A STUDY ON PEDESTRIAN LEVEL OF SERVICE IN JHUNJHUNU DISTRICT

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Abstract
This study seeks to improve pedestrian safety and reduce vehicle-pedestrian interaction. This goal requires find the research area's LOS. Level of service (LOS) is used to evaluate vehicle, pedestrian, and bicycle compatibility. HCM defines PLOS levels. The region's LOS might be inferred from its PLOS score. In order to compute PLOS, a questionnaire was created to collect qualitative feedback from road users in real time. Data was collected to determine PLOS. Many ages and genders took the survey. All questions were rating-based, in which ratings 1 to 5 are given. Logical questions were included. The pedestrian safety level was assessed and it was found that the area under investigation is a great destination for pedestrians since they feel comfortable and find all the amenities that would tempt them to stroll there.
Keywords: *Pedestrian, Level of Service.*

1. Introduction
The level of service that is offered to pedestrians is influenced by a number of different factors, the most of which may be classified as belonging to one of two main categories: the operational aspects or the physical infrastructure. The operational elements include things like traffic volume and speed limitations, whereas the physical infrastructure includes things like sidewalks, landscaped buffers, parking lanes, and street widths, amongst other things. Other operational characteristics include things like traffic volume and speed restrictions. The fact that there are more car accidents in India than in any other country lends credence to the idea that further efforts need to be made in that country in order to forestall the situation from worsening any further.

As a result of this, the concept of the degree of service was established so that we could qualitatively evaluate the level of safety that is offered for different road users, such as pedestrians, cyclists, motorists, and others. These road users include those who walk, ride bicycles, and drive automobiles. The community would be able to attain the following objectives with the help of an improvement in pedestrian safety and a safer walk able environment. Increasing accessibility for individuals who do not use motor vehicles would be achievable.

The cost of transportation will decrease by a significant amount, and the efficiency of the parking options in the neighbourhood will experience a sizeable boost. There would be an improvement made to the way that things seem. A reduction in the amount of land needed for the construction of roads. A reduction in the number of pollutants and in addition to acting as assistance for public transit a reduction in the amount of land necessary for the construction of roads.

Objectives
1. Increasing the safety of pedestrians without delaying or slowing the flow of cars entering or leaving the area is the goal here.
2. To determine the level of service by questionnaire survey method

2. Review of Literature
Nitin Nathani et al. (2021)
Transportation infrastructure is often assessed using LOS. This research examines intersection pedestrian LOS variables. Many pedestrians were asked to

rate each crossing based on their real experiences. Human convenience and quality should guide pedestrian space design. Pedestrian level of service shows environmental quality and guides pedestrian facility development. Consider comfort, convenience, safety, security, and aesthetics. "Modasa Char Rasta" (5-legged crossroads) with heavy foot traffic is the research location. The estimated pedestrian LOS on sidewalks of all roads meeting at the junction and those crossing the roadways is B & C. Thus, it is suggested to provide pedestrian signals with a green phase, vacate the walking area occupied by street hawkers and dwellers, and check the feasibility of a foot over bridge to reduce conflicting movements between pedestrian and vehicular traffic crossing the intersection.

Tufail Ahmed et al. (2021)

Due to traffic, crosswalks must be well-designed. LOS pedestrian crossing methods exist. This study assesses crosswalks using several fundamental principles. This paper suggests a pedestrian crossing level of service (PCLOS) plan to increase safety and sustainability in such settings. New PCLOS indicator scores and coefficients indicate street crossing conditions. Field observations and respondent opinions provide quantitative scores and indicator coefficients. Four Putrajaya crosswalks were examined 17 indicators measure literature. Zebra crossings trumped crosswalk drainage. Four components had coefficient values above 4, indicating that pedestrian crossing facilities significantly impact LOS forecasts. Four Putrajaya, Malaysia crosswalks were examined. Putrajaya crosswalk "PCLOS A", Putrajaya Corporation's midblock crossing was "PCLOS C", "PCLOS B" crosswalks. The method may reveal pedestrian crossing design and operation faults and give PCLOS-based pedestrian safety improvements.

