

Pedestrians at Crossroads: A Case Study of Bangalore

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“Transport does not only mean 'take or carry from one place to another by means of vehicle, aircraft, or ship⁽⁷⁾' but also **by foot**”

ABSTRACT

Walking is the most ancient mode of transport but in this automobile age, walking is often the most neglected mode. There is a tendency to underestimate the pedestrian infrastructure needs when compared to the needs of the motorists. The situation has come to such a state that daily at least one pedestrian is killed on Bangalore roads. In this paper, the authors have tried to investigate the design-safety-economic and policy issues concerning existing pedestrian infrastructure in Bangalore. Also an attempt has been made to access the public perception on pedestrian issues.

INTRODUCTION

Many researchers while tabulating the mode split of any Indian city often miss out on the share of pedestrians. It is a common perception that walking does not constitute as a mode of travel, hence does not need any planning. It is not surprising that Oxford dictionary gives the adjective meaning of pedestrian as “Dull; uninspired”. The situation has come to such a state that footpaths are often considered as part of road furniture and hence planned as a secondary accessory.

Darwin’s “Survival of the fittest” theory is very much applicable in transportation as pedestrians in Bangalore during the daily course of life have to compete with vehicles to gain accessibility and mobility often losing the battle.

With growing population, congestion, pollution and related issues, many cities are facing mobility-accessibility problems, and the governments have become more **supply oriented** and thus preoccupied in building more roads, flyovers that they have completely neglected the most ancient mode of transport. In the subsequent sections, Bangalore city has been taken as an example and dissected for better understanding of the problem.

BANGALORE THE “BLACK CITY” OF INDIA

Bangalore has the worst road traffic in India considering the destructive cocktail of high accidents, vehicular pollution, traffic violations and motorisation levels.

Consider the statistics

- Motorisation Index of 362⁽⁹⁾
- Nearly 800 road accidental deaths every year with Accident Severity Index of 11.85⁽¹⁾
- Nearly 4500 “Official” traffic violations per day⁽¹⁾
- Majority locations indicating AQI > 75 and Noise > 90 dB⁽¹⁾
- Congestion Cost of 208 million Rs/Day in terms of lost time⁽⁹⁾
- Nearly 30 Vehicles stolen per day⁽¹⁾
- Overcrowded Buses with average loading of 57 passengers with average distance between bus shelters of 2.69 km⁽¹⁾

Bangalore can in fact compete with other metropolis for having the worst pedestrian infrastructure in the country considering non existent footpaths, crossings etc as indicated in the following sections and photos.



Figure 1 & 2 indicates sorry state of footpath (not in proper shape and not sufficient)

Bangalore has nearly 5922 km of roads indicating that there is nearly 33sqm of road space for a single vehicle considering the total vehicle registrations and the available road length and widths. Applying the “HERMANN KNOFLACHER- EQUIAREA”⁽⁶⁾ principle and considering that 38% of households don't have any vehicles, the average width of footpath on one side of road works out to be 7.5m. The footpaths if available range from 0.5-2.5m. In this width, pedestrian share their ROW with roadside appurtenances such as utility (electric, water supply, telephone), street lights, transformers, sign boards, roadside vendors, bus shelters indicating worst possible level of service and gross discrimination against pedestrians.



Figure 3 & 4

Source: Hermann Knoflacher (2007), Success and failures in urban transport planning in Europe—understanding the transport system, *Sadhana* Vol. 32, Part 4

The Comprehensive Traffic and Transportation Study⁽⁸⁾ conducted in Bangalore in 2007 estimated the pedestrian trip share as 8.33% with number of trips daily being 523597. This estimation looks highly conservative as the Public Transport and IPT shares are 41.91% and 11.56% respectively. Considering very poor service of park & ride facilities available in Bangalore, the ingress and egress from the public transport share would be mainly through the walking mode, thus it should have a higher share. The reason for gross underestimation in the pedestrian mode share can be the possible preference given to the vehicular movements in the urban transportation modelling behaviour. But several experts such as Prof. Badami⁽²⁾ contribute the poor share to the available deficient infrastructure.

