Assessment of Traffic Congestion and Management Issues in Islamabad Capital Territory:

Management with Holistic Interventions

Muhammad Nawaz Khan, Usama Nizamani &
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We hope this research product will provide critical insights, and inputs to offer respite to a burgeoning and chronic issue of traffic

congestion in the twin-cities of Rawalpindi and Islamabad, and prepare stakeholders to manage this issue in a sustainable manner.

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Acronyms

AI	Artificial Intelligence
ASI	Assistant Sub-Inspector
BPS	Basic Pay Scale
CC	Cubic Capacity
CCUD	China Center for Urban Development
CDA	Capital Development Authority
DHA	Defense Housing Authority
GT	Grand Trunk
HC	Head Constable
IJP	Inter Junction Principal
IPRI	Islamabad Policy Research Institute
ITMC	Islamabad Intelligent Traffic Management Center
ITP	Islamabad Traffic Police
ITS	Intelligent Transportation System
NESPAK	National Engineering Services Pakistan
PKR	Pakistan Rupee
PLBs	Public Light Buses
PWD	Public Works Department
RTA	Roads and Transport Authority
SI	Sub-Inspector
UK	United Kingdom
UNDP	United Nations Development Programme

Executive Summary

- The traffic congestion problems are on the rise in twin cities; Islamabad and Rawalpindi. Islamabad city's existing traffic infrastructure is facing pressure due to a significant rise in the number of vehicles on the roads leading to the city and the internal roads within the city. The growing population has significantly contributed to the challenges of the traffic congestion resulting in the rise of traffic violations and frequent jams. Lack of an adequate public transport system coupled with insufficient traffic infrastructure is compounding the problem. The traffic flow has increased manifold due to commuters from the adjacent cities and provinces who travel through Islamabad towards northern areas of Murree, Azad Jammu and Kashmir, and several more. This pressure has adversely affected the ability of the Islamabad Traffic Police (ITP) to manage traffic. Resource deficit, and the inability of the Capital Development Authority (CDA) to plan and expand the road infrastructure to proportionate levels, contributes to the rise in traffic volume/density.

- A mixed method approach for this research study was followed based on interviews, focused group discussions, and field surveys. Both qualitative and quantitative approaches were employed to identify major bottlenecks/issues contributing to traffic jams and flow-related problems. Field surveys and practitioners' inputs have helped the research team in its major findings and recommendations to address traffic issues in a holistic manner.

- Overall, nineteen interviews were conducted: Two officials of the ITP, four public transport entrepreneurs, one urban planning

specialist, two officials of the CDA, and nearly ten random commuters of twin cities – Islamabad and Rawalpindi were interviewed for the study.

- The focused group discussion was held at Islamabad Policy Research Institute (IPRI) Jinnah Hall on January 18, 2021. The participants comprised urban planners, civil society activists, traffic police officials, and public transporters.

- Two surveys were administered for data collection. One with 214 officials of Islamabad Traffic Police, and another with 1000 general commuters from twin cities.

- Primary data was gathered from Islamabad Traffic Police on traffic violations and Islamabad Safe City on traffic volume entering and exiting Islamabad. Whereas the data on the quantity of the vehicle registration was obtained from the Excise and Taxation Department, Islamabad, and data for public transport plans was acquired from CDA.

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Recommendations

1. Following interventions are proposed to overcome traffic congestion in Islamabad:

- Addressing the capacity/resource deficit of ITP by following measures: -
  - Increasing the personnel strength from the existing 691 to 2700.
  - Direct recruitment of ITP personnel instead of getting personnel from Islamabad Police.
  - Increasing the pool of the ITP vehicles.

- An organization named as Islamabad Intelligent Traffic Management Center should be established to: -
  - Deploy Artificial Intelligence enabled and data science-based tools to assess traffic related issues, including congestion.
  - Report traffic related violations.
  - Provide situational awareness to the ITP of the ongoing traffic situation and coordinate any field deployment for the redressal of the traffic related issues.

- The scope of Roads and Transport Authority (RTA) needs to be enhanced by bringing various matters related to roads and traffic engineering, public transport, driving license, construction permits, vehicle registration/transfer, and development of parking facilities under its jurisdiction.

- A comprehensive survey to be conducted by the ITP and CDA in Islamabad and on roads/highways leading to the city in order to identify badly engineered U-turns and intersections.

Infrastructural improvements could later be planned based on above survey/assessment.

- The existing traffic bottlenecks on main highways, especially the Islamabad Expressway up to Rawat require widening of the highway and the development of additional flyovers/underpasses to accommodate the ever-increasing influx of automobiles. A similar intervention may also be needed along with Park Road, connecting Rawal Chowk interchange with Taramari Chowk.

- A dedicated effort towards the development of integrated public transport system, with the coverage of "last-mile," in line with the feasibility study in 2017, of the National Engineering Services Pakistan and United Nations Development Programme on Islamabad Bus Service[1] in Islamabad, should be implemented at the earliest.

- Introduction of congestion charges to discourage the use of private automobiles, and incentivized use of public-transport, along with the development of operational parking plazas at congestion hotspots within major sectors.

- Introduction of standardized driving regime, under RTA, with regulated driving centers imparting international-standard skills for safe driving.

- Revisions in existing traffic violation charges, and its strict enforcement, to create deterrence against traffic violations.

[1] "Proposed Islamabad Bus Service Routes," (unpublished study, 2017), United Nations Development Program and National Engineering Services Pakistan.

- Extension of E-Challan coverage employing electronic surveillance means to maximum areas in Islamabad Capital Territory.

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Introduction

Islamabad is the Federal Capital of Pakistan. It was established in 1960 to replace Karachi, which was the first capital of Pakistan. Since 1964, the population of this metropolis has increased from 0.1 million to 2 million.[2] Being a planned city, its infrastructure is under the pressure of an ever-increasing population. It also has a standard road network system, which was initially designed with the aim to provide uninterrupted traffic flow for commuters.

Islamabad was divided into four sectors, each of which is further divided into four sub-sectors. Over the period of time, four additional sectors were added. Each sub-sector has a uniform road layout and numbering system, making navigation simple and straightforward.[3] Nevertheless, traffic congestion is becoming a major problem in Islamabad. Congestion causes loss of time in traffic jams, resulting in pollution, energy loss, time-loss, psycho-physical and social costs.

Migration in Islamabad has led to an urban sprawl with the increased number of residents and commuters contributing to the rise in traffic congestion in the capital city. The prime factors behind traffic congestion are unplanned arteries, lack of integrated approach to manage growing traffic by the government and a fast-growing number of vehicles in Islamabad.

In this research study, an attempt has been made to explore the traffic congestion issues and problems in Islamabad, including traffic violations in order to propose interventions to overcome

[2] Pakistan Bureau of Statistics," *Islamabad Census-2017 - Detailed Tables*," April 2, 2021. https://www.pbs.gov.pk/node/3391/?name=135.
[3] Government of Pakistan, *Capital Development Authority*, https://www.cda.gov.pk/.

these issues. A planned survey was prepared for both public and traffic officials via Google Form that included both closed and open-ended questions. The questionnaire was designed to obtain information about traffic congestion, behavior of commuters towards congestion, violations, and issues with public transport, and traffic police resources, as well as public management. The target audiences of this survey were the people residing in Rawalpindi and Islamabad who usually commute to Islamabad either for work, education, or leisure, and ITP officials. The survey was aimed at mapping perceptions and opinions surrounding traffic issues in Islamabad – related to infrastructure, enforcement, and awareness of traffic rules and regulation.

The research paper comprises following parts;

- The first part encompasses factors impacting the traffic flow in Islamabad.
- The second part analyses the availability of resources with traffic police and their performance in managing different traffic issues and violations.
- The third part deals with the policy framework and recommendations.

Problem Statement

The study aims to analyze the reasons behind the increasing incidence of traffic jams, traffic violations, and poor traffic flow/management in Islamabad as well as highways and roads leading into it from Rawalpindi with the objective to offer recommendations to alleviate the above problems.

Research Objectives

This study analyzes the issue from a structure-agent lens to understand and explain the symbiotic relationship between system and agents. The structure or system includes institutes, institutional structures, regulatory policies, infrastructure, absence of facilities, whereas, the units or agents are the commuters, and residents within Islamabad, its suburbs and those from Rawalpindi. To analyze these two key elements this research study set out the following objectives:

a) To understand, explain and analyze different factors, such as road and traffic infrastructure, lack of personnel and capacity building, haphazard enforcement of traffic laws, lack of technological interventions, and poor traffic planning and management contributing to traffic issues in Islamabad.
b) To identify specific problems related to traffic congestion and its management and to identify adequate infrastructural, technological, and behavioral driven change interventions to manage the traffic issues.
c) To propose broader policy interventions for policies decision-makers makers to address the above issues.

Hypothesis

H1: Structural factors, such as inadequate road infrastructure, lack of policy implementation and enforcement, poor traffic management, and insufficient allocation of resources, contribute to traffic issues in Islamabad.

H2: Rise in Islamabad's population is leading to an increase in the number of vehicles in Islamabad.

H3: Lack of public transport is incentivizing the public's preference to own some kind of an automobile for personal commutation.

H4: Lower rates of violation charges are leading to lower compliance with traffic rules.

H5: Lower number of traffic police officials is contributing towards weak enforcement and compliance with traffic rules.

H6: Unplanned rise in number of automobiles in Islamabad is putting strain on existing road infrastructure.

Research Questions

a) What are the factors contributing to traffic management issues in Islamabad?

b) How can Islamabad's existing traffic issues be addressed and managed in an effective manner?

Research Methodology and Plan

A mixed-method approach for this research study was followed based on interviews, focused group discussion, and field surveys. The research relied on primary and secondary data gathered through open and official sources. The research generated qualitative and quantitative data. The quantitative data comprised survey-based questionnaires, quantitative data related to infrastructure and variables of interest shared by ITP and other government agencies. The qualitative data, both primary and secondary, gathered through interviews, focused group discussions, research papers, book chapters, newspaper articles, etc.

1- Interviews

Serving and former public officials (especially traffic personnel), urban planning specialists, transporters, civil society activists, and random commuters input was sought via interviews. Two interviews were conducted with the officials of the Islamabad Traffic Police, four public transport entrepreneurs, one urban

planning specialist, two officials of the Capital Development Authority (CDA), and nearly ten random commuters of the twin cities – Islamabad and Rawalpindi.

2- Focused Group Discussion

The focused group discussion was held at IPRI Conference Hall on January 18, 2021. The participants comprised urban planners, civil society activists, traffic police officials, and transporters. The duration of the discussion was one-and-half hours in length. The purpose of the discussion was to identify challenges from the perspective of key stakeholders and to generate policy recommendations for the management of Islamabad's traffic issues.

3- Data Collection & Analysis

Data for this study was collected and sourced through:

a) Surveys (Traffic Police Officers, Senior Management, Commuters)
b) Islamabad Traffic Police (Official data regarding infrastructure, violations, policies, current framework etc.)
c) Data from Capital Development Authority, and Excise and Taxation Department, Islamabad.

After the collection of required data, and data analytics, common analytical methods were applied, including congestion index to assess the situation of traffic congestion in Islamabad.

Literature Review

Traffic congestion is a condition marked by prolonged travel time, slow speed, and larger vehicular density on highways/roads. Since 1950s, traffic congestion on metropolitan road networks has risen

dramatically.[4] Congestion can occur in any mode of transportation, although it is more common in public transportation. There are numerous recurring and non-recurring factors that generate or aggravate traffic congestion; the majority of them limit a road's capacity at a single point or over a specific length or increase the number of automobiles required to transport a given amount of people or commodities. Studies on traffic congestion are still unable to precisely forecast the circumstances in which a "traffic jam" (as distinct to heavy, but smoothly moving traffic) may occur.[5]

The geographical location of Islamabad attracts people across the country, owing to its temperate weather conditions, scenic and natural beauty, job opportunities, logistics and defense requirements, and aesthetics that make people settle in the capital. Rawalpindi is the closest twin city of Islamabad where over 100,000 people commute every day from Rawalpindi to Islamabad since the past few years.[6] People frequently commute in and out for work and live in different regions of the twin cities, including adjacent areas, such as Gujar Khan, Taxila, Bharakahu, Rawat, etc. Since, workplaces are frequently located far from residential areas, they commute to work regularly. These commuters traveling to the capital city, mostly on private vehicles, are contributing to traffic congestion. Lack of public transportation infrastructure is exacerbating the congestion and other traffic issues. Public

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[4] Caves, Roger W. "*Encyclopedia of the City.*" (London: Routledge, 2004), 626, https://www.taylorfrancis.com/books/mono/10.4324/9780203484234/encyclopedia-city-roger-caves, (accessed on November 12, 2021).

[5] Science Hobbyist, "*Traffic Waves, Physics for Bored Commuters,*" February 10, 2022, https://trafficwaves.org/, (accessed on February 22, 2022).

[6] Hashmi, Wasim, Ansar Yasar, Davy Janssens, and Geert Wets. "Analyzing the Real Time Factors: Which Causing the Traffic Congestions and Proposing the Solution for Pakistani City," Procedia Computer Science 32 (2014), 413-420, https://www.sciencedirect.com/science/article/pii/S1877050914006425, (accessed on February 22, 2022).

transportation services such as metros, subways, and public buses are vital commodities for any metropolitan city, which is inadequate in Islamabad.

The inability to initiate the work on an integrated public transport is partly due to chronic fiscal issues being faced by the federal government, primarily the fiscal deficit. An integrated public transport in this study is referred to as availability of a network of public transport comprising different services such as metro buses, feeder bus systems, rail networks, etc., all providing connectivity to different destinations, at the same time. It also avoids duplication of routes. The integration also involves having electronic fare payment systems for commuters.[7]

The researchers of the study, "Alleviating Urban Traffic Congestion," argue that more microscopic policies should be actively considered, which target the problem at the size at which real policy decisions are decided. They suggest microscopic models, instead of extremely simplistic and aggregated models. This will allow them to examine a broader and more creative range of strategies, at least some of which should function well and be politically palatable for elected governments.[8] Congestion is an indication of the latter. Commuters are either unconcerned or unaware about such rules and arrive at their destinations without adhering to them. This behavior leads to further disruptions, which contribute to traffic congestion: an observation, which stands

[7] World Bank, "Integrated Public Transport Systems Make Travel Easier and More Affordable," The World Bank, last modified April 7, 2015, https://www.worldbank.org/en/news/press-release/2015/04/07/integrated-public-transport-systems-make-travel-easier-and-more-affordable.

[8] Arnott, Richard, Tilmann Rave, and Ronnie Schöb. "*Alleviating urban traffic congestion*." MIT Press Books 1 (2005). https://ideas.repec.org/b/mtp/titles/0262012197.html.

validated in our study of the traffic congestion issue in Islamabad. Committing lane violations is also an invariable feature amongst the commuters.[9]

Factors Contributing towards Congestion

Traffic congestion has greatly affected the lives of the people in Islamabad. It is one of the significant issues that residents in the city face on daily basis. Recurring congestion may also interfere with people's employment and education related commitments; it could also adversely impact their personal routine and lives with adverse psychological implications.

The following factors contribute to traffic congestion in Islamabad: -

- Population
- Urban Sprawl
- Rise in Number of Vehicles
- Lack of Public Transport
- Manual Handling of the Traffic
- ITP's Resource Deficit

Population

The close proximity of Islamabad and Rawalpindi (urban and suburban only) has earned them the title of "twin cities," with a combined population of 5.25 million.[10] According to official data, the city's population has increased by 100 per cent in the last 20 years. Islamabad's population was estimated to be 2 million people

[9] Hashmi, "Analyzing the Real Time Factors."
[10] PBS," Islamabad Census-2017."

in the 2017 census.[11] The population of Islamabad is growing at a steady rate every year due to the following reasons:

- Rural to Urban Migration
- Better infrastructure
- Better health facilities
- Services and housing societies
- Job opportunities
- Federal Capital

Growth Rate

The population of Islamabad was only 117,000 in 1961. In 1972, the population increased by 10 per cent to 237,500. By 1981, the population further grew by 4 per cent at 340,000. As per the 1998 census, the population grew further by 5.76 per cent to 805,000 and by 2017 census it reached over 2 million with a growth rate of 4.90.[12] According to the Pakistan Bureau of Statistics, as shown in Table 1, the city's population has increased by 100 per cent in the last 20 years.[13] This increase in growth rate has also caused a negative influence on the smooth flow of the traffic system.

[11] Agency, Anadolu. "*Islamabad struggles to cope with population boom,*" August 2, 2021. https://tribune.com.pk/story/2313482/islamabad-struggles-to-cope-with-population-boom.

[12] Pakistan Bureau of Statistics, "Area, Population by sex, sex ratio, population density, urban Population, household size and Annual growth rate." Accessed January 6, 2022 https://www.pbs.gov.pk/sites/default/files//population_census/census_2017_tables/islamabad/Table01d.pdf

[13] Agency, Anadolu. "*Islamabad struggles to cope with population boom.*" August 2, 2021. https://tribune.com.pk/story/2313482/islamabad-struggles-to-cope-with-population-boom.

Table 1. Growth Rate (1951-2017)

S. No	Census Year (1951-2017)	Population of Islamabad (1951-2017)	Average Census-Wise Growth Rate (1951-2017)
1.	1951	95,940	-
2.	1961	117,669	2.26
3.	1972	237,549	10.18
4.	1981	340,286	3.93
5.	1998	805,235	5.76
6.	2017	2,003,368	4.90

Source: *Pakistan Bureau of Statistics*

Migration

The conjoined proximity of Islamabad with Rawalpindi and other suburbs conveys the impression of a single city rather than inter-city dynamics. According to the Pakistan Bureau of Statistics, as shown in Table 2, the federal capital has the highest migration rate of 36 per cent in Pakistan while migration from inter-province stood at 19 per cent and from other districts of Punjab migration rate was 17 per cent.[14]

One of the major reasons for migration to Islamabad is urbanization. Islamabad being the federal capital of Pakistan

[14] Pakistan Bureau of Statistics "*Pakistan Social and Living Standards Measurement Survey (2019-2020)*" July, 2021 https://www.pbs.gov.pk/sites/default/files//pslm /publications/PSLM_2019_20_District_Level.pdf

provides better job opportunities, living standards, health and education, and better infrastructure.