Divya Manoj A, et al. (2020)

Uncontrolled midblock crossings are prevalent. Cars don't always yield to pedestrians, and pedestrians can't determine appropriate spacing between cars, putting them at danger of accidents. This article examines without signalized junction pedestrian level of service (PLOS) characteristics. Traffic conflicts, crossing facilities, and delay were the three main variables affecting pedestrian LOS at crosswalks. Second, the model's data included 92 participants' real-time comfort and safety while crossing the chosen junction crosswalks and the intersection's architecture and functioning. A two-three-legged crossroads in Ernakulam, Kerala, is the research site. Stepwise multi-variable regression analysis was done on the observed data to achieve this goal. Many pedestrians were asked to rate each crossing depending on their experience. Analysis dependent variables were pedestrian scores. A video graphic survey was used to identify the main independent factors affecting LOS and evaluated in stepwise regression analysis to establish a PLOS model for no signalized midblock traffic crossings. Variables created this pedestrian LOS model.

Socrates Basbas et al. (2020)

Walking revives purchasing, sociality, and communication while reducing emissions. This article evaluates a pedestrian area in the heart of Kalamaria, one of the largest municipalities in the Thessaloniki Metropolitan region, Northern Greece. The pedestrian area evaluated contains the oldest and most significant pedestrian route in the Municipality, situated in the CBD and serving a considerable number of pedestrian flows daily. A metro station is intended to boost pedestrian traffic. The research analyses the pedestrian roadway using Viswalk, a tiny pedestrian simulation program. The particular examination identifies LOS changes when pedestrian mix and flows vary.

Dipanjan Nag et al. (2019)

PLOS models are often used to evaluate walking facilities. Since the 1970s, these models have included three steps: attribute selection, model calibration, and service-level categorization based on Measures of Effectiveness (MOEs). This study covers sidewalk PLOS studies based on their relationship with flow features, constructed environment, and user perception, which together comprise the whole walking environment spectrum, as stated by current researchers. This analysis examines 47 PLOS research and eight review articles from the Americas, Europe, Asia, and Australia from 1971 to 2019. 49% of research included qualitative and quantitative data, but none used all three broad dimensions. These studies also leveraged existing research to pick context-specific features for the PLOS, rather than a consistent and rigorous strategy. 60% of studies calibrated their model using regression, whereas 22% utilized points-based marking. Finally, 89% of researches manually classify PLOS model outcomes to letter grades. This research found just one PLOS based on pedestrian route directness, a metric of pedestrian network connectedness.

Ankit Bansal et al. (2018)

Any nation's growth depends on urbanization. The massive growth of transportation infrastructure has rendered non-motorized modes obsolete. Thus, we must encourage non-motorized modes like walking and review pedestrian amenities. The Level of Service [LOS] given by pedestrian infrastructure depends on several pedestrian-related aspects. This research objectively reviews all possible factors and suggests the most significant ones using ranking criteria. Pedestrian variables strongly impact the LOS of continuous pedestrian facilities, whereas traffic features strongly affect the quality of service of interrupted pedestrian facilities. Socio demographic parameters have the least impact on pedestrian facility LOS, while all other components are highly correlated with them. Thus, to improve pedestrian facilities, concentrate on the most important components.

P. K. Bhuyan & Minakshi Sheshadri Nayak (2013)

The study classifies and analyses urban street LOS estimate findings from different techniques. Urban streets and LOS are explained. From a distance measurement tool to a global positioning system, travel speed data collecting has changed throughout time. LOS analysis requires classifying urban streets and ATSs on street segments. Fuzzy set theory, genetic algorithm, neural network, cluster analysis, modelling, and simulation are used to quantitatively and qualitatively analyse urban street LOS. Urban street quality is measured by road user satisfaction. Research technique may be improved.