Bangalore has the dubious distinction of being one of the few cities in world which sends at least one pedestrian to the graveyard every day.

Now let us ponder over the design aspects of pedestrian infrastructure using the case study of Bangalore and Indian Highway Code guidelines.

FOOTPATH/SIDE WALKS

Indian code for the Pedestrian Facilities⁽⁵⁾- IRC 103-1988, recommends following guidelines

- Footpath on both sides.

- Minimum width of 1.5m on both sides. LOS (Level Of Service) concept dictates the maximum width.
- Dead width of 0.5m and 1m to be added to sidewalk along houses and commercial areas.
- Footpath width to be increased in cases of bus stops and recreational areas.
- Height of footpath to be above the carriageway supported by an un-mountable kerb.

In recent years several suburban/rural areas have seen transformation into urban areas. In order to increase the traffic capacity, the shoulders of the roads were converted into paved sections. This exposed the pedestrians to the traffic thus increasing the risks as indicated in some of the photos.



Figure 5 & 6: People living on footpath and utility blocking the footpath

The RoW (Right of Way) constraints often consume the footpath widths in Bangalore. It is very common to find footpaths with 0.5-1m widths. Such footpaths force the pedestrians to use the carriageway, increasing the fatality risks.

The critical issue of dead width is often neglected by the authorities.

The footpaths are mainly occupied by the roadside vendors in the commercial areas. With CDP-2006⁽³⁾ proposing mixed land use in the future, majority of roads need to be provided with wider footpaths considering dead widths. In the places where pedestrians congregate, it is essential to increase the width (near junctions etc). Another important aspect is the dead width due to the presence of signboards. Signboards are important furniture which need to be provided for the motorists but impede the movement of pedestrians. Addition of a dead width for signboards would improve the level of service provided by the footpaths. Bangalore also needs to urgently ban private advertisements provided in the footpath area as shown in the photos.

Few Years ago, Bangalore authorities started a scheme where a person who identifies a pothole on the roads along some sections would be awarded money. The point to be highlighted here is the issue of “footpath holes” which are never publicised. The footpaths lack continuity with major portions in a bad shape because of utility repair and maintenance such as waste water drains, sewer lines, water supply lines etc. The authorities need to provide separate utility sections along the footpaths (exclusive) to improve the effectiveness and usage. The Indian code for Utility ⁽⁴⁾ - IRC-98-1997, recommends provision of underground utility beneath the footpaths which needs urgent revision.

We need to ponder over the issue of over-ground utilities such as lamp posts, electric poles, transformers etc. These fixed objects obstruct the free movement of pedestrians. Provision of utility space would allow the authorities to shift the utilities from the footpath to the utility space thus improving the mobility of pedestrians and reducing the fixed object crashes.

Another important aspect to be considered is the footpath camber. A cursory glance at the camber provided in CTTS-2007 cross section indicates a camber of 4%. Such a high camber will create transverse uneasiness to the pedestrians and would prevent more usage. In fact the roads have been provided with a camber of 2.5% with the same logic of driver comfort. A camber of 1 to 1.5% would be efficient.

Bangalore authorities need to ban parking on the footpaths by vehicles. Parking on the footpaths was adopted to increase the capacity of the roads for the vehicular movements (to prevent on street parking). With Bangalore currently undergoing mixed land use development with vertical growth in addition to multiple vehicle ownership phenomenon (ratio of number of vehicles per household already owning a vehicle being

2.76) and land prices soaring, parking facilities at homes are extremely rare to find and people have resorted to footpath parking. The banning of footpath parking would allow unhindered movement for pedestrians.



Figure 7 & 8: Footpath used for advertising and parking

GUARD RAILS

The concept of guard rails along the footpaths is almost alien in Bangalore. The guard rails play an important role in segregating the pedestrians from the vehicles and prevent jaywalking thus enhancing the safety of the system. Many roads where guard rails are provided are either discontinuous or in very poor state thus not serving the purpose. The other problem is the theft of the guardrails by miscreants as they are not vandal proof. The cross-sections suggested by the CTTS-2006-Bangalore do not propose any guardrails for the pedestrian safety. In an urban context, to have a closed system with safe openings for the pedestrians would provide best possible results. The issue of providing the guard rail opening at pedestrian desire crossing lines needs to be considered. The footpaths are often considered as emergency exit lanes during the grid locking by the motorised two wheelers which can be prevented by using such guard rails.