Table 2. Intra and Inter-Migration in Major Districts of Pakistan

Intra and inter migration in Major Districts[15]				
Districts	**Native**	**Migrated**	**Intra Province**	**Inter Province**
Islamabad	64	36	17	19
Rawalpindi	85	15	7	8
Lahore	85	15	13	2
Karachi East	81	19	11	8
Karachi West	89	11	3	9
Karachi Central	90	10	5	6
Karachi South	91	9	4	5
Quetta	88	12	6	5

Source: *Pakistan Bureau of Statistics* | *PSLM 2019-20*

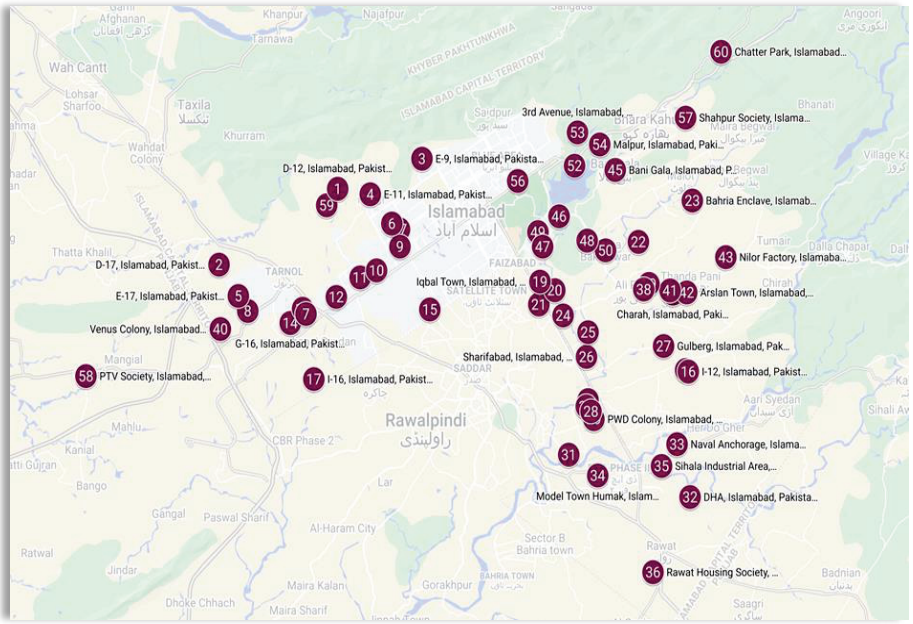
Urban Sprawl

As part of this study, it was found that the urban sprawl is continually expanding in Islamabad. It can be seen that multiple housing societies have mushroomed on the outskirts of the city in the form of various townships and housing schemes, as shown in Map 1. The estimated number of such residential schemes is 60 till

[15] PBS, "Pakistan Social and Living Standards (2019-2020)."

the writing of this study; the actual number, however, may be higher from the one reported here.

Map 1. Urban Sprawl in Islamabad

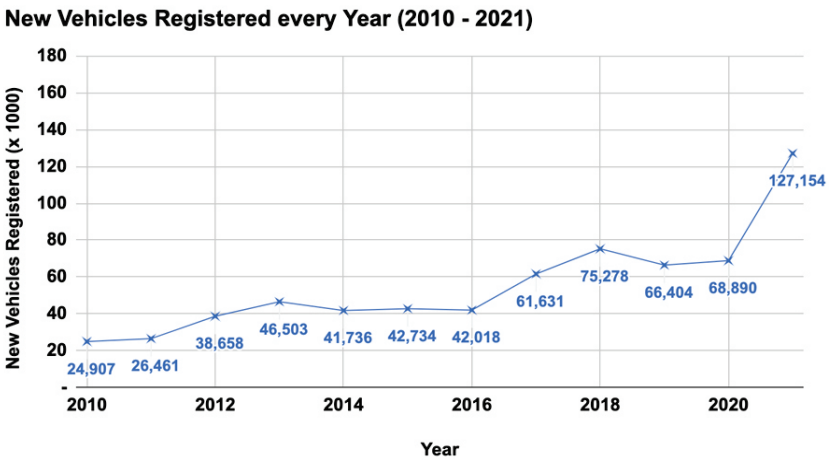


Vehicles Registered

As the population is growing, the number of vehicles is also increasing in Islamabad. However, total automobiles have increased at a considerably higher rate than the population. The reason for this discrepancy is that many residents from outside Islamabad also prefer buying automobiles with Islamabad registration plates, due to higher resale value. However, the proportion of such buyers is estimated to be lower. Unfortunately, no such data is organized by the Excise department, which may help determine the number of buyers from Islamabad and those from outside Islamabad.

Over a decade (2010-2021), a total of 662,374 cars have been registered in the Excise Department in Islamabad. According to the data of the Excise Department, as shown in Graph 1, the growth of registered vehicles in Islamabad from the year 2010-2021 has increased immensely every year. On the contrary, in the year 2021, a vast number of vehicles have been registered in Islamabad i.e., 127,154.

Graph 1. Total Registered Vehicles (2010-2021)



Source: *Excise Department, Islamabad, January 10, 2021.*

The reason for an increase in the number of vehicles is due to the lack of efficient and integrated public transport, financial affordability of automobiles, better road infrastructure and construction of additional lanes on highways – compared to other cities. However, using a personal automobile, especially cars, is becoming more appealing than public transportation because of its convenience, independence, comfort, speed, and reliability, as well as the perception that driving is more enjoyable. Furthermore,

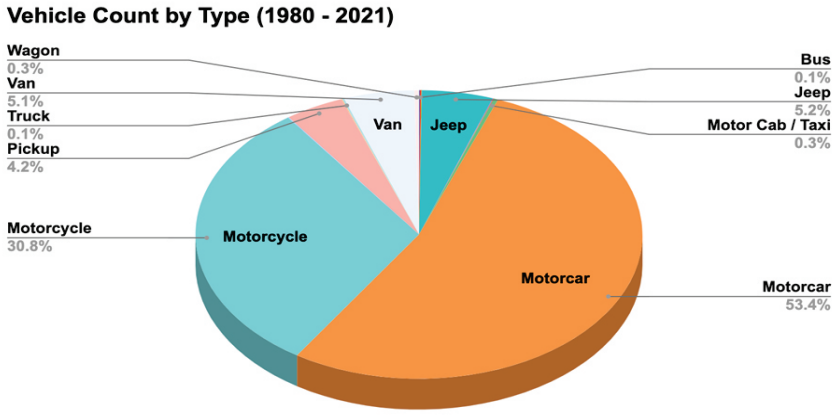
owning an automobile is a closely associated social symbol of middle-class (socio-economic) vertical mobility. Another factor is that the corporate banks in Pakistan remain in a contest to expand their base of profit and clientage from car financing schemes. They offer attractive loan packages for customers to purchase an automobile, preferably, of their own choice.

Types of Vehicle registered

The data, as shown in Graph 2, revealed that motor cars have witnessed the highest increase of vehicles registered in Islamabad alongside two-wheel motorcycles; however, the number of two-wheelers overall remains lower compared to the number of cars in Islamabad. Cars outperform public transport not just because of its' functional worth, but as a symbol of cultural and psychological ideals, such as independence and freedom, prestige, and the pleasure of driving. As a result, driving is associated with a variety of key values in modern society. As per a study from Netherlands, infrequent automobile users had a lower opinion of the car and a higher opinion of public transportation.[16]

[16] Steg, Linda. "*Can Public transport compete with the private car*?" IATSS research 27, no. 2 (2003), 27-35. https://www.sciencedirect.com/science/article/pii/S0386111214601412.

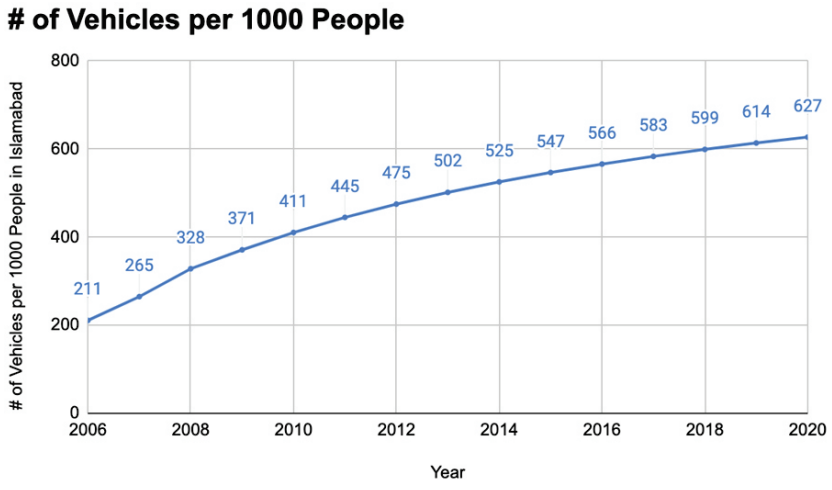
Graph 2. Types of Vehicles Registered



Source: *Excise Department, Islamabad*

Graph 3 shows that in 2006, out of 1000 people, in Islamabad, 211 people owned a personal vehicle. By 2021, nearly 627 people, i.e., 62 per cent owned a vehicle in Islamabad.

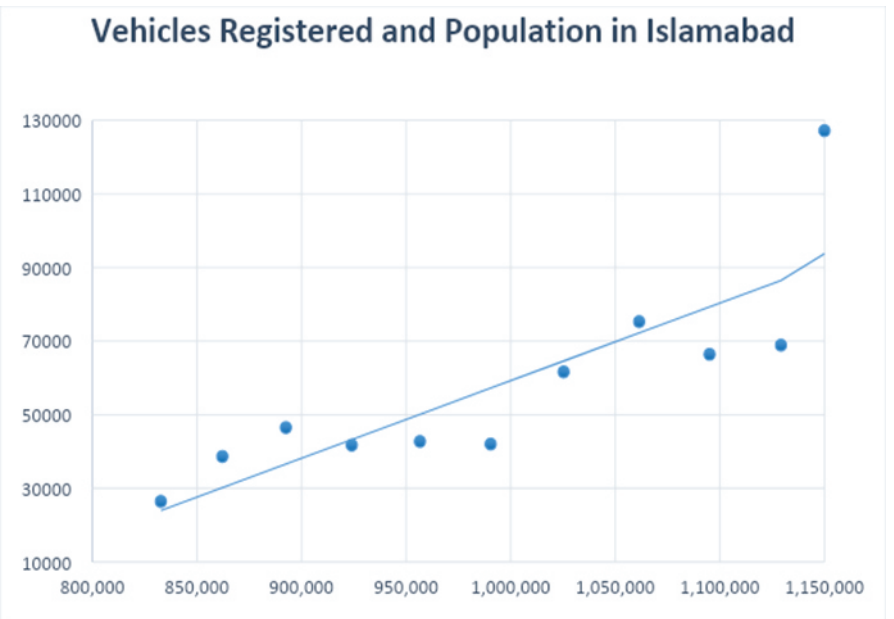
Graph 3. No. of Vehicles per 1000 People



Similarly, a strong and positive correlation was observed between the number of vehicles registered each year and overall rise in population (as shown in Graph 4). A very strong correlation between registered vehicles and population was determined. The coefficient of this relationship was observed at 0.85: reflecting the closely interlinked relationship between rising population, and growing ownership of automobiles in Islamabad.

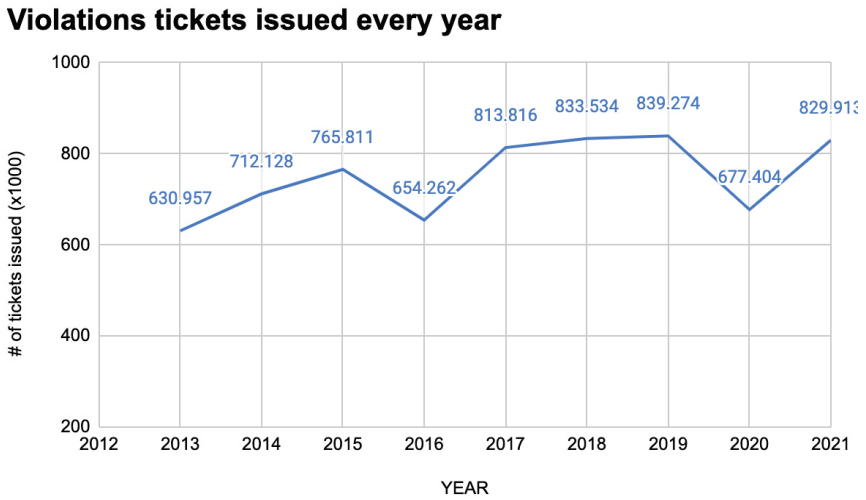
Graph 4. Correlation between Vehicles Registered and Population in Islamabad

Challans Issued in Islamabad



In 2021 the Islamabad Traffic Police (ITP) have issued over 829,913 challans in the capital for violations of traffic rules. The Graph 5 shows the numbers of challans issued every year by ITP. It can be seen that from 2017 to 2019, there has been a significant increase in the violation tickets: this could be attributed to a rise in the number of vehicles in Islamabad.

Graph 5. Total number of Annual Violation Tickets Issued (2012-2021)



The violations committed are due to lack of sufficient knowledge about the traffic rules among drivers, and poor enforcement of rules. Many individuals drive on roads without appropriate understanding and application of the traffic rules. Some commuters have never been to a driving school: most of them learn on their own with assistance from friends or a family member. Broadly, most of the driving sense usually rests at their ability to operate the steering wheel, clutch, and brakes.

Major Traffic Violations in Islamabad

The major types of violations committed by commuters in the past five years, in Islamabad as per ITP's traffic violation data, are shown in Table 3. Interestingly, careless driving has been observed during the last five years; it remained the second major violation in 2017 and 2018, and top violation in 2019, 2020 and 2021. Riding without a helmet is also among the second most reported violations

between 2019 and 2021 and topmost in 2018. While one of the most randomly committed and observed violations such as lane violation, remains among the least reported violations. The reason for such lower numbers of reportage is due to shortage of technology deployed for reporting of traffic violations and lack of human resource with ITP. However, due to significant costs attached to human resources, intensive investment towards technology is necessitated.

Table 3. Top 5 Violations Tickets in Past 5 Years (2017-21)

2017	2018	2019	2020	2021
Driving on the one Way	Driving Without Helmet	Careless Driving	Careless Driving	Careless Driving
Careless Driving	Careless Driving	Driving Without Helmet	Driving Without Helmet	Driving Without Helmet
Obstruct-ing Traffic	Overloading	Not Fastening Seat Belt	Overloading	Overloadi ng
Driving without Driving License	Not Fastening Seat Belt	Overload-ing	Not Fastening Seat Belt	Lane Violation
Turning where prohibited	Lane Violation	Lane Violation	Wrong Turn	Not Fastening Seat Belt

Source: *Islamabad Traffic Police Data of Traffic Violation (2017-21)*

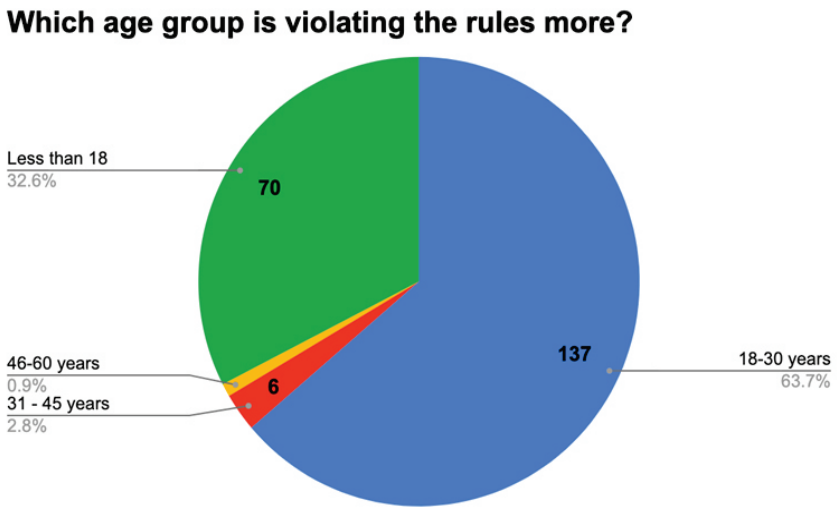
Furthermore, the breakdown, as per the ITP, of the top five violations include: riding without helmet (PKR 100); lane violation

(PKR 300); driving without seat belt (PKR 300); careless driving (PKR 200); driving wrong way in one way (PKR 300); wrong turn (PKR 100); and overload (PKR 300). The maximum violation charge levied against a particular violation is PKR 500. The existing violation charges are not enough or perhaps very low to induce effective deterrence and compliance with the traffic rules. Analysis of international traffic management systems shows that cities, which enforce a robust traffic violation tickets regime, experience lower incidence of traffic violations. However, there is no data with ITP to establish a similar relationship here since ITP only maintains annual revenue data without observing frequency of individual traffic violations. The challan regime for violations is ineffective due to low challan rates. It is important to increase these four-fold in the upper-range (the charges in the range 400-500) and six-fold in the lower-range (PKR 100-300) in order to induce fear and a sense of compliance with the traffic rules.

By Age Group

As part of the study, an attempt to map the perceptions surrounding the age of traffic violators was made. Graph 6 depicts commuters' perception on this question. About 63.7 per cent of the individuals believe commuters between the ages of 18-30 years are most likely to violate traffic rules. This is because of the lack of awareness of traffic rules, rush to reach the destination, and inadequate training of driving skills among youth. Followed by it, nearly 32.6 per cent of the respondents believe that underage driving is a major reason for traffic violations in Islamabad.

