

Understanding the Active Factor for Development of the Streets

Kumar Utkarsh^{1*}, Nishant Arora²

¹ M. Arch (Urban Design), Department of Architecture, Guru Nanak Dev University, Amritsar, Punjab. 143005, Contact: +91-7905143232,

Email: ar.utkarsh1806@gmail.com

² Assistant professor, Department of Architecture, K R Mangalam University, Gurugram, Haryana.

Email: nishantarora.11@gmail.com

Abstract - In this new world today, Urban streets playing a major role as a heritage streets or commercial streets and sometimes a residential or historical street. The concept of streets came from Roman period and the use of streets as a surprising element can be seen in medieval period where end of the streets surprisingly into a large space. The creation of vistas from a large square to one end of street gave an interesting feel to visitor as seen in Renaissance period. Now the street policy is changed and ensure the right of way to be design and planned for all users with proper accessibility and safety. In India, the streets planning and designing led by the transport engineers who gave always preferences to motor vehicles against the pedestrian walks. With 75% population will live in urban areas by 2050 and that time urban streets need to balance the increasing vehicles and the city economy. When the city grows it grows in all directions and it is important to consider the processes that shape our streets because they are directly linked upon other urban systems and it is important to design them well for the benefit of the cities and its residents or visitors. Streets should not be seen in isolation or as transportation projects alone, it should be evaluated on the basis of parameters like pedestrian safety, Urban realm, parking, loading activities. This paper talks about the concept of "Link and space design" by considering the users safety on the street rather than vehicles in planning and design both. This paper helps to understand the desirable and minimum street performance indices with time and identifies the areas for improvement and to determine the appropriate balance of street space and capacity. The aim of this paper is to illustrate to redesign an urban high street to meet the needs of local residents, visitors and local businesses so that the street of that city play a major role as a social gathering space which contribute the quality of life in urban areas.

Keywords - Urban Streets, Quality of life, Safety factor, social equity, Link and Space design, Safety and basic amenities, Street performance.

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INTRODUCTION

Introduction of the city

The early Roman and Greeks was also encouraged to design streets in the city and the Roman Architect and Engineer Vitruvius classified these streets in three parts as Tragic, Comic and Satiric. He said that these streets to be laid to control winds which brings humidity and disease in the city [2]. The streets have two generic forms where first one is carved consist of solid block materials could be seen as a positive space of the surrounding architecture and many medieval streets fall in this category and the other one is Parkland in which buildings are seen as isolated

objects and streets flow around the building without any shape like Garden city [2].

The famous architect of Renaissance period Alberti said that noble and powerful streets should have straight streets to carry winds as well as majesty and greatness but cities had small towns and fortifications should have winding streets for the defensive purposes [2]. In mid-15th century Italian Architect Andreas palladio suggested buildings stoops in front of the houses to protect peoples on the street from the harsh weather [2]. The streets considered as the traditional pattern of urban structure which has been overtaken by vehicular motors form buildings and spaces and Richard

Davies called this as Revolutionary impact of modern transport panning on the towns [5]. Therefore, the streets could be easily defined as vertical and horizontal elements which emphasized on height of surroundings blocks, wide or narrow lanes, enclosed or open areas connected to other streets/squares or centrally large open areas.

Definition of street in Indian Context

In India, Streets are often taken for granted but the truth is that these streets involved a majority of public spaces which facilitate the large number of low-income groups of peoples for their livelihood and their basic amenities. According to Appadurai (1987), Streets and its cultural characteristics integrates in the heart of people's life in contemporary India especially in major cities where urban housing is crowded and uncomfortable and the most of the daily activities of life is performed on these streets where the atmosphere is not often frigid [3]. Throughout the history, Indian streets shared major spaces for pedestrians, horse drawn carriages, rickshaw cycles, vendors activities, bi-cycles etc. but now these spaces are overtaken by motorized vehicles such as cars, bikes, tractors etc. which resulted in the transformation of urban ecology of the streets [1].

According to 2011 population census, India has the population of 1.21 billion people and have been promptly increasing urbanizing cities in the world with an urban population growth from 281 million (27.31%) in 2001 to 373 million (31.06%) in 2011 and expected that 75% of the total population will live in urban areas by 2030 [8]. When the city grows it grows in all directions and it is important to consider the processes that shape our streets because they are directly linked upon other urban systems and it is important to design them well for the benefit of the cities and its residents or visitors.