PEDESTRIAN CROSSINGS

Pedestrians need to cross the roads at some locations during the course of travel. The crossing locations should provide for safe and comfortable movement. In India, the two types of crossings i.e. at-grade and grade-separated, are provided exclusively based on traffic intensity.

At grade pedestrian crossings are provided along minor intersections, mid blocks to provide safe crossings for the pedestrians. Important aspects to be considered in the provision of at grade crossings are

- Crossings should be at right angles to the carriageway.
- Crossings should be illuminated with proper visibility.
- Crossings should be intelligently placed along pedestrian desire lines.
- Provided with other accessories like warning signs, markings, information signs etc.
- Wider roads should have refuge islands.
- Crossings at mid block should be provided when distance between intersections is minimum of 300m.
- Road safety audit should be done before opening the road for traffic.

A detailed review by the authors has indicated gross violations of basic guiding principles while proposing at grade crossings as shown in photos.

Traditionally the concept is to give the priority to the movement of pedestrians when he steps on to the zebra crossings (alternate white-black strips), but with Bangalore ranking high in traffic violations in the country (4500 traffic violation cases/day) the priority is always with the motorised vehicles. It is the classic case of *might is always right!*

The most vital point missed by the Indian code while prescribing the philosophy of Zebra crossings is the traffic flow speeds. Major roads have peak hour speed of nearly 15 kmph. The speed profile is not constant. Urban roads in India due to high congestion, high number of traffic calming measures, mixed traffic allows generation of shock waves. These shockwaves generate sinusoidal speed profiles with maximum speeds crossing 60 kmph on feeder and collector roads. International codes limit the usage of Zebra crossings on Roads with 85 percentile speeds of less than 35 mph.



Figure 9 & 10: Lack of Pedestrian Crossings

The important aspects of the code to be considered in the provision of controlled crossings at mid blocks are listed below

- Peak hour volumes of pedestrians and vehicles are such that $PV^2 > 1$ million (Undivided carriageway), $PV^2 > 2$ million (divided carriageway)
- Stream speed of greater than 65 kmph
- Waiting time for pedestrians/vehicles become long
- Accident records suggest 5 or more injuries to pedestrians in a year due to collision with vehicles



Figure 11 & 12: Pedestrian Underpass under construction and a Skywalk

The provisions of the code need urgent updating as many stipulations are not quantitative or clear. For example third stipulation of high waiting time, it does not indicate the duration of waiting time. As per the speed stipulation of 65 kmph, nearly 350 km of arterial roads should have grade separations or controlled signals such as Pelican, Puffin, Toucan crossing etc.



Figure 13& 14: Footpaths encroached by the shopkeepers and zebra crossing on speed breaker!

Junctions in Indian cities paint a grim picture with pedestrians slogging out while trying to cross the junctions in absence of exclusive pedestrian phase. The PV^2 stipulation is also not clear as in the absence of a crossing, the pedestrian crossing can be anywhere between a section of road making the enumeration very difficult. The stipulation can be converted by providing controlled crossings every 200-300m if no junction is available.

PEDESTRIAN STREETS

With growing congestion levels, the government has been forced to look for out of the box solutions, one of such solutions is the pedestrian zone with only pedestrian streets. The core city areas with total commercial landuse can be subjected to such treatment.

The problem with Bangalore is that nearly 250km of roads in the city have been converted to one-ways, with mixed landuse norms being adopted; the majority of areas carry through traffic which cannot be prevented. CTTS-Bangalore proposes pedestrian streets along three prime roads with traffic management and other improvements suggested. The following figures extracted from CTTS indicate the pedestrian only zones proposed for Bangalore. Mixed Landuse prevents adaptation of more number of Pedestrian streets.



