



Characterization's Study of Drivers and Pedestrians Interaction While Road Usage from Ethical Perspective

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Abstract—In this study, the certain factors that have affected the interaction between the drivers and pedestrians and caused serious traffic problems including traffic jams, road accidents, injuries, and deaths of people were analyzed and discussed in detail. Data was collected by surveying 6th Road Junction on Murree Road, Rawalpindi, Pakistan. Likert Questionnaire-based survey was used to organize data according to the public reviews. After the collection of data, it was then analyzed by SPSS software. The values of standard deviation varied from 1.1 to 1.36 in case of driver's data analysis. Similarly, the values of standard deviation varied from 1.04 to 1.53 in the case of pedestrian data analysis. These mean and variance values directed to divide the whole data into five ranges starting from never to always. Pie charts showed the values for literacy rate, age, and gender of people using the 6th road including both drivers and pedestrians.

According to the data gathered from the demographic analysis, there were 60% male and 40% female pedestrians.

Index Terms— pedestrians' interaction, questionnaire analysis.

I. INTRODUCTION

IN our daily life, we face certain traffic issue as traffic congestion, traffic accidents due to certain factors. As a result, these factors cause serious injuries or even deaths of human beings. Therefore, it is necessary to study the interaction between drivers and pedestrians and to find all the factors that affect the interaction between them. During this study 20 questions were asked from drivers and 20 questions from pedestrians to collect the

In this research 85.7% male and 14.3% female drivers were studied. It showed they were not ethical enough with others while driving the vehicle in case of drivers and while crossing the road in case of pedestrians. Most of the drivers were found without a license while driving their vehicles. Similarly, many pedestrians were found careless while crossing the road as they use mobile phones while road crossing. Many factors were involved that were the main reasons for traffic problems. These factors included not using footpath, use of mobile phones while driving, not using overhead bridges or underpass for road crossing, lack of road signs knowledge, careless attitude while driving the vehicle, use of harsh languages with each other in case of accidents or traffic jam and the over speeding of vehicles, etc. Therefore, it is necessary to educate the drivers and pedestrians about traffic rules and regulations and the importance of these rules and regulations for better conscience to avoid traffic congestion, road accidents, and injuries.

data as much as possible. For the questionnaire, Odd Likert Scale questionnaire data was analyzed on the SPSS tool. This software works on the principle of statistical analysis for mean, variance, etc.

A. Literature Review

1. Signalized Crosswalk

Installing the crosswalk didn't have any significant effect on the pedestrians' sensitivity to waiting for gap size, speed, or the speed of the approaching vehicles. However, it caused reductions within the speed in approaching vehicles which successively encouraged pedestrians to simply accept shorter gaps (Danaf, Sabri et al. 2020).

Pedestrian violation may be a major explanation for traffic accidents involving pedestrians. Pedestrians crossing behavior have a very positive effect on time when they are waiting for a while some of them can stop waiting and some of them can continue waiting. The increase in violation inclination of the most pedestrians with the increasing waiting duration but about 10 percent

Manuscript received: September 22, 2021; Accepted: December 30, 2021

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of pedestrians were at high risk of violation while crossing the road. (Gou, Gao et al. 2011).

2. Unsignalized Crosswalk

For pedestrians, the rise in the number of lanes and vehicular volume and also the waiting time for pedestrians increases but decreases with the volume of pedestrians. The lanes are the critical factor that affects the waiting time of the pedestrians at unsignalized midblock crosswalks. The vehicular delay increases with the expansion of the vehicles' volume, the pedestrians' volume, Therefore, the number of lanes congests. Compared with the pedestrians, the vehicular delay increases sooner than the pedestrian waiting time with the rise of the vehicles' volume, pedestrians' volume. (Zhao, Malenje et al. 2020)

These are the main factors that increase the chance of pedestrians' death at unsignalized zebra crosswalks: the presence of no street light means darkness, two-way road, divided road, mid- block crosswalk location, non-built-up area, and summer period means high-temperature regulation may be a crucial factor. The death probability increases by 37% with every 10 km/h rise within the regulation. Fatality risk increases also with the victim's age and is higher for male pedestrians. (Olszewski, Szagala et al. 2015).

3. Violation of Traffic Rules

Unawareness of rules of traffic has the best importance because it's the premier determinant from one hand and on the opposite hand; it is the utmost relation with the opposite cultural variables. (Mavi, Zorbakhshnia et al. 2017).

Comprehensiveness and speed priority sense and also the difficulty of rules affects traffic violations. Asian drivers tend to violate the principles associated with priority within the road space while North and South Americans violate rules associated with speed, and south East Asian drivers violate rules associated with priority and comprehension of traffic rules and road signs. Asian drivers tend to cause crossing collisions while on the opposite hand North and South Americans are susceptible to head-on collisions and rear-end collisions. It had been concluded that driving safety measures supported drivers' characteristics concerning the region were effective. (Yoh, Okamoto et al. 2017).