AIM AND OBJECTIVE OF THE PAPER

This paper begins with definition of the concept Link and space design which illustrate the street form with its daily activity pattern by considering the need of the peoples rather than vehicles. The definition of Link and Space design further explains with the help of matrix diagram and the result come out in the form of basic parameters as design strategies. The study of street typology of Varanasi and its activity pattern was carried out with the help of survey which clearly determine the street functions. The detailed study of the small part of the street with its activity plan and section further explained as an example which analyses the street activities at different times. The design strategies and principles are suggested to identify potential design areas of the street in accordance with required parameters. The paper ends up with the recommendation and conclusion which helps in making the street a livable space.

LITERATURE CONTEXT OF LINK AND SPACE DESIGN

Definition of Link and Space

Urban street provides a wide range street activity which clearly define the street functions in two broad terms i.e., Link and Space [1]. Link is a movement pattern of street which may be an integral part of street network. It could be a linear path with minimum obstruction for the beginning to the end and the link user can travel through variety of means of transport like bus, foot, cycles etc. depend upon the transport available which take minimal time. Whereas Space could be the different activities on the street like shopping, parking by employees or customers, vendors etc.

These two functions actually explain the street hierarchy and its typology in which Link could be primary, secondary and tertiary streets and Space might be the different activity spaces as shopping areas, vendor activities, loading/unloading of commercial vehicles, resting or open space, parking by customers or employees on these streets. Here we use a matrix diagram of five by three which might help to determine the minimum requirement of space for the retrofitting of the urban streets. It could help in reducing the noise as well as pollution level of the area created by the continues traffic flow by vehicular movements with heavy traffic volume on the streets which restricted the pedestrian movement between two sides of the streets.

METHODOLOGY

The study area has started on the shopping high street of Varanasi city that is approximately 800 metres in length, and is a Place of quite high status. It contains around 100 shops on both sides of the road, and is also a major Link with approximately 20,000 vehicles passing along it in both directions in a 12-hour period on a weekday. The development Authority has planned to develop a new scheme on this street which recognised the range of interest groups and objectives, including those of retail/commercial businesses, local residents, through traffic and road safety, public transport, pedestrians and the need to support the local economy and enhance the local environment.

For the study, five major indicators were developed for Link and Place topics such as Pedestrian, Parking, Loading, Safety, Urban Realm were showed 'degree of problem' scores for each topic, which are then indicated to give an overall attention. The area will be analysed according to observing the Link and Place status of a particular street, firstly specifies the intended functions of that street, rather than how it performs at present and secondly the context of what is happening in the whole urban area. For the study purpose Street Plan, which defines the strategic functions and Link and Place is prepared to show the potential status of

each segment in the urban street network, also taking into consideration of land use pattern and any transport mode priorities (e.g. strategic bicycle routes) used different times of the day,

Urban context and Urban Grains of old core area of city

Varanasi is one of the oldest living cities in the world regarded as older than history settled along the bank of river Ganga and known for his rich cultural heritage such as tangible and intangible [6]. Being a religious city one can easily identify diversity in culture in the form of tangible assets such as Temples, Gurdwaras, Jain temples and Mosques along with many Dharamshalas, Churches, Havelis and other 1250 listed archaeological sites [7]. This research paper talks about the Dashashwamedh ghat marg which is found in old part of the city and one of the major tourists and pilgrimage attraction due to the presence of famous Vishwanath temple.



Source: Refer [10]
Figure 1: Master plan, Varanasi.

The old part of the city has high tourist footfall of average 52,51,413 persons per year including pilgrims which is a major source of livelihood for the peoples of the areas [7]. The solid building blocks along the street has an important core designed heritage values with very high vehicular traffic movements, lack of parking spaces and encroachments on the streets is the major issues the streets face. The old street has potential tangible structures like Man Singh Museum also known as Ganga observatory, temples, Dashashwamedh ghat, famous Banarasi silk sarees with their manufacturing setups, Dharamshalas, very old commercial shops along with the famous Vishwanath gali

ASUREMENT OF STREET TYPOLOGY AND ITS ACTIVITY PATTERN

Street typology and its hierarchy

The street of the city has undergone several transformations with the changing lifestyles. The old part of the city lies between the ghats along the holy river ganga and the road parallel to the river. The street has major traffic issue because of the narrow width and the speedy movement of the motorized vehicles always remind a fear of safety and security for the pedestrians. This street is very dense grains with uneven texture which emerged as commercial shops in the front of the street with major residential areas in the background.



Source: ref [11], chapter 6
Figure 2: Street hierarchy plan

Around 1901, this whole stretch (figure 2) was developed as a street and due to its potential location and connection to the major institutions like railway station (4.2 Km) and bus stand (4 Km), the maximum land use on the stretch changed from residential to commercial activity. This main street connects the famous Vishwanath temple to the Dashashwamedh ghat where in the evening famous ganga aarti happens daily.