Figure 15&16: Pedestrian Streets near Gandhinagar and Commercial Street (Source: CTTS-Bangalore)

PUBLIC AND MEDIA PERCEPTION

In view of limited resources of this research detailed survey investigations could not be carried out to gauge public-media perception on pedestrian-vehicular infrastructure domain. It was decided to understand the public-media perception by making use of public forums available in the newspapers. The 'Times of India', one of the most widely read newspaper in Bangalore carries a forum "My Times, My Voice" where the readers can suggest, complain about civic problems. The December month details for the year 2007 was collected to explore the public perception on pedestrian issues

The below pie chart indicates the public perception on pedestrian issues. Transportation infrastructure was the prime concern for the public with nearly 57.4% share. Of the transportation infrastructure share, pedestrians concerns were expressed by only 9.68%. The majority public was more concerned with issues concerned to roads (59.68%).

The public and media perceptions follow the logic of egg and hen with each interlinked to the other. The media perception was assessed by accumulating and classifying the articles on various infrastructure issues published in Times of India (pages 1-5) for the December month.

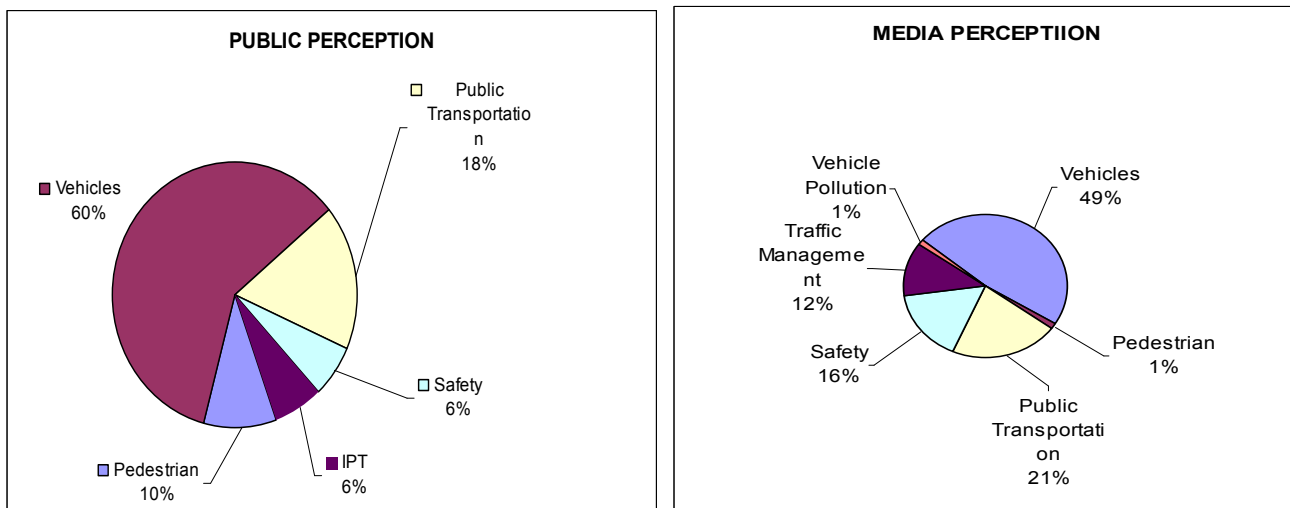


Figure 17&18: Public and Media Perception

The analysis throws the result along expected lines with issues related to roads and motorists ruling with 47.76%. Media by and large has neglected the pedestrian issues with only 1.5% coverage. Media has raised public transportation and road safety issues with 37.3%.