3. Methodology

When applying a methodology to the process of calculating performance measures and the quality of service for the study area, selecting an analytical tool is the step that has the greatest weight in terms of its significance. It can collect qualitative information by use of a questionnaire survey method in the context of pedestrians, to assess or make estimates about their performance. Determining the degree of service provided to pedestrians it was postulated that the PLOS and the data obtained from the questionnaire would have a link to one another that might be described as linear. In this specific example of a linear connection, the inverse variance method was chosen to be used for the purpose of carrying out the computation of the coefficients. The coefficient a stood for the conditions of the sidewalks and roadways; the coefficient b represented the characteristics of the roads; the coefficient c represented the interaction of the pedestrian mode with the other modes of transportation at intersections; the coefficient d took into consideration the effect of buffers on PLOS; the

coefficient represented the transit area; and the coefficient f represented the safety coefficient. This was done in order to establish the values. In order to determine the extent of PLOS, ideal and suboptimal conditions were chosen, and then the highest and lowest values of each variable were computed for comparison. The next step is to begin with the lowest value and work our way up to the highest value as we add the interval in that sequence. This will give us the boundary boundaries of each individual LOS.

Formulation of Questionnaire

Q. 1. Do you think that footpath width is sufficient?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 2. How would you rate the maintenance of the footpath?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 3. How would you think that road width is sufficient?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 4. Do you find the road divider properly?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 5. Does traffic signs are provided in proper way?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 6. Does speed barkers are provided at necessary points?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 7. Does zebra crossings are provided on the road?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 8. How would you rate the safe crossing on the road?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 9. Does the bus stop have clear view and sufficient distance from road side?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

Q. 10. How would you rate the follow of rules and regulations by the drivers?
(a) 1 (b) 2 (c) 3 (d) 4 (e) 5

4. Result and Discussions

Total 10 questions were selected for the result analysis. The researcher formulated a questionnaire survey in which a no. of questions was chosen ten. The questionnaire survey organized in a manner such that it filled out from the respondents on road side. The corrected and completed 20 questionnaire were selected for final result discussion. The results of the respondents are given below.

Name	**Age**	**Sex**	**Q.1**	**Q.2**	**Q.3**	**Q.4**	**Q.5**	**Q.6**	**Q.7**	**Q.8**	**Q.9**	**Q.10**
Mahesh	M	42	2	2	3	3	2	5	1	3	3	4
Pawan	M	26	4	3	2	1	4	1	5	3	2	3
Raju	M	31	3	4	1	5	5	4	3	5	4	5
Urmila	F	27	3	3	5	2	1	3	2	4	5	4
Sonia	F	24	3	5	5	4	3	3	4	1	1	4
Akbar	M	32	1	3	3	2	4	5	1	2	3	3
Kamlesh	M	44	5	2	4	1	2	4	3	5	5	5
Ankit	M	26	3	4	2	3	3	2	2	4	4	4
Pooja	F	25	2	3	3	2	3	4	2	4	2	1

Muskan	F	28	4	4	3	2	3	3	4	3	5	2
Fatima	F	29	3	2	4	1	5	4	1	2	3	5
Nadeem	M	35	3	3	4	4	2	5	2	4	3	5
Saroj	F	47	4	4	4	3	1	4	3	4	3	3
Indrajeet	M	52	2	2	5	5	4	4	3	3	4	4
Ramu	M	48	3	1	3	1	3	2	5	1	2	4
Mahavir	M	55	1	3	3	1	3	3	2	4	1	3
Dinesh	M	28	3	4	5	4	1	5	1	5	4	3
Lalchand	M	43	4	2	1	2	2	4	4	4	3	4
Kalu	M	50	3	5	3	2	3	4	3	2	1	2
Rekha	F	37	5	3	4	3	4	5	3	3	2	4