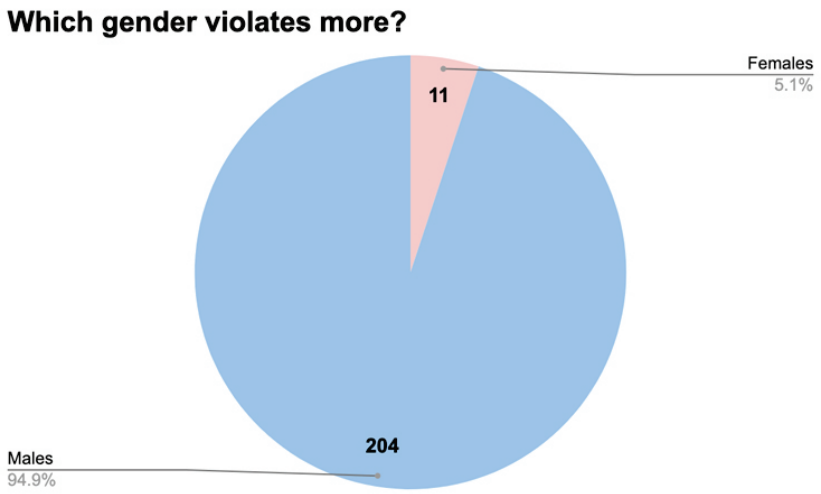
Graph 6. Commuters' Perceptions on Violations by Age-Group



By Gender

The role of gender has been investigated with regard to unsafe driving problems in Islamabad and it is revealed that, on average, males are more likely to violate traffic rules than females. The results from the survey showed that male drivers violate traffic rules more often than females. As shown in Graph 7 around 94.9 per cent of the males, as per respondents, break traffic rules, in contrast to the females. Only about 5.1 per cent of the female drivers tend to commit such violations.

Graph 7. Violations committed by Gender



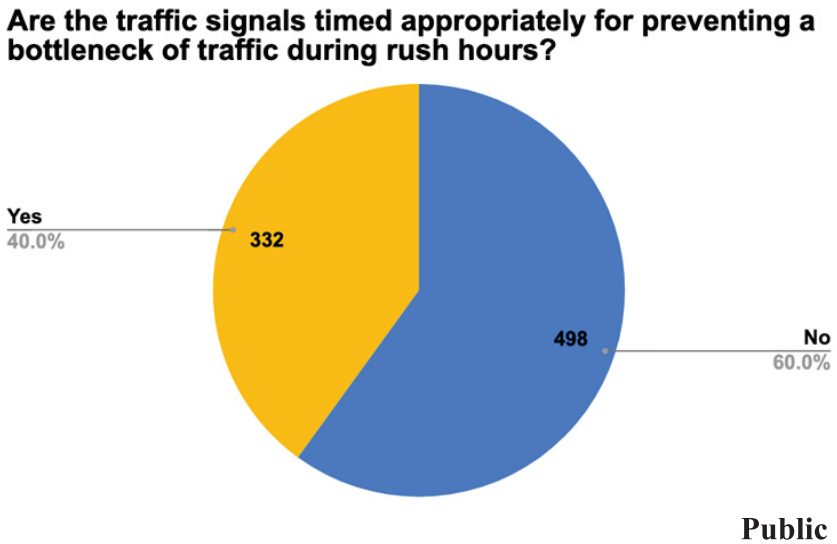
An implicit purpose for placing this question in the survey, both administered with the traffic police and the general commuters, was to map the gender-bias of the respondents related to traffic violations. The responses reflect that respondents objectively attribute violations, in terms of volume, committed by the male gender than otherwise.

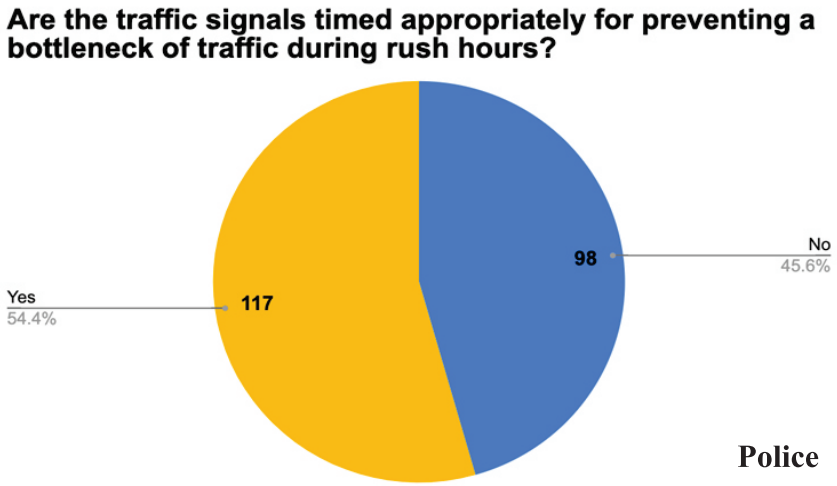
Manual Handling of Traffic (Congestion Indices)

There is a slight difference of opinion among Islamabad traffic police on the signal timing. Nearly 54.4 per cent of the police is of the opinion that the timing of the traffic signals is appropriate enough for preventing a bottleneck during rush hours, as shown in Graph 8. In contrast, public opinion is different from traffic police. About 57.1 per cent of the general public believes that the timing of the traffic signals is not adequate enough to prevent the bottleneck

of the traffic during rush hours. When consulted with the relevant department of the Capital Development Authority (CDA), it was learnt that the data is not uniformly maintained on timings of the traffic signals at different locations in the four zones of Islamabad Capital Territory.

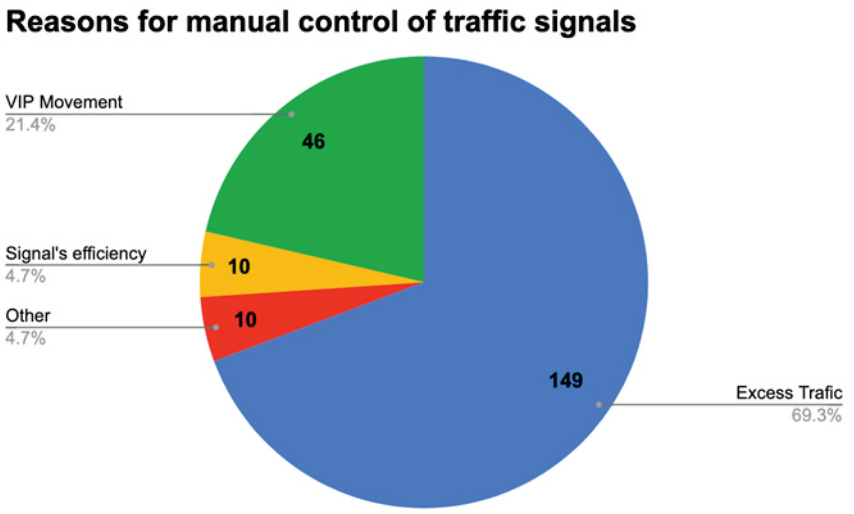
Graph 8. Comparison of Perceptions on Timing of Traffic Signals (Police vs. Public)





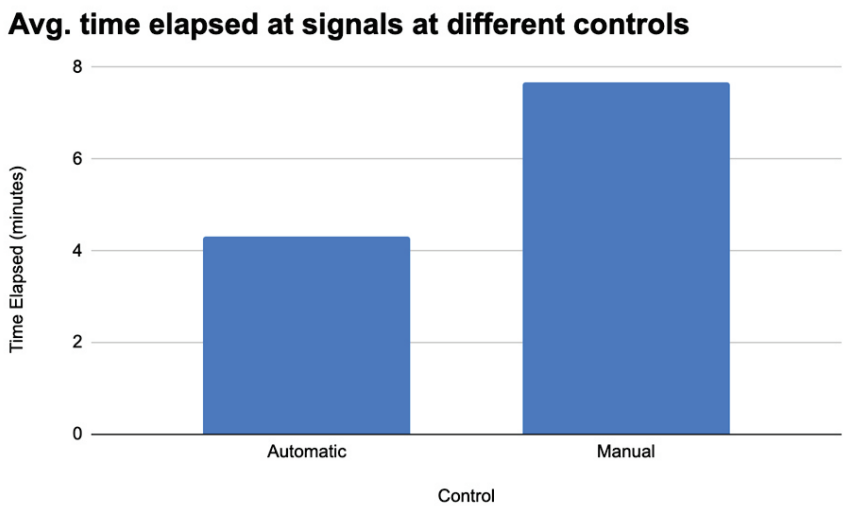
Traffic police officials were also asked concerning the major reasons for handling the traffic manually. As shown in Graph 9, 69.3 per cent of the police officials considered excessive traffic as a cause of the manual control of the signals. Only 4.7 per cent believed that the traffic is handled manually due to the inefficient timing of the traffic signal.

Graph 9. Factors for Operating Traffic Signals Manually



Traffic officials claimed that signals fail when there is an excess traffic, which requires ITP officials to control the signals manually. Therefore, the research team carried out an experiment in which 3 different signals (G11, G9 and F8) were tested around the same timeframe (morning between 8 AM - 11 AM) from 3rd January, 2022 to 20th January 2022. It turned out that time elapsed to cross the signal when it is being controlled automatically is very less as compared to when it is being manually controlled. While increased traffic flow during rush hours creates the demand for managing the traffic. Manual managing does not solve the issue, as shown in Graph 10. Therefore, as the experiment demonstrates, reliance on automation is effective for traffic management during rush hours.

Graph 10. Average Time Elapsed at Traffic Signals (Automatic vs. Manually Controlled)



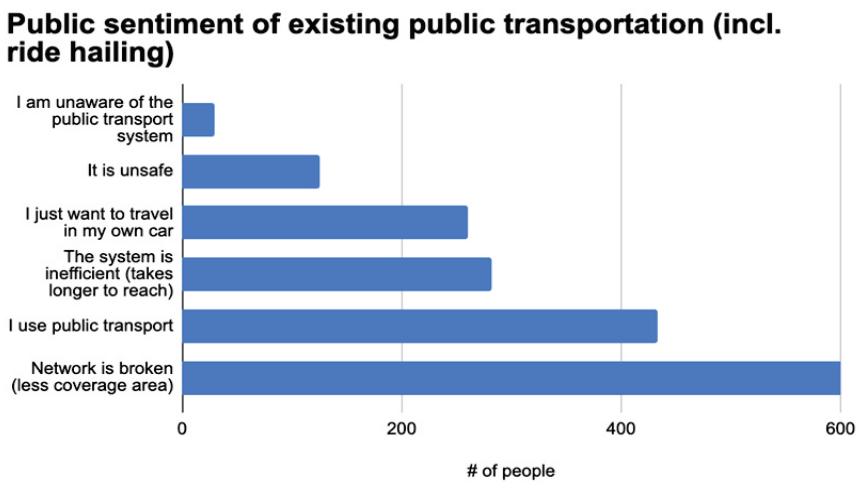
The discrepancy in public and police perception on traffic signals timing can be explained in several ways. First, most of the individual perceptions of police officials are based on their area of duty in the field, which could vary from commuters' experience based usually on their points of commutation. Second, though manual handling is required in case of excess traffic yet, instead of reducing congestion, it only contributes to compounding it during rush hours. On the contrary, improving the timing of the traffic signals, during rush hours, and operating them automatically, is a better solution for overcoming congestion.

Inadequate Public Transport in Islamabad

When asked about public transport services, nearly 59.2 per cent of the respondents, as shown in Graph 11, found the public transport network inadequate and incapable of offering complete coverage to different residential areas in Islamabad – and broadly across the

twin cities. Probable major reasons for avoiding public transport by commuters are: crooked transport routes, outdated public transport buses and vans, whereas, the metro bus service does not cover all the other main areas of Islamabad, especially housing societies such as Defence Housing Authority (DHA), Bahria, Rawat, Taxilla, and Bharakahu. Residential societies, hospitals, businesses, and retail establishments are frequently located in regions that are difficult to reach without a car and with inaccessibility of quality public transport. According to 28.6 per cent of the people, they are not willing to commute large distances for over extended periods of time on public transport, or they may not be aware of or trust transportation providers and routes. This reflects clearly that the current absence of an extended public transport system is also contributing to the rise in trend towards the purchase of private automobiles among the residents of Islamabad and Rawalpindi. On the other hand, CDA also plans to extend the existing metro bus routes in Islamabad.

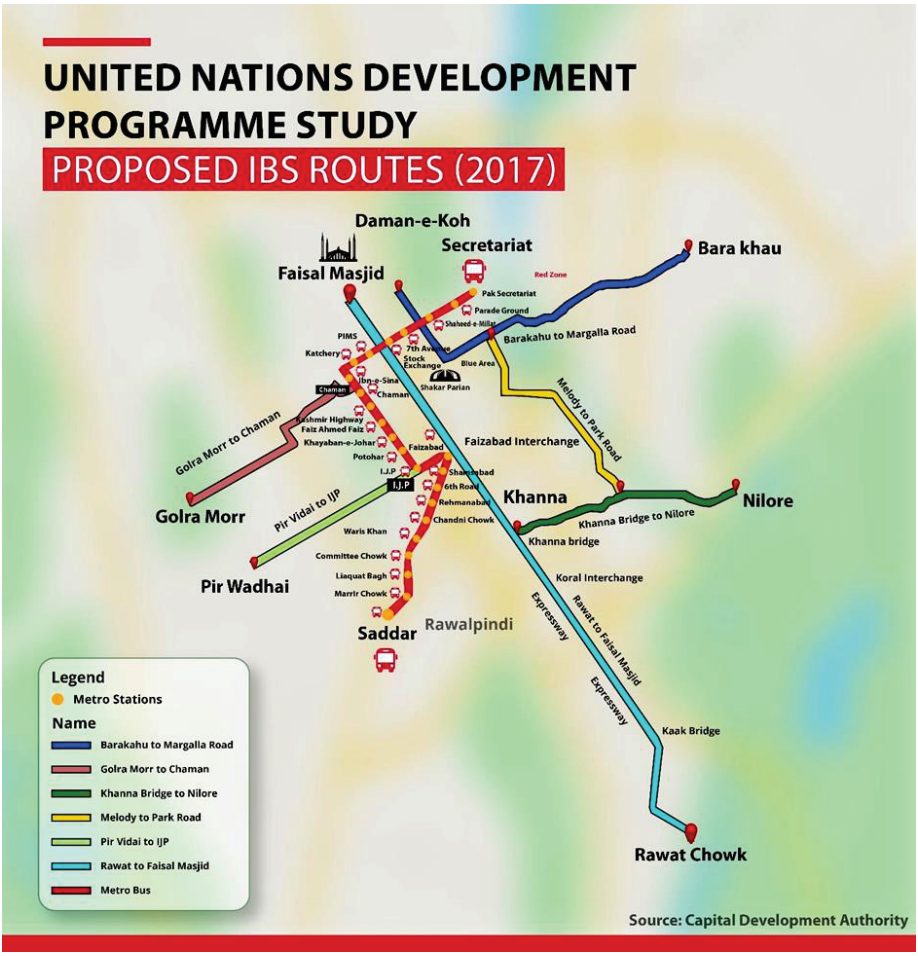
Graph 11. Public Sentiment of Existing Public Transportation Services



At present the routes are operating from Saddar, Rawalpindi to Secretariat, Islamabad. After a revised feasibility study on Proposed Islamabad Bus Service routes, undertaken in 2017, by National Engineering Services Pakistan (NESPAK) in collaboration with the United Nations Development Programme (UNDP),[17] as shown in Map 2, the existing metro service will be extended to additional, three routes: First; from Sawan Interchange to Faisal Mosque; second, from Barakahu to Murghazar; third, from Tarnol Railway Station to N5 Metro station. Thirty buses will be operated on all these three routes in the pilot phase along the sixty-four bus stations. Later, the number of buses will be scaled up-to a hundred to provide optimal supply of buses to commuters. Plans remain for extending additional feeder routes from Nilor to Khanna Bridge, which will feed into the Sawan-Faisal Mosque route, with feeder route connecting Barakahu from the Park Road with Nilor-Khanna Bridge route. Moreover, a route from Pirwadai will merge with the Metro Bus terminal at the Inter Junction Principal (IJP) terminal station. An illustration of the planned routes, shared by the CDA, is shown in the following figure.

[17] "Proposed Islamabad Bus Service Routes."