4. Road Accidents and Traffic Congestion

The vehicle area is ordinarily subordinate to a few issues, for example, gridlock also, mishaps. In spite of this, lately, it is additionally developing with respect to participation between vehicles. The basic goal of this pattern is to build street security, endeavoring to foresee the conditions of expected threat. Vehicle-to-Vehicle (V2V), Vehicle-to-Infrastructure (V2I), and Vehicle-to-Everything (V2X) advance endeavors to give correspondence models that can be utilized by vehicles in various application settings. The subsequent foundation is a specially appointed work organization whose hubs are vehicles as well as all cell phones furnished with remote

modules. The communication between the different associated substances comprises of data trade through the appropriation of reasonable correspondence conventions. The fundamental point of the audit completed in this paper is to analyze and evaluate the most pertinent frameworks, applications, and correspondence conventions that will recognize the future street frameworks utilized by vehicles. The consequences of the examination uncover the genuine advantages innovative participation can include in street security. (Arena and Pau 2019).

With the increase of rain some drivers slow down their motors and some increased their bikes or cycles speed which results in brake failure and pedestrian also suffer as their assessments for a gap to cross the road proved wrong as drivers of the bike, or bicycles or cars become victims of collision with passersby on roads. From the assessments, results concluded that weather changes affect driver-pedestrian interaction behaviors as much as it affects other environmental aspects. And the rainy day is much different than normal day for the environment of road and vehicular activities. counter flows (Koyama, Inoue et al. 2020).

II. METHODOLOGY

A. Existing Research

During this phase, existing researches were studied on the interaction between pedestrians and drivers to find all the factors which lead the traffic congestion and traffic accidents. This phase helped in doing the survey and making the best questionnaire.

B. Site Selection

This study was based on the interactions between pedestrians and drivers. Many factors affected their interactions including the intersection of the road, pedestrian sidewalks, road signal, congestion of traffic, zebra crossing, pedestrian's road crossing bridge, the crowd of people, different age and gender of people, etc. After observing all these factors, it was decided to select the 6th road intersection on Murree Road because this road intersection covers approximately all these factors. Therefore, this site was most suitable for our study at that point.

C. Survey of 6th Road

By surveying the 6th- road, we found all types of details about the road including road infrastructure, road geometry, traffic signal detail, and use of land. With the help of group members, we found the peak hours in which traffic was more than the normal routine. After finding all problems, we were able to make a questionnaire for doing the survey. We collected our required data by taking the interviews of pedestrians and drivers at this intersection.

D. Sample Population and development of Questionnaire Survey:

The drivers were divided into two types including public vehicle drivers and private vehicle drivers. Out of 200, only 181 people (91 drivers and 90 pedestrians) responded. Furthermore, from 91 drivers some were using public vehicles (rickshaw, Taxi, Bus) and some drivers were using private vehicles (bike, car, jeep).

Two questionnaires were formed separately for pedestrians and drivers. Each questionnaire contained 20 questions and all questions had a unique value. For pedestrians, the age, gender, road use, and education were asked mandatory and for the drivers, the age, gender, road use, education vehicle type, driving license, and driving experience were asked mandatory. Questionnaires were formed on the Odd Likert scale and all questions were asked on the type of frequency Likert scale. In this Likert Questionnaire 5 options were provided including Never, Rarely, Sometimes, Frequently, and Always for each question to both drivers and pedestrians.

E. Method of Analysis

Questionnaire data were analyzed with help of SPSS Statistics (Statistical Package for Social Sciences). Pedestrian's and driver's data was collected to calculate the standard deviation and means for finding the factors which caused the problems during the interaction between pedestrians and drivers.

III. SIMULATION AND RESULTS

A. Demographic analysis of Drivers

According to the data analyzed by us in the graph below, there were 85.7% male and 14.3% female drivers in this research. The 11% driver's age was below 18 years in this research. The 74% drivers age was 18-30 years in this research. The 7.7% of driver's age was 30-60 years in this research. The 6.6% driver's qualification was under matric in this research. The 17.6% driver's qualification was matric in this research. The 75.8% driver's qualification was above matric in this research. The 59.3% of driver's road use was daily in this research. The 37.4% driver's road use was once a week in this research. The 3.3% driver's road use was yearly in this research. The 28.6% driver's vehicle type was public in this research.

B. Questionnaire analysis of Drivers

In the first statement result, drivers showed ethically dissatisfied behavior because the mean value of 2.5 was below the neutral point of 3.0. In the second statement result, drivers showed ethically dissatisfied behavior because the mean value of 2.6 was below the neutral point of 3.0. In the third statement result, drivers showed ethically dissatisfied behavior because the mean value of 2.4 was below the neutral point of 3.0. In the fourth statement result, drivers showed ethically dissatisfied