The figure 3, shows the redevelopment scheme of the street from Maidagin chowk to Dashashwamedh ghat of a stretch around 2.0 km. The study area of this research paper is Dashashwamedh ghat marg having a stretch of around 800 mt which starts from Godowlia chowk and ends up at river ganga. The streets of the old part where primary street are around 12-15 mt wide, secondary street is about 10-12 mt wide and tertiary streets is only 1.5-2.0 mt wide. This is the one of the famous and wide streets which connect the core area of the city with the river ganga else all other streets are not wide enough to cater the large population at a time. The street land use are mixed use buildings, commercial buildings, religious precincts (Vishwanath temple), heritage buildings (Man Singh observatory) which attract the tourists as well as local residents of the city.\



Source: ref [8]
Figure 3: Redevelopment scheme



Source: Author (2018)
Figure 5: Afternoon view of street



Source: Author (2018)
Figure 6: Morning view of street

Activity pattern of the street

The different types of activities portrayed a sense of life on the street which focused the attention of people and gives a certain identity of the core areas. The activity can be formal or informal both which include stalls, bazaars, hawkers, beggars etc. These informal and formal activities make the streets attractive for the users. Sometimes the informal vendors on the street also create some chaos on the streets may lead to accidents, traffic issues, difficult in loading and unloading of vehicles, obstruction in pedestrian movement.



Source: Author (2018)
Figure 4: Morning view of street

Figure 4, 5 and 6 illustrating the movement pattern on small part of the street explaining the activity pattern and movement which seems to be an unorganized and in an unplanned manner. Figure 4 showing the street activity where streets are freely accessible for pedestrian movement with less hawking activities. Where as in figure 5&6, demonstrates the activities on the street during the afternoon time and evening times respectively such as hawking activities, parking of vehicles on the street, restricting pedestrian movement through the section. These problems could result into increase level of noise and air pollution, road accident which ultimately affect the character of the streets.

In order to evaluate and assess the level of safety perception, a mixed self-administered qualitative method approach was adopted using matrix table, this analysis of the street had done by the survey at different times a day i.e., morning, afternoon and evening. As a result, it is found that the activity on the street changes from the morning till the night. As we talk about the morning activity, it was very pleasant as for pedestrian movement on the streets to the river for worships. After that in the afternoon till night, commercial as well as religious activities continues and in the evening Ganga aarti is a major attraction for tourists as well as local residents.

Redevelopment of the street

Even after the redevelopment of the street (figure 8-11) in 2020-21, the problems on the street remains constant and unchanged. The street sidewalks were developed but after that these spaces occupied by the hawkers again. The new parking building areas were initiated near Godowlia Chowk but the half of the street width occupied by the bike parking's. The design of the street and its surrounding are important not only as transportation mode but also as public space. From the above table 1, it shows that there is a strong relationship between frequency of usage and attempt to change route. The local resident users who frequently use the area is more likely to change route whenever they feel unsafe compared to those rarely being in the area.



Source: Author (2022)
 Figure 8: Street after redevelopment



Source: Author (2022)
 Figure 9: Street after redevelopment



Source: Author (2022)
 Figure 10: Street after redevelopment

STREET PERFORMANCE INDICES

An integrated and people-oriented approach of street designing and street planning is to assess the requirement as per Link and Space functions

Link Indicators	Space Indicators	Outcomes
Traffic movements	General Traffic	Urban Realm
Accessibility	Loading problem	Personal security
Non public users	pedestrian	Accidents

Source: Author (Street performance Indicator)
 Table 1: Link and Space activity indicators

In order to evaluate and assess the level of outcomes, a mixed self-administered observation has been done throughout a day. As a result, it is found that the activity on the street changes from the morning till the night.

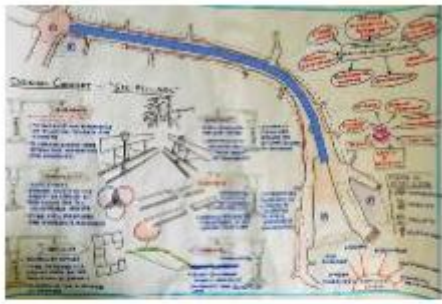
Street User (Link)	Activities (Space)	Infrastructure required
Motor Vehicles	Parking	Proper ROW, Parking
Van/Lorry user	Loading/Unloading	Provision Management, Adequate Lighting
Pedestrian	Movement, Accessibility	Proper side walks, Barrier free Infrastructure for aged people
Safety	Traffic rules, IRC	Provision of crosswalks, traffic signals
Urban Realm	Provision of basic amenities, utilities etc.	Provision of benches, buffer zone, drinking water

Source: Author (2020), Ref [1]
 Table 2: Comparison chart between Link and Space

As we talk about the morning activity, it was very pleasant as for pedestrian movement on the streets to the river for worships. After that in the afternoon till night, commercial as well as religious activities continues which creates problem for local visitors as well as loading/unloading of vehicles and in the evening Ganga aarti is a major attraction for tourists as well as local residents which is around of 45 minute. The below table addresses some issues on the street study area.