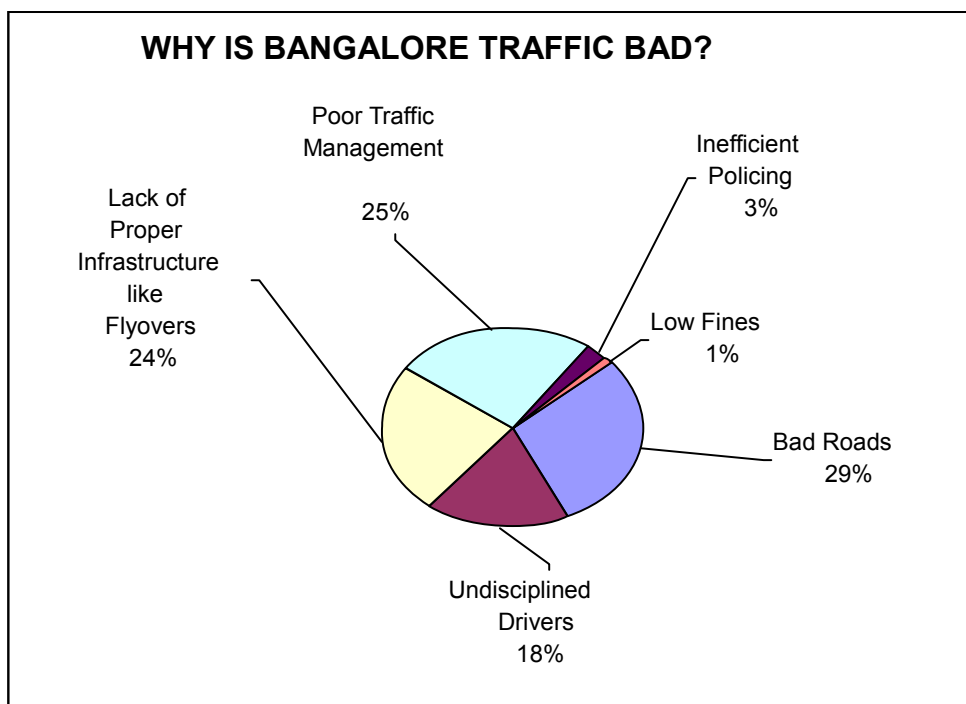


Figure 19: Public Opinion Survey by Times of India

Times of India conducted an Opinion survey through an agency called as Synovate⁽¹⁰⁾. The above pie chart indicates the responses by the public regarding the query about Bangalore Road traffic. As seen from the chart that people mainly tend to concentrate on the vehicular movements.

The public virtually neglected the issues regarding the pedestrian infrastructure. With public and media largely concerned with issues related with roads-vehicles-motor vehicles, the government has largely concentrated on roads with priority to vehicles as suggested by the investment pie indicated in the next section.

INVESTMENT PROPOSAL

CTTS-2007 proposes a massive investment of Rs.46944 Crores during the next 16 years. The major portion of the investment is absorbed by Mass Transportation improvement strategies (79%). The pedestrians who would be the prominent ingress and egress to the mass transportation have been discriminated by getting

only 0.6% of investment pie which is lesser than the amount made available for parking. The government proposes to improve only 350km (175 km of both sides improvement) of footpaths and provide 68 numbers of skywalks and underpasses.

Many researchers believe in the philosophy of Induced Traffic. The logic is the more you invest on infrastructure, the more traffic it would attract. The same holds good on pedestrian infrastructure also. If the government plans more investment on pedestrian infrastructure, the more pedestrian traffic it would attract. Considering the problems such as safety, pollution, congestion, it would be the most apt thing to do. The “Butterfly” effect has a role to play in transportation also. A very small investment of around 3% of Total Transportation Budget would induce major shift in mode split towards pedestrians. The potential is there (38% households do not own any vehicles, high obesity and other health risks) and the only need is to act and provide the facilities.

CONCLUSION

Every 1 hour, approximately 1.2 cars can be manufactured by the automobile companies in India. The government for ages has considered the wheels as the biggest invention of mankind and planned the cities to hold as many wheels as possible. By and large the support for pedestrian issues has been muted with little support from people, media or government. No solution can be arrived at by increasing the investment of roads as vehicles would keep coming at a greater rate. With such a biased policy, the worst affected category is the pedestrians who have to share and compete with vehicles for their ROW often losing the battle and ending up in a hospital or graveyard.

It is a fact that the most eco friendly mode is not the most loved one. The government needs to wake up and decide as to where it wants to be in the future. In the age of “Carbon Credits”, let us give some incentive to the pedestrians. Let us give them some space for walk.

The pedestrians are at crossroads – waiting and undecided, to continue or not. Let us provide some help before it is too late.

“Build footpaths and the pedestrians would come”

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