Map 2. UNDP and NESPAK Proposal to Extend Metro Bus Services across ICT

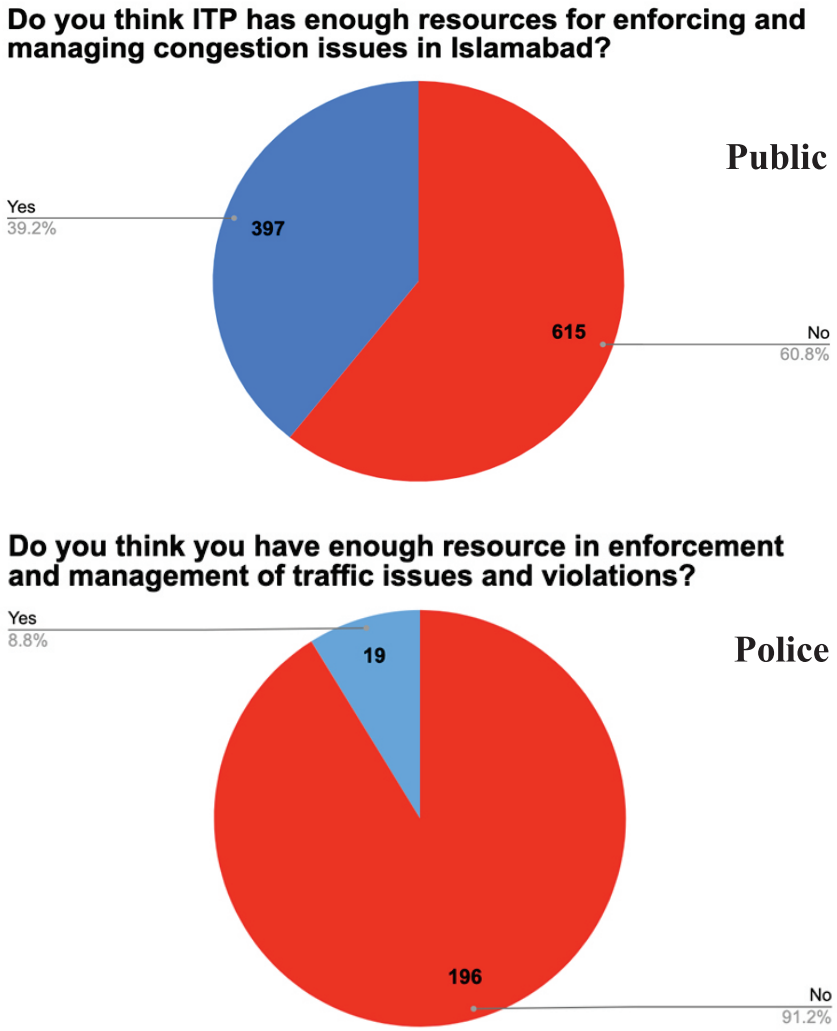


Resource Deprived ITP

A major challenge confronted by the ITP in the management of traffic and enforcement of traffic rules is resource deficit: in terms of equipment, technological solutions, and manpower. The public and the police have similar viewpoints regarding insufficient

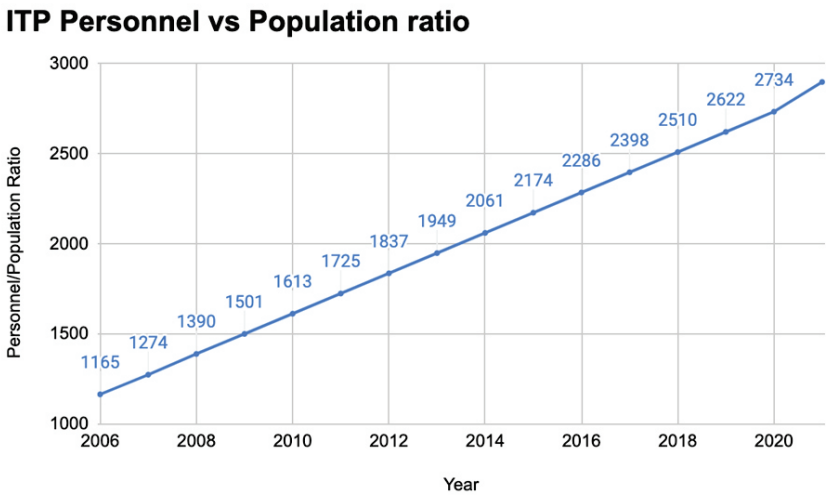
resources for the management of traffic congestion and violations faced by Islamabad Traffic Police. According to 91.2 per cent of the police officers and 60.8 per cent of the public believed the ITP does not have enough resources for the management of traffic congestion, respectively, as shown in Graph 12.

Graph 12. Public and ITP Personnel Perceptions on Resource Shortage faced by the ITP



The ITP is also short of adequate numbers of personnel resulting in ineffective management of traffic, compliance, and enforcement of traffic rules across Islamabad territory jurisdiction. Presently, the force is working as per its allocated strength of 691 personnel sanctioned in 2006, – see Graph 13. When estimated the availability of the traffic police personnel, for every 1165 people, there was 1 traffic police personnel in 2006 and it has risen to 2734 people in 2020: depicting the rising anomaly in the proportion of personnel with population.

Graph 13. Ratio of ITP Personnel vs. Rise in Population (2006-2021)



For instance, to manage the traffic flow and congestion between Rawat-to-Zero Point and vice versa, only ten ITP personnel are deployed on the one-way road, on each side, to manage the traffic in a 12-hour shift. Overall twenty personnel are managing the traffic in each shift and cumulatively 40 ITP personnel are manning the route

in 24 hours. To overcome this resource deficit, the number of personnel should well be revised and ought to be raised.

In terms of recruitment and deployment, ITP personnel are transferred from Islamabad Police. All ranks are primarily transferred and later rotated from Islamabad Police. Rationing of personnel through such practice restricts ITP from having an independent workforce. The policy may require independent recruitment and deployment for ranks between BPS-01 up to BPS-16. Doing so will also alleviate the burden on Islamabad Police to meet the adequate supply of personnel for Islamabad Traffic Police and enable the latter to effectively manage its primary operations.

Revamping of ITP Vehicles

ITP is currently experiencing a serious scarcity of automobile and transportation resources, which has impacted its day-to-day operations. The inventory table shows that ITP had 45 Toyota GLI/XLI available in 2006, but this number has now dwindled down to just 6 in 2021. See Table 4. Though ITP has added few new vehicles like Toyota Prius and Fortran Pickup in its inventory in the past 15 years but overall number of automobiles has decreased from 69 to 63. The following table shows a comparison of current mobile 4 x wheeler vehicles available with ITP to their condition in 2006, when ITP was revamped.

Table 4. Comparison of Automobile Resource with ITP (2006-2021)

S #	Vehicles[18]	Quantity		Difference
		Year 2006	Year 2021	
1.	Toyota GLI/XLI	45	6	- 86.67%
2.	Prius Cars	0	18	100%
3.	Swift Cars	0	2	100%
4.	Cultus Cars	0	1	100%
5.	Jeep	3	0	-40%
6.	Toyota Pickup	5	3	100%
7.	Fortan Pickup	0	18	100%
8.	Trucks	4	4	0%
9.	Mobile Canteen	2	0	-100%
10.	Fork Lifters	8	7	-12.50%
11.	Toyota Hiace	2	3	50%
12.	Recovery Van	0	1	100%
Total		**69**	**63**	**-8.70%**

Source: *"Concept Paper on Revamping of Islamabad Traffic Police (ITP)," ITP*

Motorcycles

ITP had 72 motorcycles in 2006, which have now increased to 97 making it a 34.72 per cent increase. However, the current inventory is mostly composed of 125-Cubic Capacity (CC) and 150-CC bikes compared to 250-CC and 500-CC motorcycles in the past. Due to higher fiscal and maintenance cost, associated with 250 and 500 CC motorcycles, the decision to procure 150 CC and lower CC models has largely been moderated by these factors – see Table 5. However, the decision to increase such units by forgoing the option of at least 250 CC is not entirely rational: The reason is that models

[18] "Concept Paper on Revamping of Islamabad Traffic Police (ITP)," *Islamabad Traffic Police*. (Received November, 2021).

lower than 250 CC may not be entirely suitable for patrolling roles either on expressways, highways or against higher CC four-wheeler automobiles.

Table 5. Comparison of Number of Two-Wheeler Resource with ITP (2006-2021)

S #	Motorcycles	Quantity		Difference
		Year 2006	Year 2021	
1.	Motorcycle 500 CC	10	7	**-30%**
2.	Motorcycle 250 CC	62	12	**-416.67%**
3.	Motorcycle 150 CC	0	16	**100%**
4.	Motorcycle 125 CC	0	52	**100%**
5.	Motorcycle 70 CC	0	10	**100%**
Total		**72**	**97**	**34.72%**

Source: *"Concept Paper on Revamping of Islamabad Traffic Police (ITP)," ITP*

The available resources of the ITP do not commensurate with the rising population, number of cars, and average size of commuters visiting Islamabad on a daily basis. As shown in the Table 6, the number of vehicles daily entering Islamabad have grown by 81 per cent in the past 15 years and local population has increased by 149 per cent. On the other hand, the number of ITP personnel has stayed stagnant at 691, and 4-wheel vehicles available to them have decreased from 69 to 63. This has resulted in a large number of unattended points/areas throughout the city. Though the number of

motorcycles have increased from 72 to 97, it is negligible compared to the automobile boom and urban sprawl faced by Islamabad in the last 15 years.

Table 6. Summary of Resource Scarcity Faced by ITP

Items	2006	2021	Per centage Increase
ITP Personnel	691	691	-
ITP's 4-wheel vehicles	69	63	-8.70%
ITP's Motorcycles	72	97	34.72%
Population	805235	2003368	149%
Total Vehicles Registered in Islamabad	169788	1205546	610%
Daily Average Vehicle Entry in Islamabad	274987	497591	81%
Uncovered Areas/Points	33	231	600%

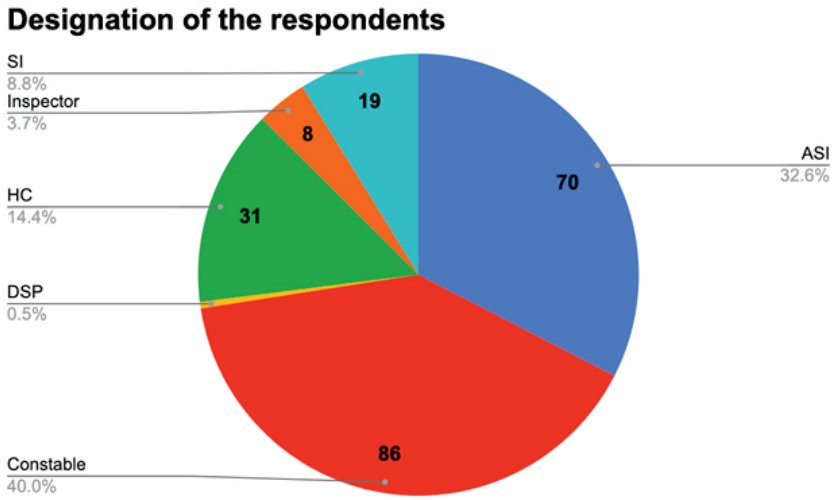
Source: *"Concept Paper on Revamping of Islamabad Traffic Police (ITP)," ITP*

Traffic Police Sentiment on Congestion and Traffic Violations

To further understand some of the challenges and issues confronted by ITP, in managing traffic and different violations, a detailed analysis is warranted. The findings of the survey conducted with ITP officials are discussed in this section.

A total of 215 respondents, as per Graph 14, from among the ITP officials were surveyed. The designation of the respondents of constables were 40 per cent, whereas 32.6 per cent were Assistant Sub-Inspector (ASI). The chart also reflects 3.7 per cent Inspectors, 8.8 per cent Sub-Inspectors (SI), and Head constables (HC) 14.4 per cent, respectively.

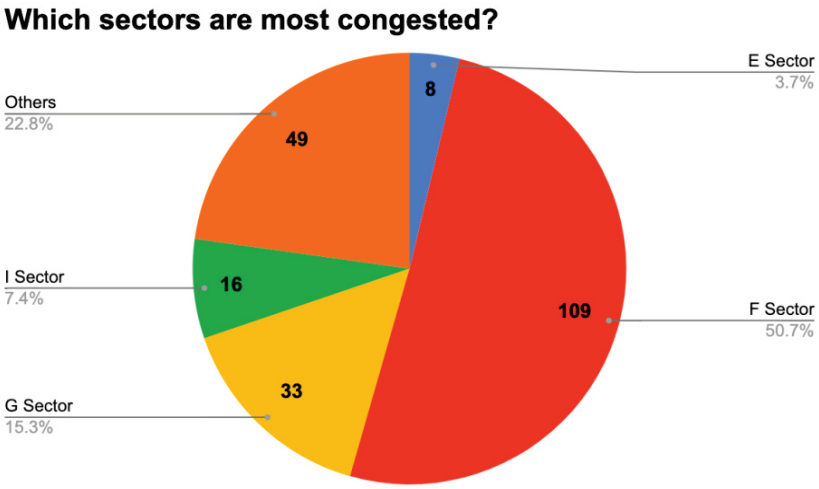
Graph 14. Designations of Traffic Police Respondents



Congested Sectors/ Areas

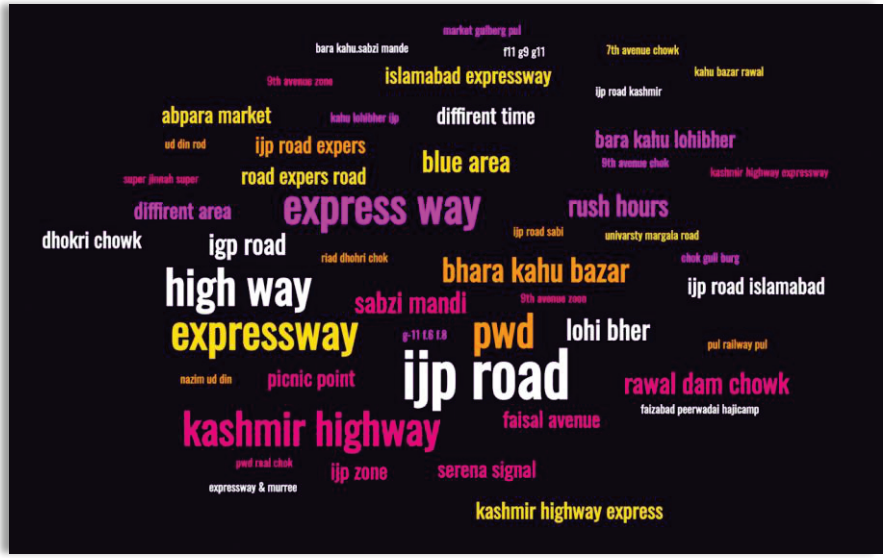
As per Graph 15, about 50.7 per cent of the traffic officials surveyed claimed that the main congested sector in Islamabad is the F-sector. Followed by the classification of areas other than the Islamabad sectors, the G-sector, and the I-sector, were classified among the most congested areas.

Graph 15. Congested Sectors in Islamabad



The content analysis of the additional responses identifies several other areas within and at the periphery of Islamabad confronting the issue of traffic congestion, as indicated in the image below (see Graph 16). The main congested areas according to traffic police, other than the already mentioned sectors are the IJP road and the highways, including Islamabad Expressway, Kashmir Highway and vice versa. As indicated above; these perceptions concerning congestion in local sectors may not be reflective of the actual patterns of congestion, which may vary in degree from sector to sector.

Graph 16. Most congested areas in twin-cities



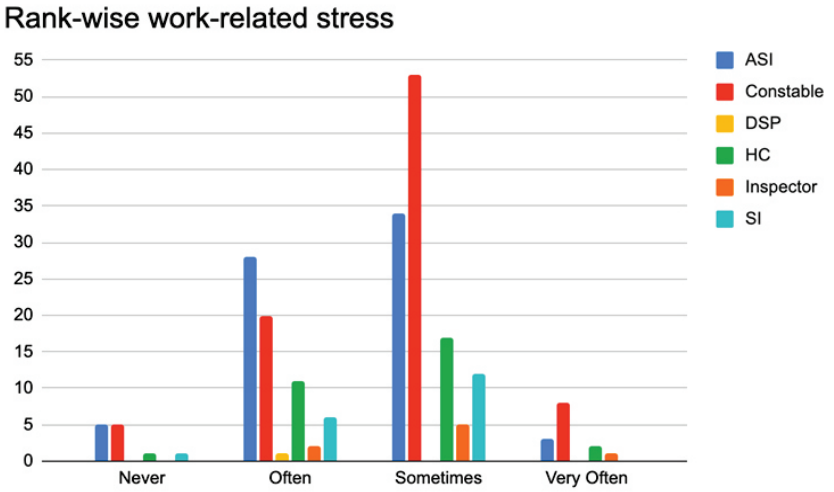
Work-related Stress and Traffic Police Personnel

When asked, what number of hours did they work, a 55 per cent said they were working on a "12-hour shift," whereas, an 8.8 per cent reported working on over "16 hours of shift," (see Graph 17) while, 25.6 per cent reported working on a "10 hours shift," whereas only 10.7 per cent were working on an "8-hour shift." It is also important to mention that those working on an "8-hour shift," are usually performing office-based tasks.

Graph 17. Average Number of Work Hours per Day

When it comes to work-related stress, only 6.5 per cent of the traffic officials reported experiencing such stress "very often," whereas, 31.6 per cent claimed they "often" experience work-related stress-see Graph 18.

Graph 18. Frequency of Work-related Stress and Rank-wise Distribution

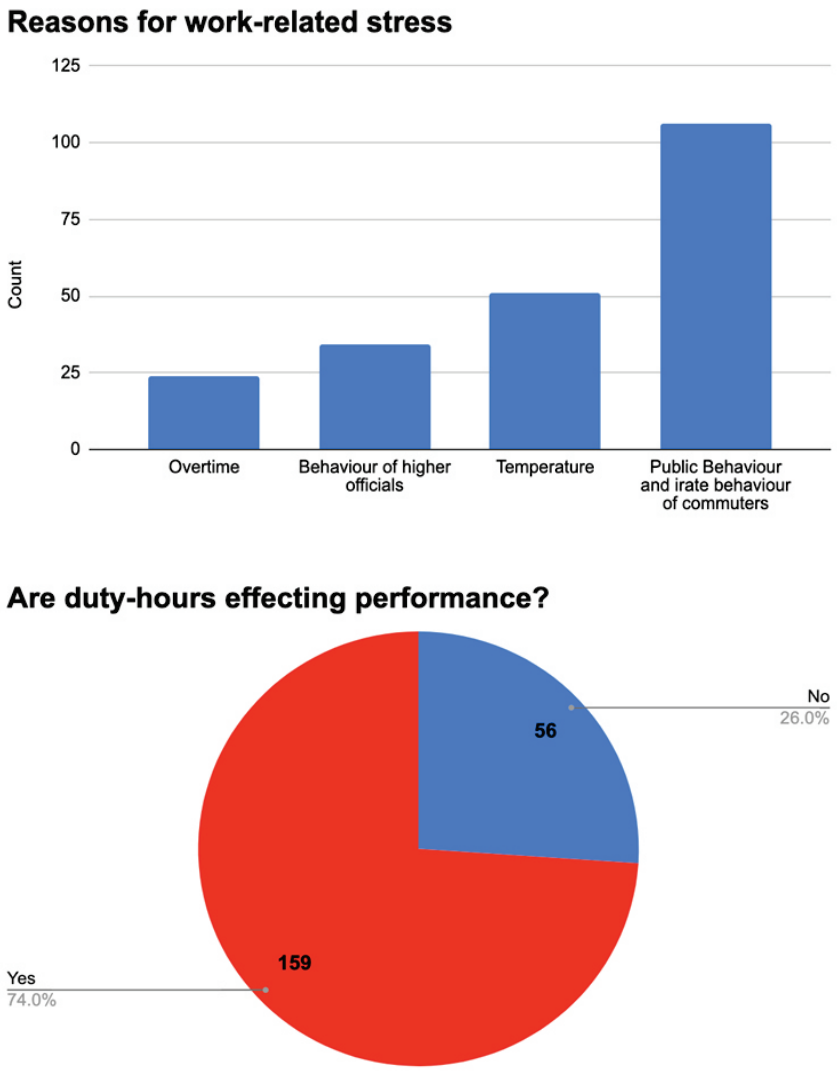


The previous graph shows the rank wise, work-related stress among the ITP officials. Most of the constables believe that "sometimes," they experience work related stress, and were followed by the opinion shared by the Assistant Sub Inspectors, Head Constables and Sub Inspectors. The second most opted option of "often" on work related stress was selected by Assistant Sub Inspectors, followed by Constables, Head Constables and Sub Inspectors.