DESIGN CONSIDERATION AND RECOMMENDATIONS

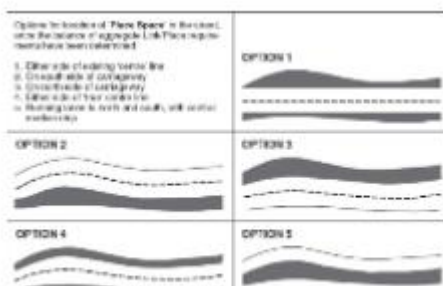
The word active factor means that the required essential resources for making the complete street. When the concept of street develops, it means for social gathering spaces, markets, open spaces etc. But now the total concept of street changes after industrial revolution and there is a need to bring that character to sustain the urban ecology for which it was known for.



Source: Author [Refer 11]
 Figure 12: Street Design considerations
 (Concept stage)

The street user requires a combination of space and specialist 'street design elements' in order to successfully carry out their activities. The table 2, illustrate that the study area is yet to be designed as more pedestrian friendly streets, these problems may hinder the opportunity for visitors to experience the city with a greater sense of enjoyment and ease by walking.

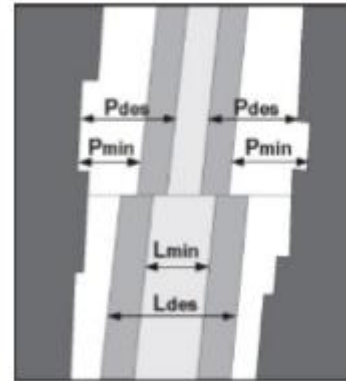
The Table 2, also determine the basic essential parameters came out from link and space matrix table which concluded that the active factor requirement of the individual street design elements for the different hierarchy of streets such as requirement of more or no parking space, either to give access to private vehicles or not, gives priority to be public transportation route, properly assigned spaces for vendors, presence of appropriate spaces for loading or unloading of vehicles, potential area for design of transition space such as green space or open space.



The street can be redesigned in three dimensions i.e., width, length and timing. The width helps in identifying the minimum and desirable level of link and space activities requirements. The length shows the potential of the space which can be linked with various other activities. The timing shows the possibility of activities in a particular time interval.

To protect the character of the street, a two-layered strategy must be followed. First at policy level which ensure the necessary traffic movement activity, by laws and regulations with the help of transport professionals. Secondly at the street level, which ensure street guidelines, adequate spaces for vendors

and sidewalks, design of transition space with the help of planning and designing professionals.



Source: Stephen Marshall [refer 1]
 Figure 14: Link and Space activity consideration

With the concept of Link (L_{des} & L_{min}) and space design (P_{des} & P_{min}) (fig 15), the street can be classified whether it has desirable space (P_{des}), minimal space (P_{min}), or insufficient space and on that basis, redesigning of street can be proceeded. If the street has insufficient space, then it is strictly re-assessed otherwise the street may face a decrease in demand level as well as street performance

The design strategies also include the provision of shared street in on both side of the street as the buildings provide shades on both the corners of the street ,also helps in separating the traffic speed and gives priority to the pedestrians thus allow to walk and perform the activities safely.

CONCLUSIONS

In India street planning and designing led by transportation guidelines and IRC. This paper emphasized the concept of link and space design where link part could be deal by transport planners and engineers and the space activity design might be led by urban designers/planners which helps to encourage close relationship between different professionals. The pedestrian movement is a crucial need to ensure the physical pedestrian safety and security by the separating the high-speed vehicular traffic. The paper has shown that the streets mainly rely on its ability to manage activities that reflect the cultural values and behavioral pattern of the local residents. The definition of Link and space design illustrates the range of street functions and the needs of the people on the basis of the hierarchy of the street and then identified the appropriate balance of street space for different user groups. The city has an anxiety reason with the issues of social integration, economic strategy, public realm therefore, the streets of the city play a major role in social gathering space which enhance the quality of

life of the residents by making the street a livable space.

WAY FORWARD

The study has the number of considerable points for the safety and security on the streets which has been way forward the redevelopment of the streets in the core areas of Varanasi city. There are various other issues on the streets which has to be considered and integrate with the current issue for redesigning the streets.

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Corresponding Author

Student Name*

Author Designation