Table 1: Question wise Responses by the Respondents

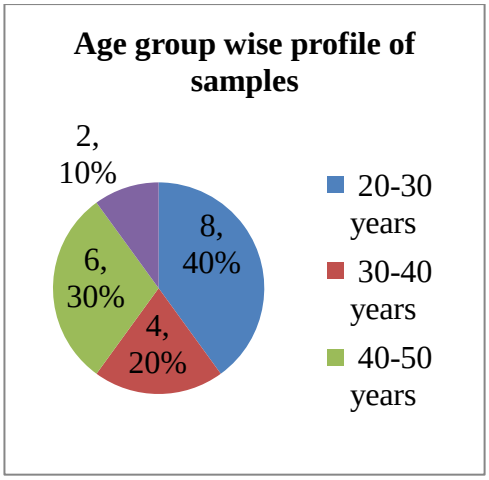

Figure 1: Age group wise profile of samples

Explanation: It is cleared from above figure that out of 20 respondents, 8 respondents are of age group 20-30 years, 4 respondents are of age group 30-40 years, 6 respondents are of age group 40-50 years and 2 respondents are of age above 50 years. The data can be expressed in percentages as 40 % respondents are of age group 20-30 years, 20 % respondents are of age group 30-40 years, 30 % respondents are of age group 40-50 years, 10 % respondents are of age above group 50 years. So it is cleared that most of the respondents belonging from age group 20-30 years.

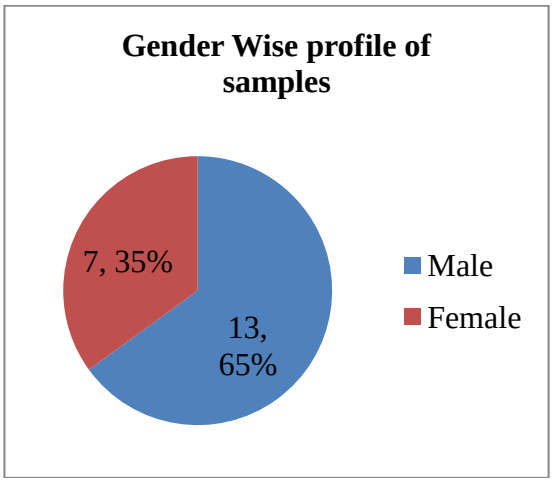

Figure 2: Gender wise profile of samples

Explanation: It is cleared from above figure that out of 20 respondents, 13 respondents are male and 7 respondents

are female. The above data can be represented in percentages as 65 % respondents are male and 35 % respondents are female. So it is cleared that most of the respondents' male candidates.

Strongly Agre	Agre	Moderatel	Disagree	Strongly disagr	RII	Ran
5	4	3	2	1		

S.N.	Questions	5	4	3	2	1		
1	Do you think that footpath	2	4	9	3	2	0.	6
2	How would you rate the	2	5	7	5	1	0.	5
3	How would you think that	4	5	7	2	2	0.	3
4	Do you find the road	2	3	4	6	5	0.	10
5	Does traffic signs are	2	4	7	4	3	0.	8
6	Does speed barkers are	5	8	4	2	1	0.	1
7	Does zebra crossings are	2	3	6	5	4	0.	9
8	How would you rate the	3	7	5	3	2	0.	4
9	Does the bus stop have clear view and	3	4	6	4	3	0. 6	7
10	How would you rate the	4	8	5	2	1	0.	2

Table 2: Result of the Questionnaire

5. Conclusion

It is clear from the above result table that there are 10 questions related to safety features of the road network. From all questions "Does speed barkers are provided at necessary points?" secure first rank so that it attracts the maximum attentions of the respondents. So that it gives the more positive results about the speed barkers constructed on the road. Maximum respondents are agreeing with the 4 ratings. While question "Do you find the road divider properly?" secure the last ranking in the list. So that mostly respondents disagree with the road divider because some places having no road divider, for example road no. 3 has the most traffic volume and there is no road divider provided. Questionnaire survey finds that most of the respondents are agree and moderately from the above questions while some of them are disagree with the safety provision of the road.

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