They were also asked, whether "overtime" contributes as a major stressor, only 11.17 per cent reported it as such, whereas, 47.9 per cent attributed it to "irate behavior of commuters" towards on-duty officials, while, 23.2 per cent and 14 per cent considered "temperature" and "behavior of higher officials", respectively, as shown in Graph 19, as a major work-related stressor. On the other hand, ITP officials were asked whether longer work-hours affect their work-performance, an overwhelming 74 per cent agreed, whereas, only 26 per cent disagreed. Another reason why "overtime" is failing to factor in as a major stressor is primarily due

to lack of insight, among ITP officials, to consider it as a major stressor, as it could be considered routine work hours. However, observations elsewhere, as mentioned above, indicate otherwise.

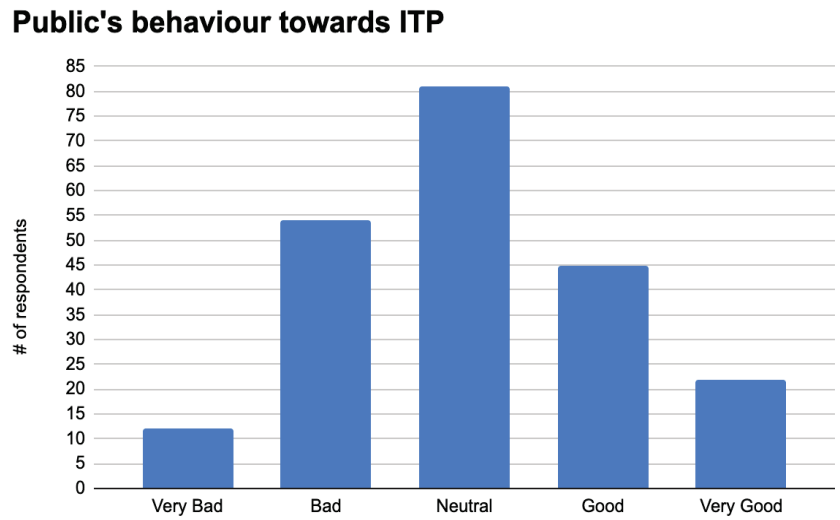
Graph 19. Comparison between Major Stressors, and Work-Hours and Performance



Behavior of Public towards ITP

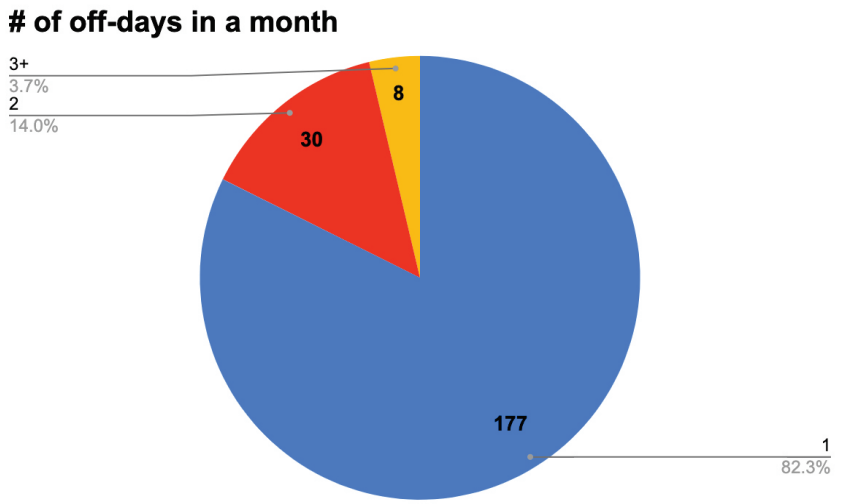
The result from the survey revealed that the majority of the public show "neutral" behavior towards ITP personnel. However, nearly 25 per cent of the personnel believe that public displays "bad" behavior, whereas, 21 per cent consider public behavior to be "good" towards them, followed by 10 per cent and 5.6 per cent consider it "very good," and "very bad," respectively – see Graph 20.

Graph 20. Public Behavior towards ITP Personnel



During the course of this survey, it was also found that ITP personnel are over-worked due to the limited provision to avail leaves for the personnel working in the field. The result from the survey, as shown in Graph 21, showed that 82.3 per cent of the police officers only take one day-off in a month. Majority of the traffic police reported to work more than 12-hours a day, which can affect their work performance and lead to work-stress or psychological stress on the field.

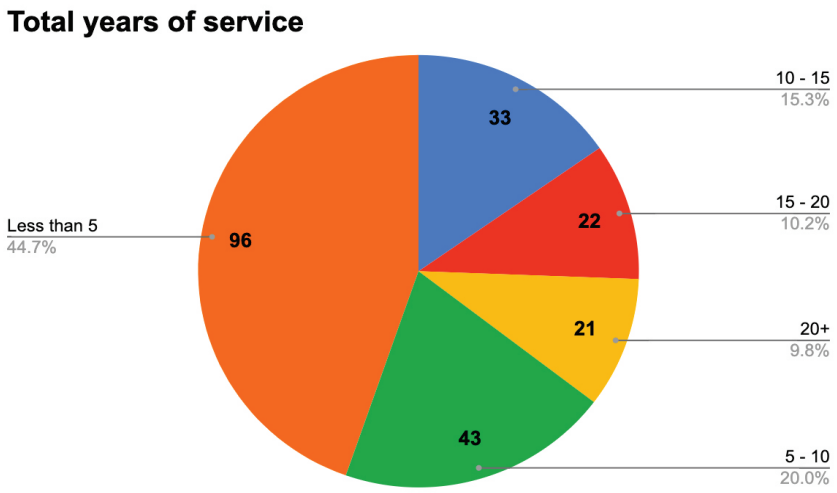
Graph 21. Number of Leaves Granted in a Month



Overall experience and capacity building

As part of this study, an attempt was made to map the relationship between number of service years and on-job training received. The findings show that the relationship between capacity building and years of experience remains disjointed. Since, ITP is a part of Islamabad Police; the former relies on temporary transfers from the latter. Mostly, training is provided by Islamabad Police to officials being transferred to ITP. During this basic training, overwhelming focus remains on imparting training on investigation, and physical fitness, whereas miscellaneous areas, such as traffic management, first-aid, public relations, etc., receive little attention. In this regard, 44.7 per cent of the traffic officials have been serving in the Islamabad Traffic police for less than 5 years. However, 15.3 per cent of the officials have been serving for more than 10-15 years, as shown in Graph 22.

Graph 22. Total Years of Service in ITP



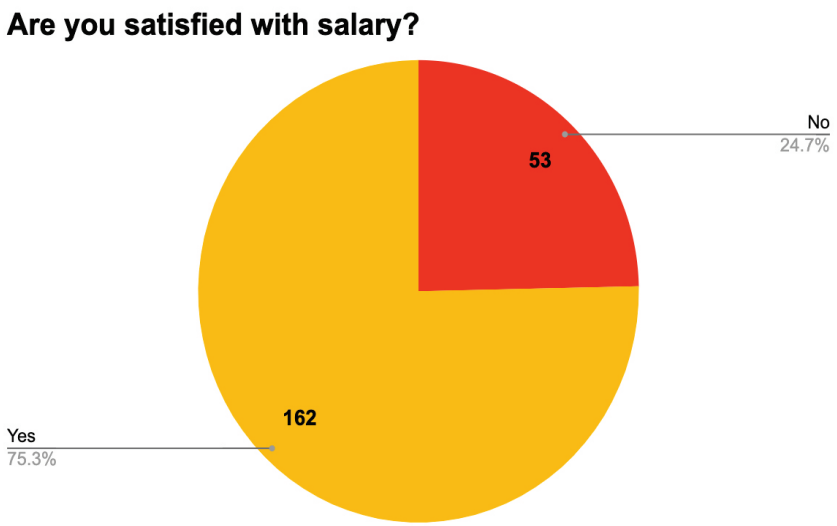
About 67.4 per cent of the traffic police have received on-job training 1-5 times during their service at the ITP, while 14.4 per cent of the officials never received any on-job training, except basic training – see Graph 23. Whereas, 8.8 per cent and 9.3 per cent, after their appointment at the ITP, reported of receiving on-job training 5-10 or 10 and more times, respectively. Among those who also reported receiving training within the range of 1-5 times, most respondents orally reported of receiving only basic training.

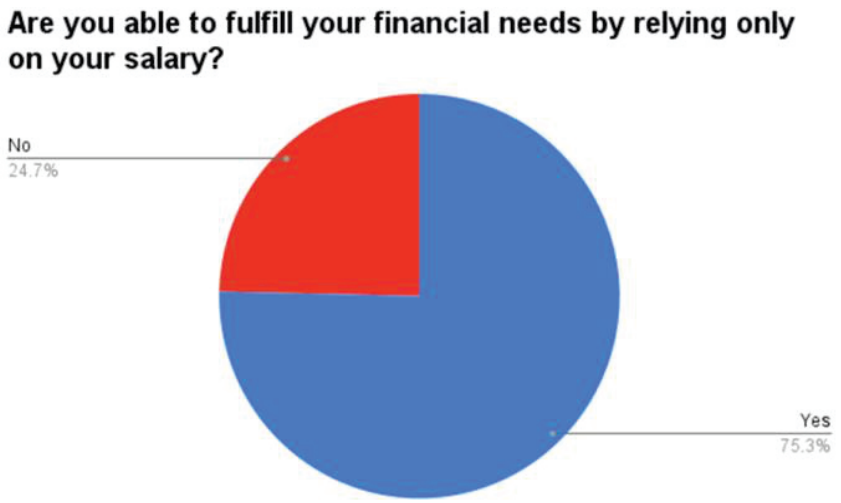
Graph 23. Number of Training Received during Service, and Rank-wise Distribution

Job Satisfaction and Salary

The element of job satisfaction and salary was discussed in the traffic official surveys. This was undertaken to study whether police officials were satisfied with their remuneration despite stressful, and often challenging, work conditions. According to 75.3 per cent of the officials, as per Graph 24, they were satisfied with their salary. In contrast, 24.7 per cent of the officials were dissatisfied with their existing salary. Although, the reasons for dissatisfaction with the existing salary were not mapped; however, it could owe primarily to the rise in inflation in Pakistan.

Graph 24. Salary and Job Satisfaction





Public Sentiment on Congestion in Islamabad

For this study another survey was conducted with the general public in order to map perceptions surrounding traffic congestion and major traffic violations in Islamabad. Two separate surveys were designed – one in English and another in Urdu. For this purpose, a sample of 1012 respondents from Islamabad and Rawalpindi were consulted for the survey. Respondents comprised commuters, both driving and non-driving ones. Findings from this survey are discussed in this section, along with other relevant indicators about the respondents.

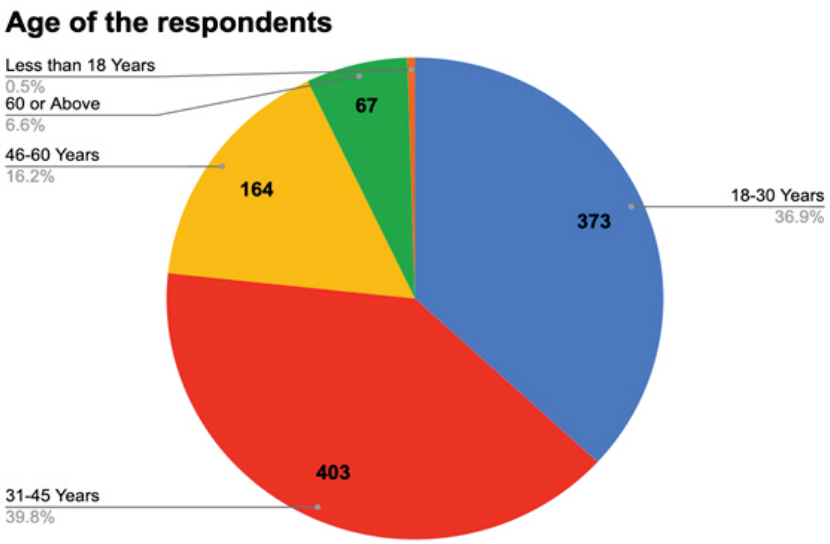
Demographics

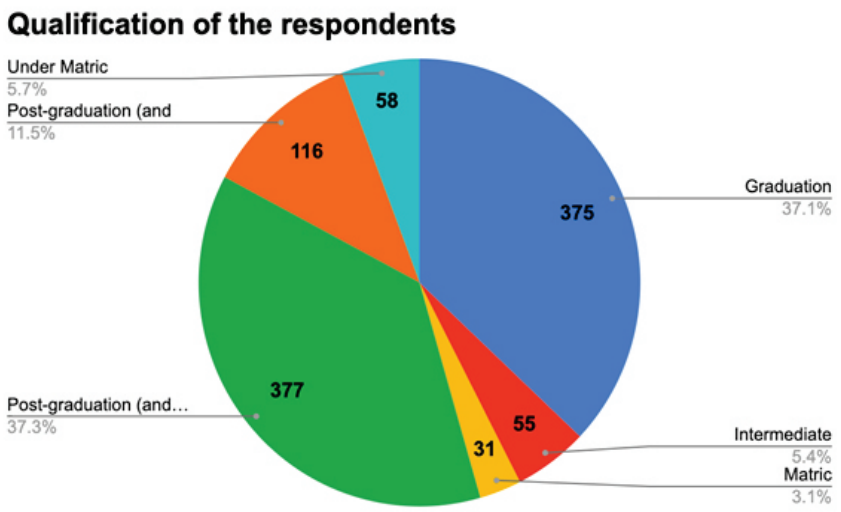
Nearly 75 per cent of the respondents, as shown in Graph 25, were between the ages of 18-45. Almost 37 per cent of these were between 18-30 years and nearly 39.8 per cent were 30-45 years old. Despite attempts to reach out a diverse set of respondents – through social media, and physical outreach – to ensure an inclusive and balanced response sample, the gender imbalance remained apparent with only 15 per cent female participants responding to the survey

against over 84 per cent of male respondents. The lack of gender-balance among respondents has been a shortcoming of our study, especially in the public survey, while attempts were made for an inclusive response from the general public, irrespective of the gender divide.

In terms of the education-level of the general public, almost 37 per cent of the respondents have received a graduate-level education, also shown in Graph 25, while nearly 48 per cent held post-graduate qualification. To ensure a representative sample from the general population, 5.4 per cent of the respondents were intermediate, whereas nearly 3.1 per cent were matriculate and almost 5.7 per cent had received either primary or middle level of education. To collect responses from individuals with lower-textual and digital literacy special efforts were made to conduct these surveys through in-person assistance to respondents.

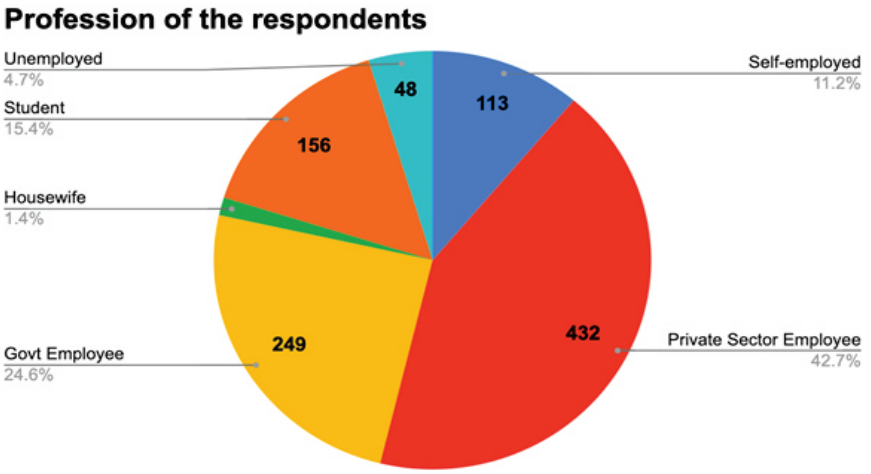
Graph 25. Age and Qualification of the Respondents





In terms of the professional association of the respondents, as per Graph 26, almost 25 per cent of the respondents were associated with the public-sector, whereas, nearly 43 per cent were working with the private-sector. Over 15 per cent identified as "Students," while 11 per cent reported being self-employed. Almost over 1 per cent identified themselves as housewives, while 4.7 per cent classified their status as being unemployed.