behavior because the mean value of 2.8 was below the neutral point of 3.0. In the fifth statement result, drivers showed ethically dissatisfied behavior because the mean value of 2.7 was below the neutral point of 3.0. In the sixth statement result, drivers showed satisfaction because the mean value of 3.3 was above the neutral point of 3.0. In the seventh statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.3 was below the neutral point of 3.0. In the eighth statement result, drivers showed ethically dissatisfied behavior because the mean value of 2 was below the neutral point of 3.0. In the ninth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.1 was below the neutral point of 3.0. In the tenth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.6 was below the neutral point of 3.0. In the eleventh statement result, drivers showed satisfaction because the mean value of 4 was above the neutral point of 3.0. In the twelfth statement result, drivers showed ethically satisfied behavior because the mean value of 3.2 was above the neutral point of 3.0. In the thirteenth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.8 was below the neutral point of 3.0. In the fourteenth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.9 was below the neutral point of 3.0. In the fifteenth statement result, drivers showed ethically satisfied behavior because the mean value of 3.3 was above the neutral point of 3.0. In the sixteenth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.6 was below the neutral point of 3.0. In the seventeenth statement result, drivers showed ethically satisfied behavior because the mean value of 3 was equal to the neutral point of 3.0. In the eighteenth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.4 was below the neutral point of 3.0. In the nineteenth statement result, drivers showed ethically satisfied behavior because the mean value of 3 was equal to the neutral point of 3.0. In the twentieth statement result, drivers showed ethically unsatisfied behavior because the mean value of 2.6 was below the neutral point of 3.0. The values of standard deviation varied from 1.1 to 1.36.

C. Demographic analysis of Pedestrians

According to the demographic data of the pedestrians, there were 60% male and 40% female pedestrians in this research. The 4.4% pedestrian's age was below 18 years in this research. The 93.3% pedestrian's age was 18-30 years in this research. The 2.2% pedestrian's age was 30-60 years in this research. The 8.9% pedestrian qualification was matric in this research. The 91.1% pedestrian qualification was above matric in this research. The 35.6% pedestrian road use was daily in this research. The 57.8% pedestrian road use was once a week in this research. The 4.4% pedestrian road use was yearly in this research. The 2.2% pedestrian road use was the

first time in this research.

D. Questionnaire analysis of Pedestrians

The first statement results, pedestrians showed ethically satisfied behavior because the mean value of 3.2 was above the neutral point of 3.0. In the second statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.5 was above the neutral point of 3.0. In the third statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.2 was above the neutral point of 3.0. In the fourth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.4 was above the neutral point of 3.0. In the fifth statement result, pedestrians showed ethically unsatisfied behavior because the mean value of 2.8 was below the neutral point of 3.0. In the sixth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.6 was above the neutral point of 3.0. In the seventh statement result, pedestrians showed ethically unsatisfied behavior because the mean value of 2.8 was below the neutral point of 3.0. In the eighth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.8 was above the neutral point of 3.0. In the ninth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.6 was above the neutral point of 3.0. In the tenth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.9 was above the neutral point of 3.0. In the eleventh statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.8 was above the neutral point of 3.0. In the twelfth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.5 was above the neutral point of 3.0. In the thirteenth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3 was equal to the neutral point of 3.0. In the fourteenth statement result, pedestrians showed ethically unsatisfied behavior because the mean value of 2.4 was below the neutral point of 3.0. In the fifteenth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.5 was above the neutral point of 3.0. In the sixteenth statement result, pedestrians showed ethically unsatisfied behavior because the mean value of 2.9 was below the neutral point of 3.0. In the seventeenth statement result, pedestrians showed ethically satisfied behavior because the mean value of 2.2 was below the neutral point of 3.0. In the eighteenth statement result, pedestrians showed ethically satisfied behavior because the mean value of 3.5 was above the neutral point of 3.0. In the nineteenth statement result, pedestrians showed ethically unsatisfied behavior because the mean value of 2.7 was below the neutral point of 3.0. In the twentieth statement result, pedestrians showed ethically unsatisfied behavior because the mean value of 1.7 was below the neutral point of 3.0. The values of standard deviation varied from 1.04 to 1.53.

IV. CONCLUSIONS

From the results after analyzing the data, we concluded the following aspects in our conclusions:

- Stopping before zebra markings, adherence to one-way traffic, and using shoulder lanes in the areas where the major deficiency has been observed because drivers do not remain in their lanes and do not give way to pedestrians always.
- The use of a shoulder lane for normal driving and parking also showed a noticeable lack. Especially parking in no-zones was found to be alarmingly by commercial drivers.
- Some of the pedestrians tend to cross the road as fast as possible and due to their hurry, while crossing the road, they came before the vehicle and as a result face serious accidents as vehicles were at high speed.
- When the signals turn yellow, most of the drivers speed up their vehicles without waiting for the signal to turn green. Due to this hustle, they hit pedestrians and lead them to serious injuries or even deaths.
- Some of the drivers avoided using side mirrors of their vehicle while driving and it became another reason for the road accidents.

V. RECOMMENDATIONS

In view of these broad conclusions, some recommendations are as follows:

- Educate people particularly about zebra markings, one-way driving, parking, and shoulder-lane responsibility
- Enforce these regulations particularly in the case of commercial drivers as they commit relatively more infractions
- Enforce that all shops should have their parking place.
- In commercial areas, road batters should be covered with steel bracing.
- Enforcement of the law that people near the road cannot use a mobile phone.
- Enforce the law that parking near the commercial area should not have text so people can easily park their vehicle.
- Footpaths should be clear from goods so that people should use them.
- The traffic warden should do a fine challan for pedestrians who do not use zebra markings.

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