (No commercial activities allowed)
 - b. Commuter streets with defined time/evening temporary sale points only
 - c. Commuter streets with separate pedestrian pathways and offside parking lot for commercial activities.

Streetscape features for various street hierarchies may be decided and designed to match the urban context/heritage or legacy of the urban area or locality.

- (5) Type and location of garbage bins along the roadside must be re-looked into and judiciously decided in order to avoid any eye-sore spots in the urban fabric. The garbage collection and disposal system is one of the important but neglected aspects in which we need to rethink.
- (6) Lighting fixtures and tree guards must be considered in the streetscape and there is the scope of innovation in this area to enhance user experience.

5. Conclusions

Research is carried out to study the user experience in the present scenario and determine the user's expectations. Strategies for establishing the street system enhances the user experience. We need to transform urban areas for a better user experience by re-visiting the streets hierarchy. Streets are to be categorized as per the functions they are supposed to perform in a particular urban area. Commercial activities are to be de-linked from selected streets in various urban areas and commercial zones are to be planned well in town and country planning bye-laws. A new framework for urban street planning and design of streetscape elements is to be formulated at the city level while considering user experience and expectations. "If we can develop and design streets so that they are wonderful fulfilling places to be community-building places, attractive public places for all people of cities and neighborhood, then we will have successfully designed about one-third of the city directly and will have had an immense impact on the rest" [12].

6. Scope of Further Research

This paper presents the outcome of the study in a broad manner. Micro-level study and data analysis based on the age group and gender of the respondents shall be carried out further, in order to understand the user experience and expectations at a deeper level.

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