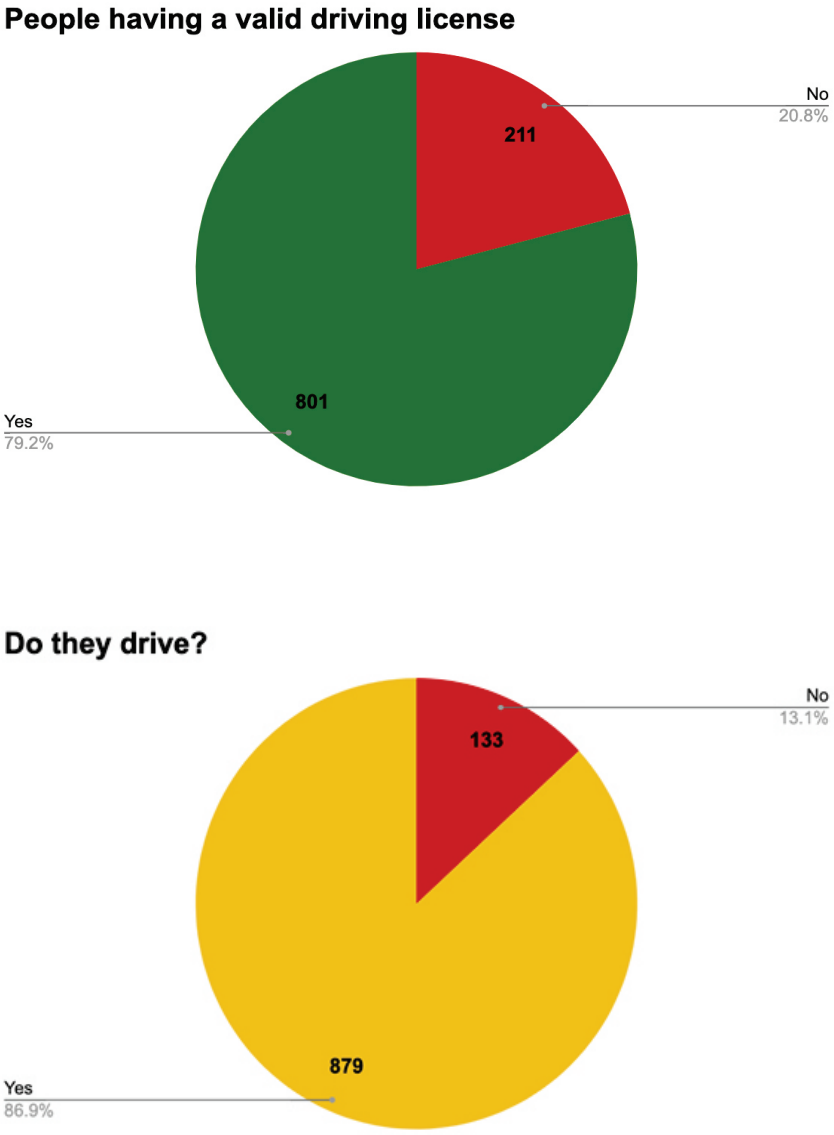
Graph 26. Profession of Respondent



Driving License

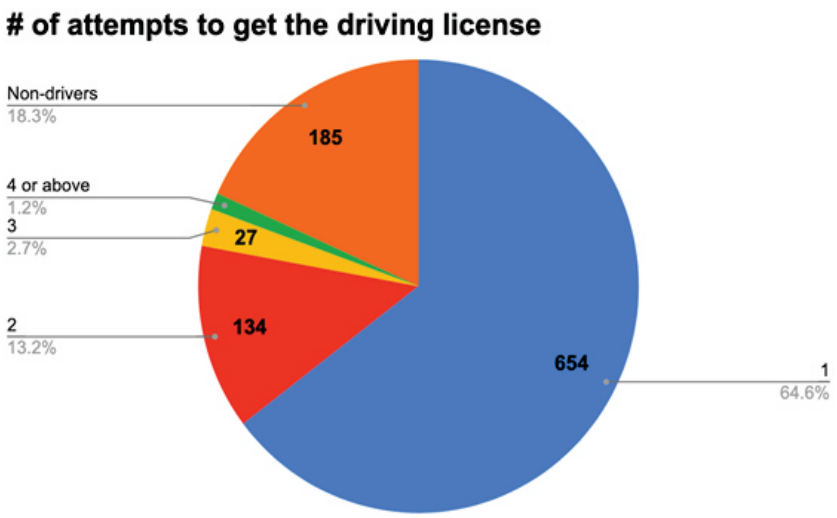
Possessing Driving License and Self-Identified Drivers: A contrast was observed among the proportion of drivers reporting to possess a driving license and those that admitted of driving some form of vehicle. Nearly 79.2 per cent of the respondents admitted possessing a license, whereas, 20 per cent of people did not possess one (see Graph 27). Similarly, in a follow up question nearly 87 per cent of such respondents admitted of driving some form of vehicle. While 13 per cent reported on the contrary. It is observed that almost 7 per cent of the respondents are driving some kind of a vehicle without a valid driving license. Though the sample size surveyed is smaller, if the proportion of such samples is expected to be a representative of the general public than the number of such individuals, driving without a driving license, may be much higher.

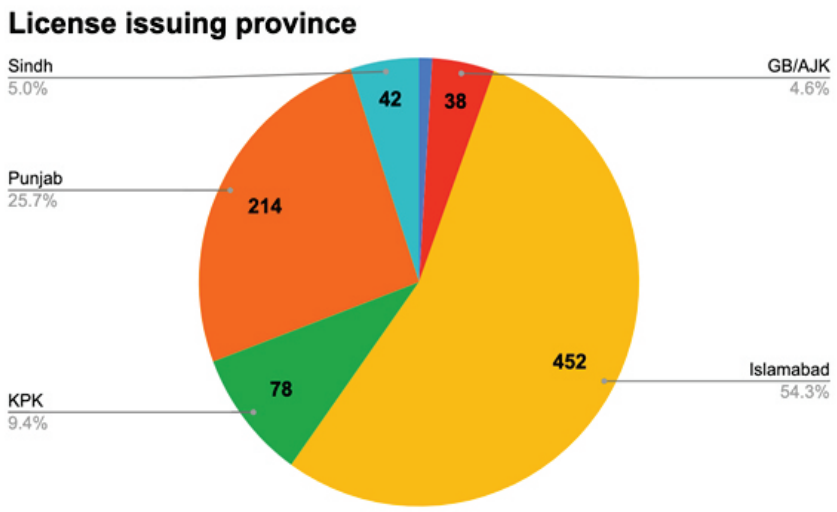
Graph 27. Comparison of Respondents Possessing Driving License vs. Self-Identifying Drivers



Attempts for Issuance of Driving License: Lack of uniformity and irregularity was also identified in the acquisition of the license. While 18 per cent of respondents identified themselves as non-drivers, over 64 per cent of respondents admitted to have received a driving license after the first attempt (see Graph 28). Over 13 per cent only admitted to receiving a driving license upon their second attempt, whereas, 2.7 per cent respondents on their third attempt and 1.2 per cent on their fourth attempt. Almost 54 per cent of such respondents received their licenses from Islamabad, 25.7 per cent from Punjab, whereas the rest received it from other provincial and administrative jurisdictions such as Sindh, Balochistan, Khyber Pakhtunkhwa, Gilgit-Baltistan and Azad Jammu and Kashmir.

Graph 28. Number of attempts to Acquire a Driving License, and License Issuing Province





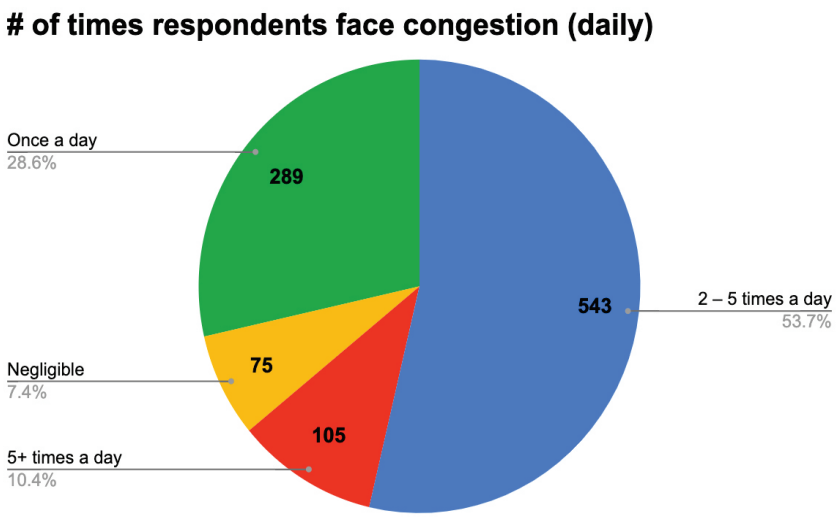
Traffic Congestion in Islamabad

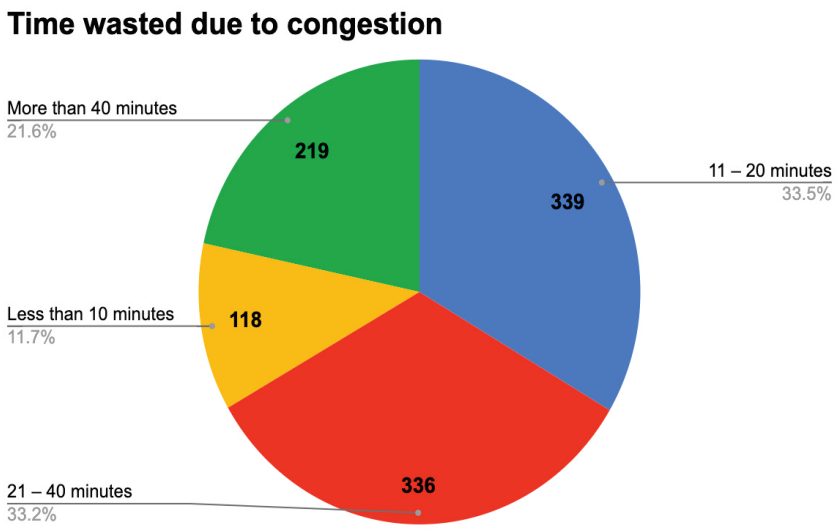
Congestion Frequency and Duration: Congestion can be classified into two types: recurrent and non-recurring. Recurring traffic congestion occurs as a result of capacity and behavioral concerns, whereas non-recurring traffic congestion occurs as a result of accidents, construction, or incidents. The impacts of recurring and non-recurring congestion, which have different sources however are still identical. A traffic bottleneck adds to the inconvenience, causing passenger uncertainty, resulting in personage stress and potentially dangerous transportation conditions, which can be caused by recurring as well as non-recurring factors. To help understand congestion, we asked various questions on when (including its frequency), why and where they are most likely to confront recurring and non-recurring congestion in Islamabad.

In the general survey, respondents were also asked to report the frequency of congestion they experience during their commute.

Over 53 per cent of the respondents experience congestion between 2-5 times a day, and over 28.6 per cent experience it once during the day – as shown in Graph 29. Ten per cent of the respondents experience it more than 5 times a day. Respondents over 33 per cent reported spending nearly 11-20 minutes, while 33 per cent spent between 21-40 minutes of getting stuck in traffic. The cumulative proportion of spending time between 11-40 minutes is 66 per cent (also see Graph 29). Almost over 21 per cent of the population spends more than 40 minutes after getting trapped in the traffic.

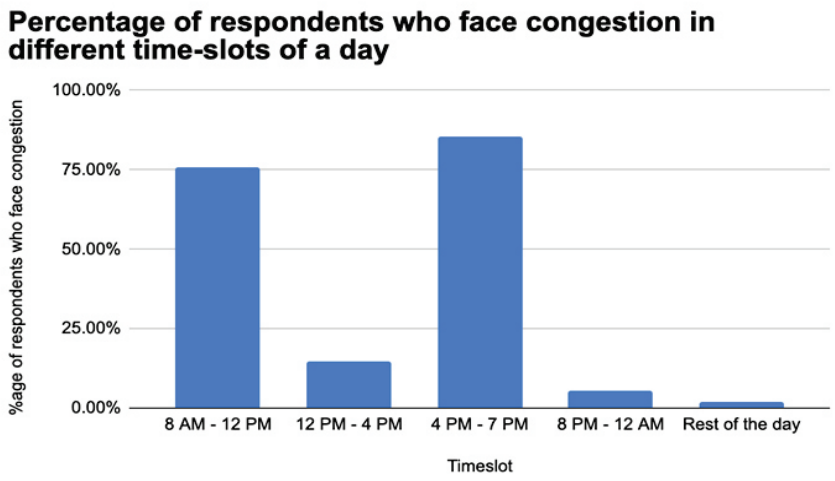
Graph 29. Frequency of Congestion, and Time Spent in Congestion





When questioned about the proportion of respondents' experiencing congestion in Islamabad, over 11 per cent of the respondents denied the existence of the problem, whereas, 88.3 per cent reported experiencing congestion in Islamabad. About the congestion timings of the day, 75 per cent of the respondents experience congestion higher between 8 AM – 12 PM, whereas over 80 per cent of the respondents experience congestion between 4 PM – 7 PM. While over 15 per cent of the respondents experience congestion during 12 PM – 4 PM (see Graph 30).

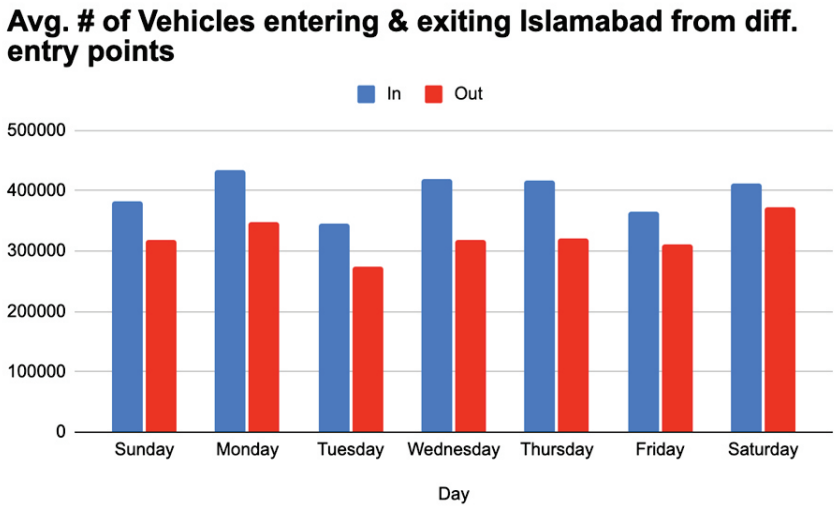
Graph 30. Congestion across Different Time-Slots



Traffic Flow in Islamabad

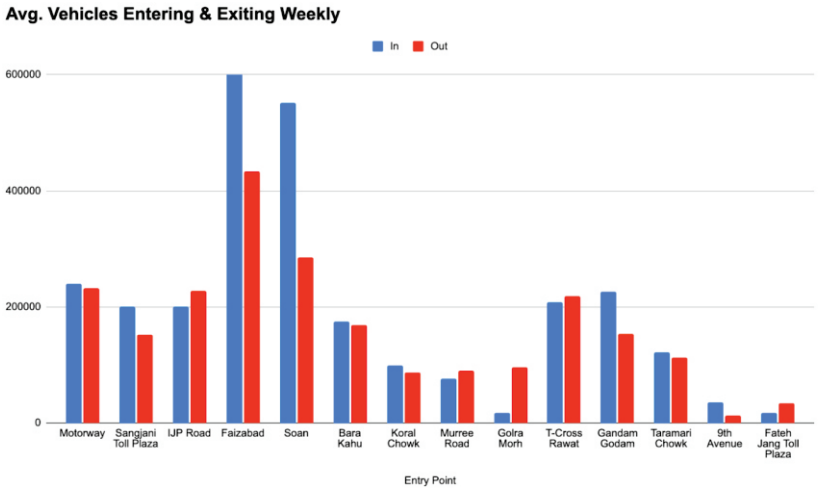
Weekly average data of the month of November, 2021, acquired from the Islamabad Safe City shows that variations in the number of vehicles entering Islamabad are not significant; however, Mondays have the most inflow of commuters averaging at 433,668 (see Graph 31). However, variations in exit suggest that such commuters could either be tourists using Islamabad as a thoroughfare or residents that are usually entering the city.

Graph 31. Average No. of Vehicles Entering and Exiting Islamabad from Different Entry Points



An analysis of average weekly data of vehicles entering and exiting different points of Islamabad was also undertaken. The highest number of the inflow of vehicles is observed at Faizabad and Soan where an average of 603973, and 551984 were observed, respectively (see Graph 32). Followed by these, the Gandam Godam at 225,822, T cross-Rawat at 208,678, IJP Road 201,305 and Sangjiani Toll Plaza with 200,209 had the highest average number of vehicles. The data suggests that the average weekly number of vehicles commuting, entering and exiting different points of Islamabad suggest that the city is confronted with a serious congestion problem.

Graph 32. Average Number of Vehicles Entering and Exiting Weekly

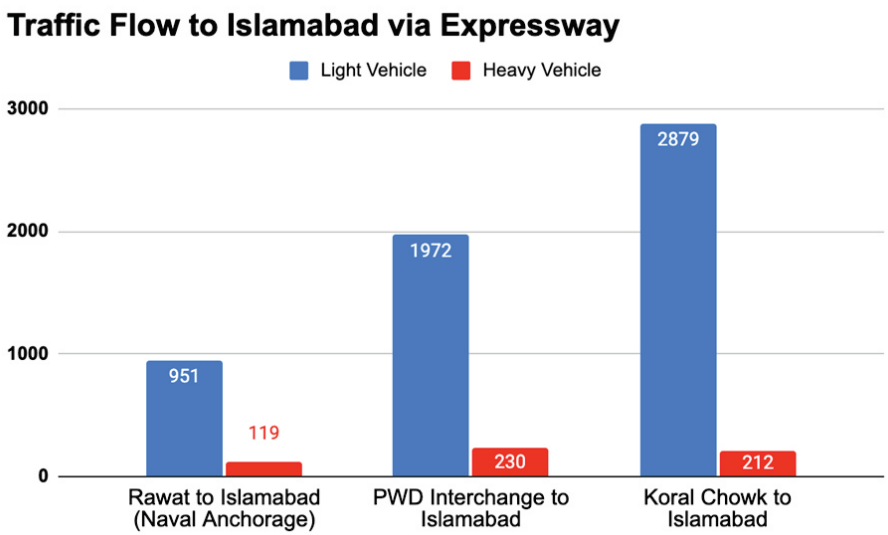


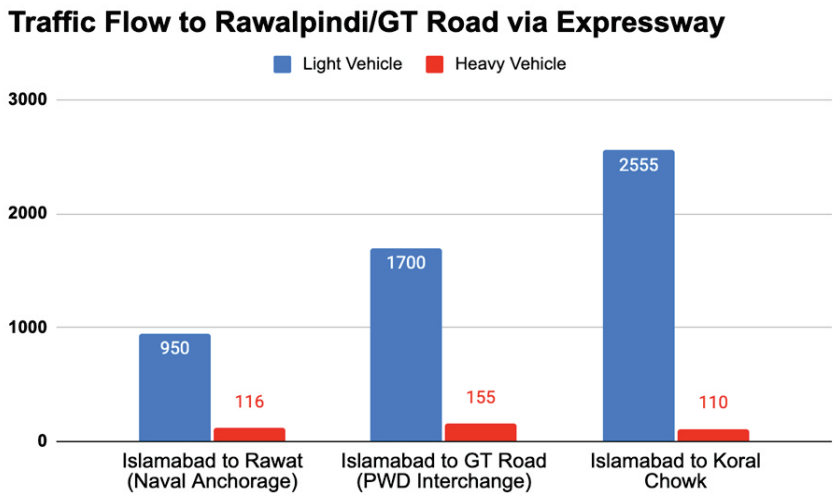
Traffic Flow and Congestion at Islamabad Expressway: In addition to the data provided by Safe City Islamabad, a random field observation of three points, at three different time intervals, along the Islamabad Expressway was undertaken to study the traffic volume coming towards and out of Islamabad. The first observation was made between 09:45 to 10:15 AM at Naval Anchorage; the second between 10:33 and 11:03 AM at PWD Interchange; and third at 11:28 and 11:58 AM at Koral Chowk fly-over.

In the first observation at Naval Anchorage for traffic flowing towards Islamabad, there were 951 Light Vehicles and around 119 Heavy Vehicles. From PWD interchange to Islamabad there were 950 light vehicles and 116 heavy vehicles (see Graph 33). In the second observation observed at PWD interchange of the traffic heading towards Islamabad, there were 1972 light and 230 heavy vehicles. On the other hand, the traffic approaching from Islamabad,

at PWD Bridge towards GT Road, there were 1700 light and 155 heavy vehicles. In our third observation at Koral Chowk, the traffic flowing towards Islamabad, the number of light vehicles were 2879, whereas, there were 212 heavy vehicles. Similarly, the traffic heading from Islamabad towards GT Road and Rawalpindi via Koral Chowk Bridge consisted of 2555 light vehicles and 212 heavy vehicles.

Graph 33. Observation of Traffic Volume from Islamabad Expressway-to-Islamabad, and Islamabad-to-GT Road, Average of 4 days in February 2022





An estimation of the traffic volume at three different locations is also projected for almost 11 hours (10:00 to 21:00 hrs) in the tables and charts below, for an average week-day (see Tables 7, and 8, and Graphs 34, and 35, respectively). Based on this projection the one-way traffic near Koral Chowk, on each side, may have the highest density, followed by second highest at PWD Bridge and interchange, with lowest projection at Naval Anchorage flyover.

Table 7. An 11-Hour Projection of the Traffic Volume from Rawat-to-Islamabad (10:00 to 21:00 hrs)

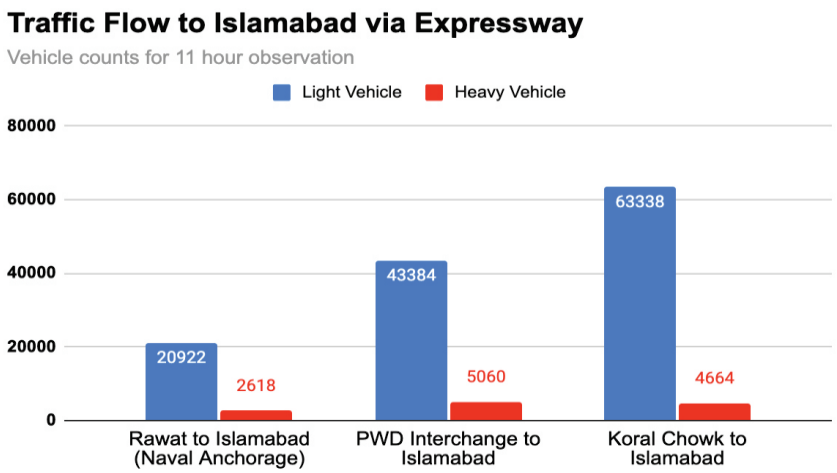
Rawat- Islamabad Expressway – Islamabad			
Location	Light Vehicle	Heavy Vehicles	Total Vehicles
Rawat to Islamabad Naval Anchorage Fly over	20,922	2,618	23,540

PWD to Islamabad	43,384	5,060	48,444
Koral Chowk Flyover to Islamabad	63,338	4,664	68,002

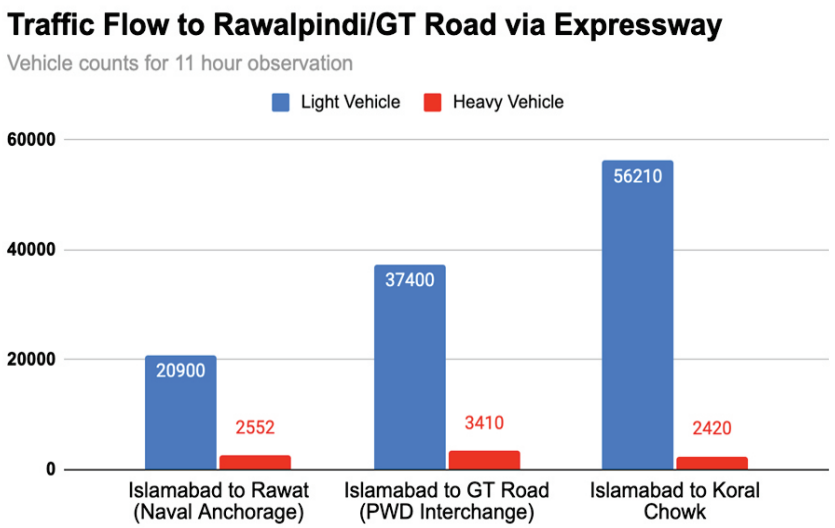
Table 8. An 11-Hour Projection of the Traffic Volume from Islamabad-to-Rawat. (10:00 to 21:00 hrs)

Islamabad- Islamabad Expressway – Rawat/GT Road			
Location	Light Vehicle	Heavy Vehicles	Total Vehicles
Islamabad to GT Road Naval Anchorage Flyover	20,900	2,552	23,452
Islamabad to PWD and GT Road	37,400	3,410	40,810
Islamabad to Koral Chowk and GT Road at Koral Chowk Fly over	56,210	2,420	58,630

Graph 34. Graphical Representation of Traffic Volume Rawat-to-Islamabad (10:00 to 21:00 hrs)



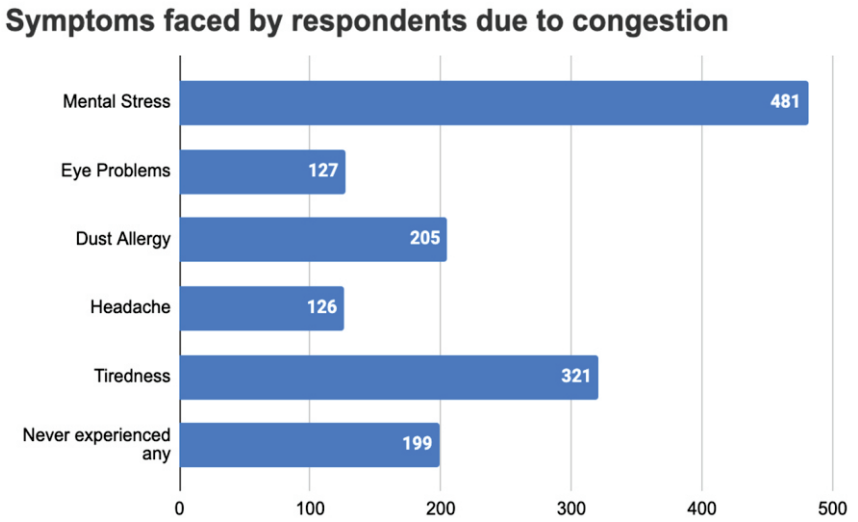
Graph 35. Graphical Representation of Traffic Volume Islamabad-to-Rawat (10:00 to 21:00 hrs)



Congestion Economy: Given the amount and frequency of time spent in congestion, the study does not account for the resulting time, productivity loss, and environmental costs. These issues can be explored as questions of interest in future studies. These factors also point to an interesting dimension argued earlier: Congestion economy, which is underway in Islamabad; whereby sale and purchase of automobile and associated products and services are being incentivized, including import-based fuel, at the cost of an environment-friendly policy of promoting public transport throughout the city. Under a congestion economy, all related and non-related services, also contributed broadly by congestion in ICT and may be benefiting also. Broadly, in terms of economic growth, this may appear as a positive development; it however may not be sustainable for the wellbeing of the public and the environment either.

Physical and Psycho-Social Costs of Congestion: When inquired on various physical and psychological adversities experienced as a result of traffic congestion, as shown in Graph 36, nearly 481 respondents reported of some form of "mental stress," whereas, 321 reported of experiencing, "physical tiredness," 205 respondents experience, "dust allergy," 127 experience some form of "eye problems," and 126 experience "headache." Only 199 respondents reported of "not experiencing any form of complications."

Graph 36. Physical and Psychological Symptoms experienced due to Congestion



Factors Contributing to Congestion across City: The study sought to investigate both the recurring and non-recurring factors, contributing towards congestion in Islamabad. The perceptions of the ITP and public – drivers and commuters varied – on these indicators, the reasons for such divergence can be two-fold: first; the ITP personnel may only have a relatively temporal and spatial experience compared to commuters driving across different parts of Islamabad or from Rawalpindi during their commute to-and-fro. Second, on the whole, the propensity out of some unconscious bias from ITP officials, to downplay the role of some factors contributing to congestion, could be contributing to either.

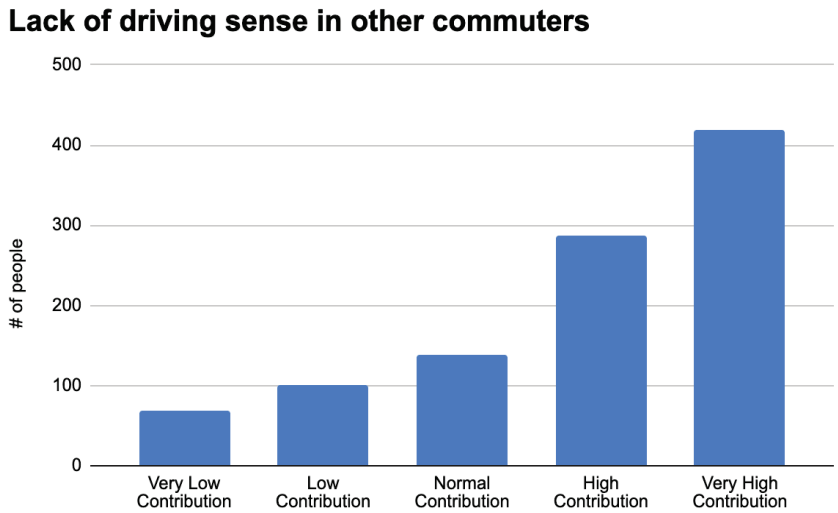
There are multiple factors including recurring and non-recurring – contributing to either "High" or "Very-High" traffic congestion in Islamabad, including: protests; insufficient infrastructure; accidents,

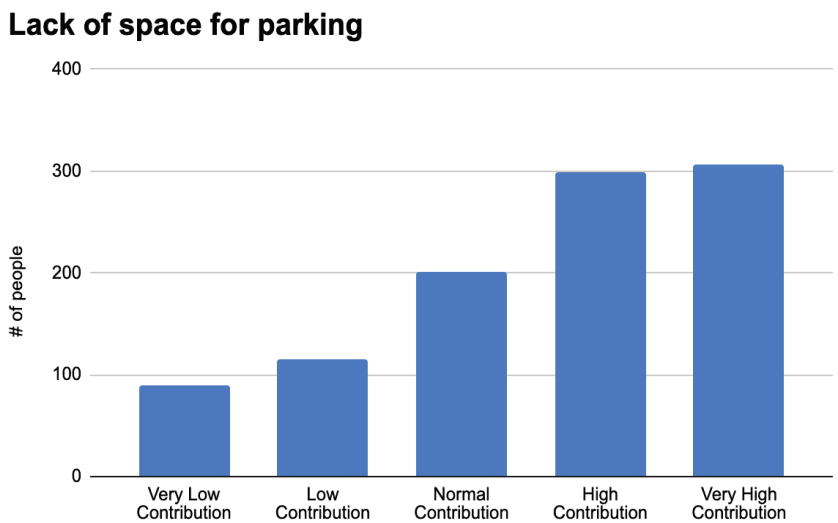
inadequate traffic controllers; accidents; poor enforcement of rules; lack of space for parking; and lack of driving sense in other commuters. A breakdown of the major congestion factors to either is provided in Table 9 and Graph 37 for policy-makers and various stakeholders.

Table 9. Comparative Overview of Factors Contributing To Congestion in Islamabad

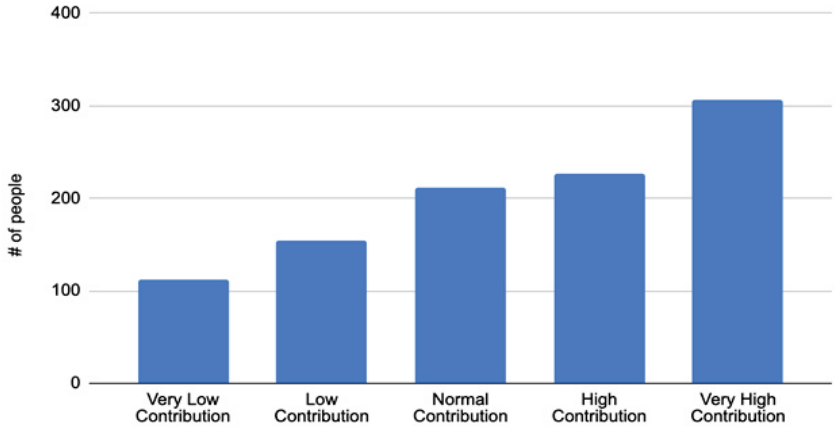
Factor	Factor Type	As per Public	As per ITP
Weather Issues	Non-recurring	Normal	Low
Construction	Non-recurring	Normal	Low
VIP Movements	Non-recurring	High	High
Inadequate Traffic Controllers	Recurring	High	Low
Special Events	Non-recurring	High	High
Protests	Non-recurring	Very High	Normal
Insufficient Infrastructure	Recurring	Very High	Low
Accidents	Non-recurring	Very High	Very Low
Poor enforcement of rules	Recurring	Very High	Very Low
Lack of space for parking	Recurring	Very High	Very High
Lack of driving sense in other commuters	Recurring	Very High	Normal

Graph 37. Graphical Representation of Contribution of Non-Recurring and Recurring Factors to Congestion

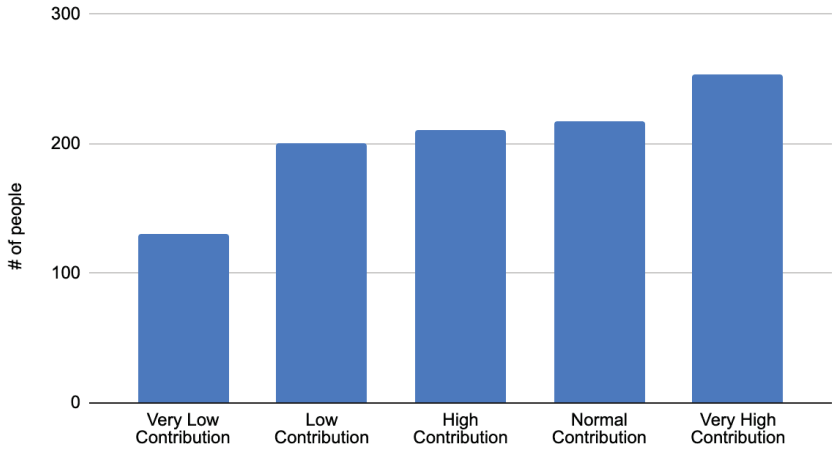


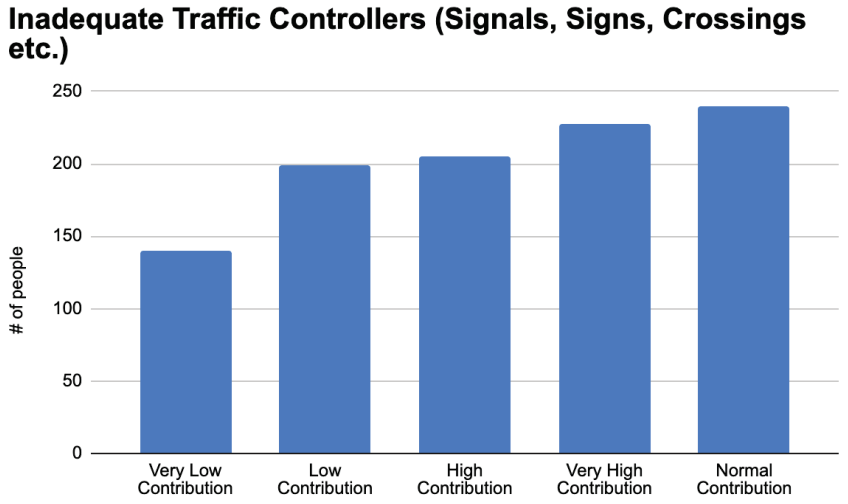


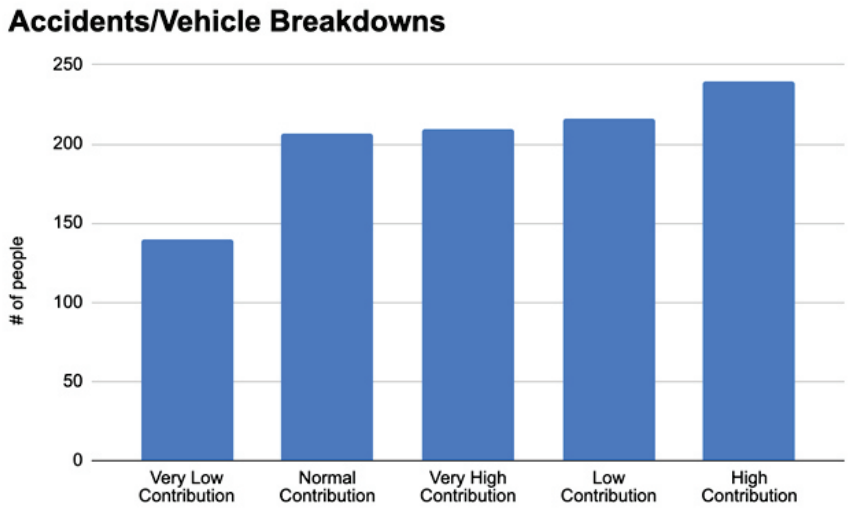
Poor enforcement of rules by the Police

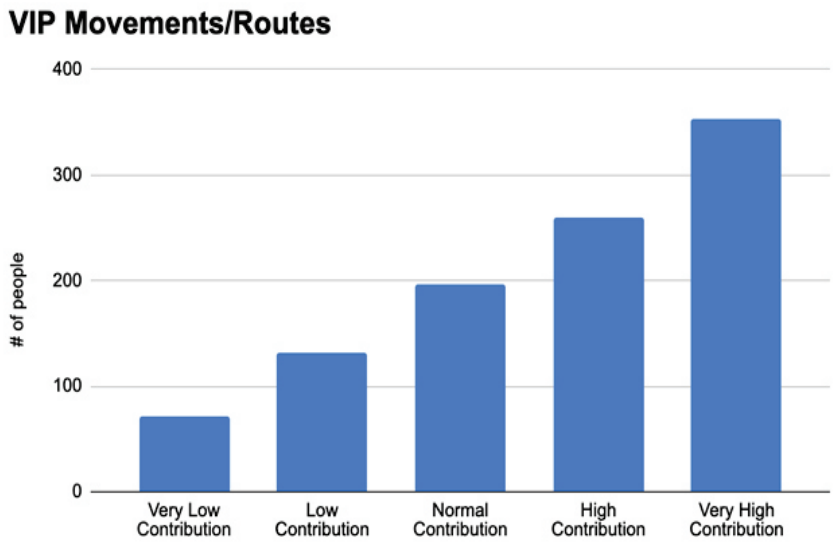


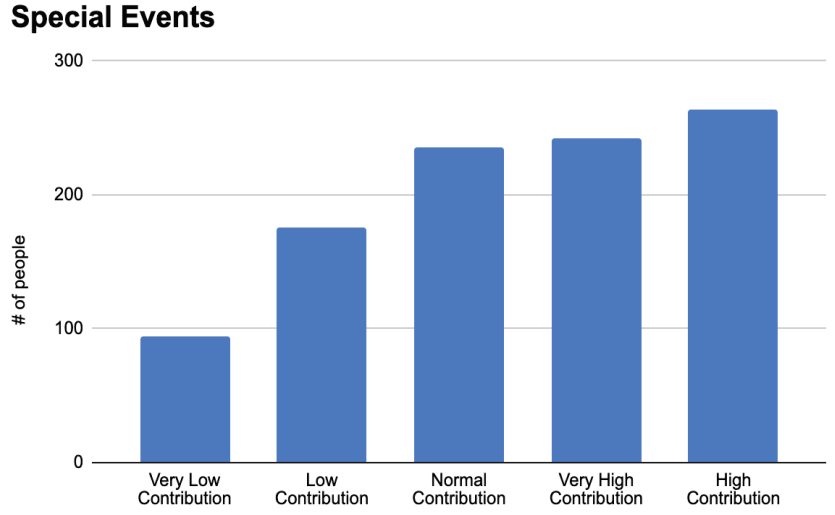
Insufficient Infrastructure (Roads etc.)

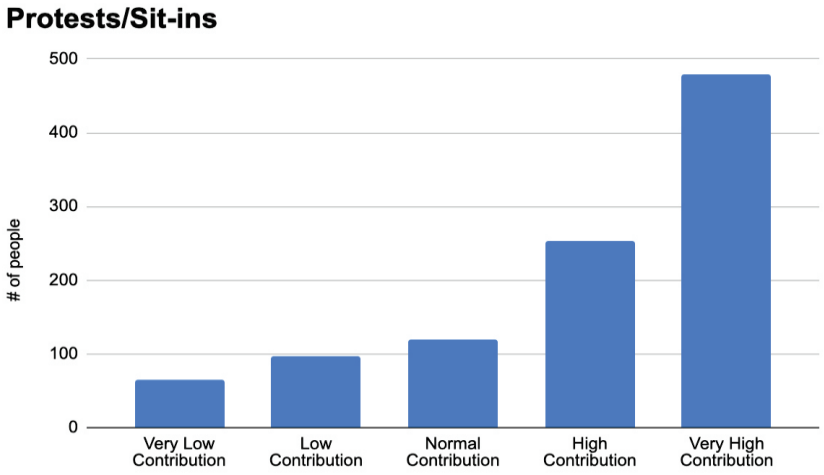


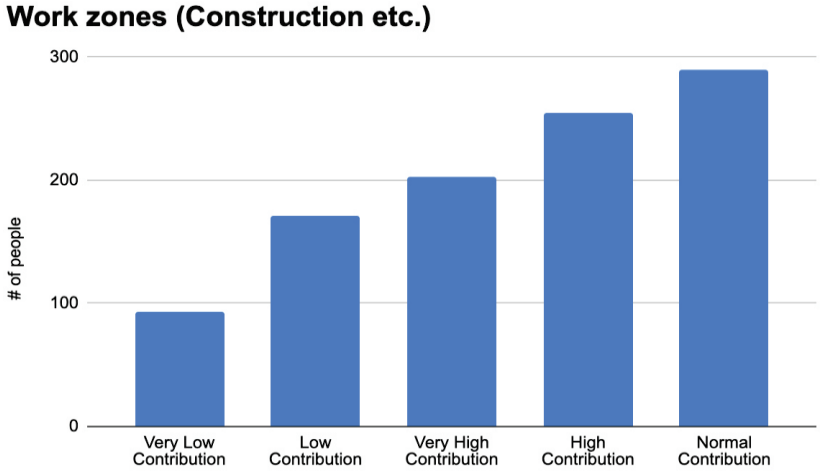

Inadequate Traffic Controllers (Signals, Signs, Crossings etc.)
# of people
250
200
150
100
50
0
Very Low Contribution
Low Contribution
High Contribution
Very High Contribution
Normal Contribution

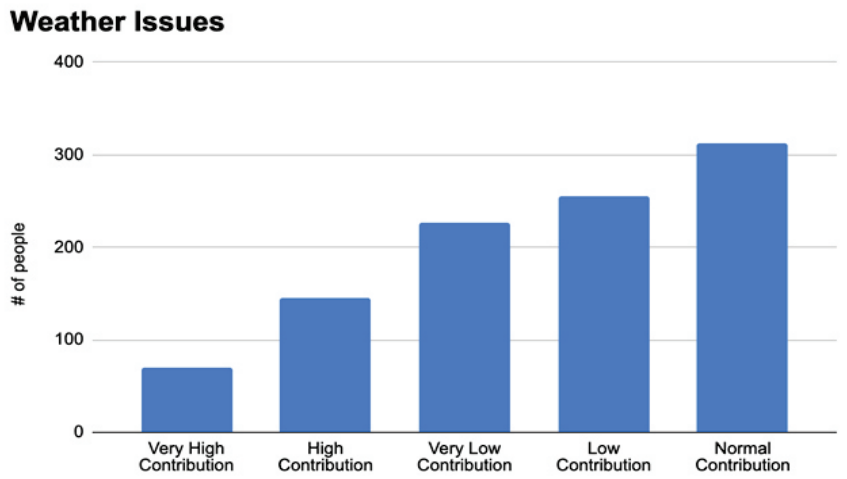

Accidents/Vehicle Breakdowns
# of people
250
200
150
100
50
0
Very Low Contribution
Normal Contribution
Very High Contribution
Low Contribution
High Contribution


VIP Movements/Routes
400
300
200
100
0
# of people
Very Low Contribution
Low Contribution
Normal Contribution
High Contribution
Very High Contribution


Special Events
300
200
100
0
# of people
Very Low Contribution
Low Contribution
Normal Contribution
Very High Contribution
High Contribution


Protests/Sit-ins
500
400
300
200
100
0
# of people
Very Low Contribution
Low Contribution
Normal Contribution
High Contribution
Very High Contribution


Work zones (Construction etc.)
300
200
100
0
# of people
Very Low Contribution
Low Contribution
Very High Contribution
High Contribution
Normal Contribution



Level of Congestion: Congestion is most reported to be "high" near intersections and signals, malls and plazas, *marakiz* and markets, and areas surrounding schools and universities are reported to have "very high" congestion. Some of these findings also corroborate reports made by Islamabad Traffic Police. Universities and commercial areas are experiencing higher density of congestion (see Table 10). A significant reason for such congestion is the unavailability of adequate parking infrastructure and public transport to discourage the use of personal automobiles for commuting. Hence, the city faces a chronic and growing congestion issue at multiple hotspots identified below.

Table 10. Level of Congestion across Different Areas in the ICT

Area	Level of Congestion (Majority Vote)
Streets	Low
Housing Societies	Normal

Service Roads	Normal
Main Highways	Normal
Intersections/Signals	High
Malls/Plazas	High
Marakiz/Markets	High
Areas surrounding Schools/Universities	Very High

Additionally, some of the areas believed to be most congested throughout the city. They are mapped (see Graph 38), based on the content analysis of the responses.

Graph 38. Graphical Representation of Content Analysis

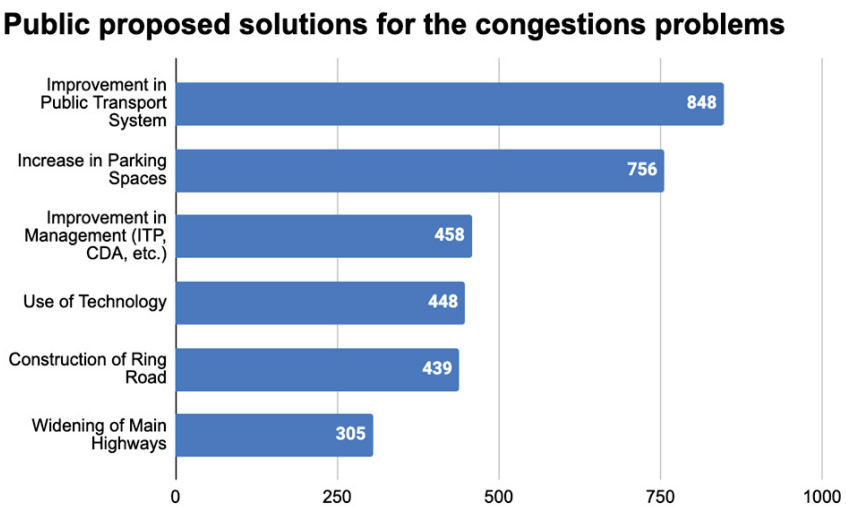
Public Policy Measures

Integrated Public Transport System and Use of Technology

It was also observed that unavailability of an integrated public transport system is pushing people to commute through private

automobiles. Over half of the respondents, 59.2 per cent, as shown previously in Graph 11, do not use public transport system as the network is inadequate. To overcome this and the issue of traffic congestion, as shown in Graph 39, over 83 per cent of the people have called for the improvement in the public transport system through the extension of the routes and the development of an integrated public transport system. Doing so, will give incentive to the public, to use public transport to commute instead of using private automobiles. Also, 44 per cent of the respondents suggested use of technology for managing traffic-related issues, including violations and congestion.

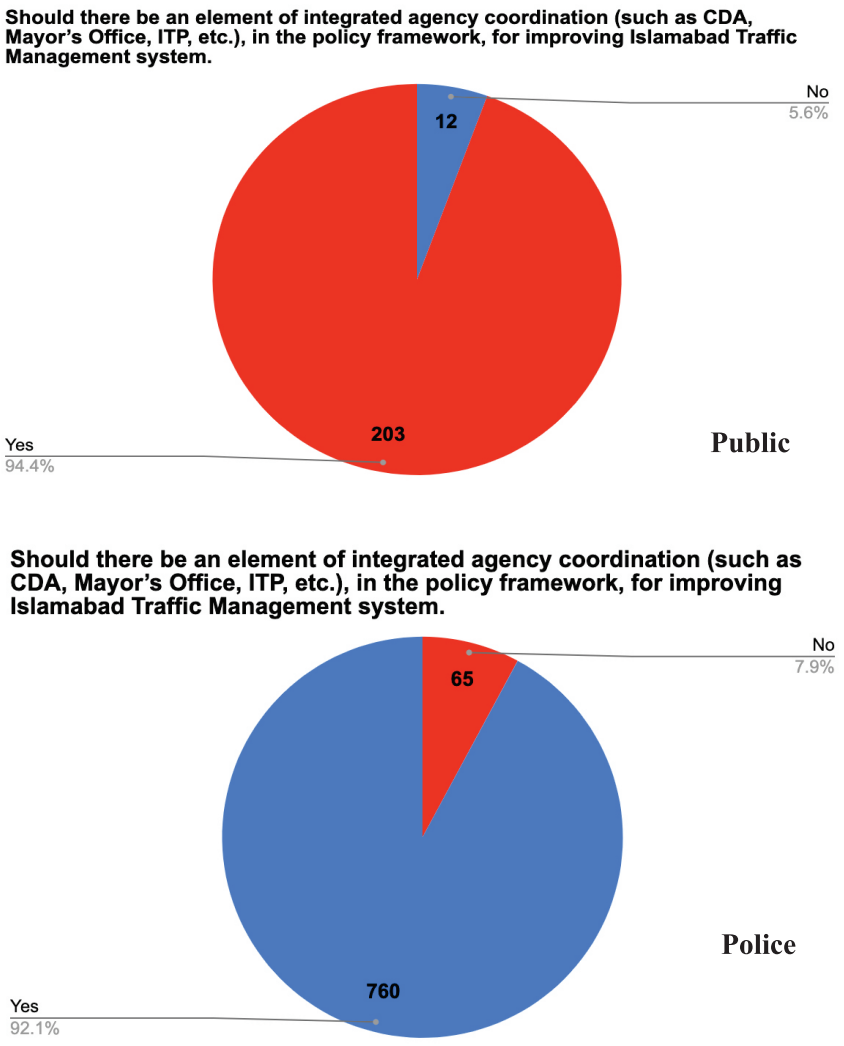
Graph 39. Proposed Interventions to Overcome Congestion in the ICT



Interagency Coordination: As a result of our study, it was found that previously an interagency coordination system was established to ensure coordination between ITP, CDA, and other public entities and make a durable strategy to manage traffic issues. However,

later, this was discontinued for unknown reasons. Under this study a consultation on this question from general public and ITP officials was also conducted. Nearly 92 per cent of the general public and 94 per cent of the traffic police officials responded for the resuscitation of the inter-institutional system. (See Graph 40).

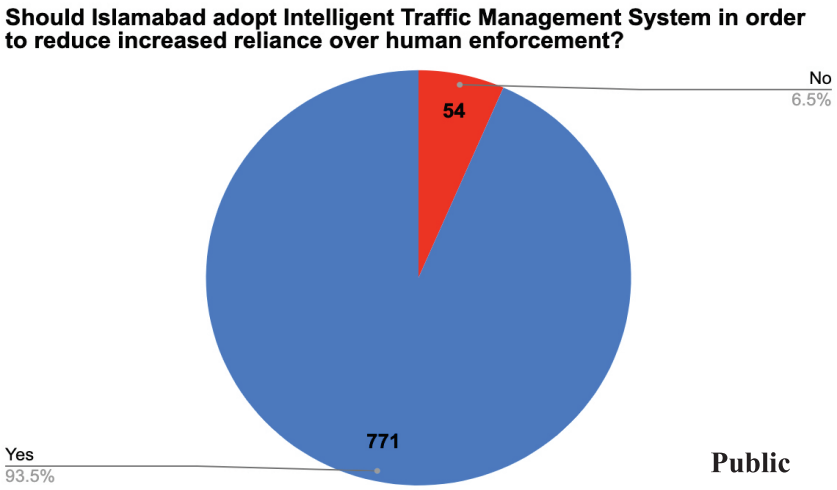
Graph 40. Comparison of Public and ITP Responses on Inter-agency Coordination



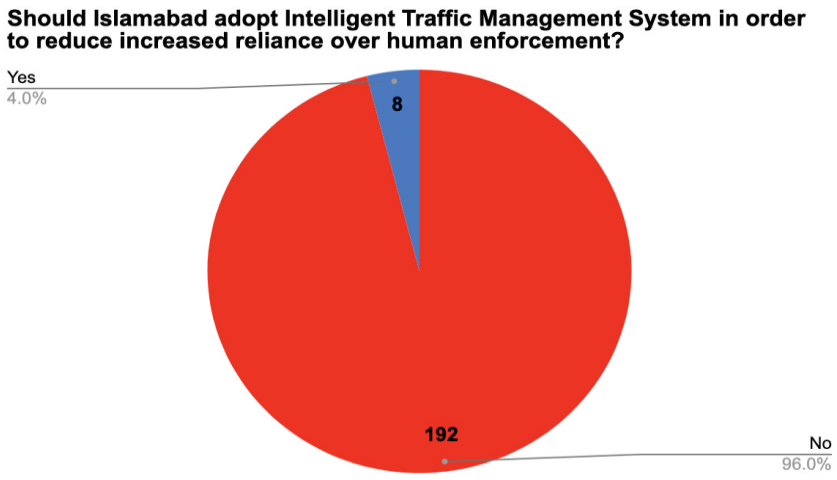
An alternative to such an arrangement can be found in the form of an empowered Roads and Transport Authority. The plan is to reform and transform Islamabad's traffic management regulation at international levels. This requires the restructuring of existing government bodies such as, the Roads and Engineering, Planning, Road Beautification, Metro and Public Transport from the CDA, Vehicle Registration and Transfer from the Excise and Taxation Department, and Driving Licensing and Registration shifted from Islamabad Traffic Police to an empowered Islamabad RTA. A detailed outlook of this is provided in the policy recommendations section.

Intelligent Traffic Management Center: General commuters were also surveyed whether an Intelligent Traffic Management Center should be put in place to improve the real time situational awareness and ensure an effective management of traffic issues. An overwhelming 93.5 per cent, of general commuters, responded in favor of setting up an Intelligent Traffic Management System, and 95 per cent of ITP officials favored a similar intervention – see Graph 41.

Graph 41. Comparison of General Public and ITP Official Responses on Islamabad Traffic Management System



Public



Police

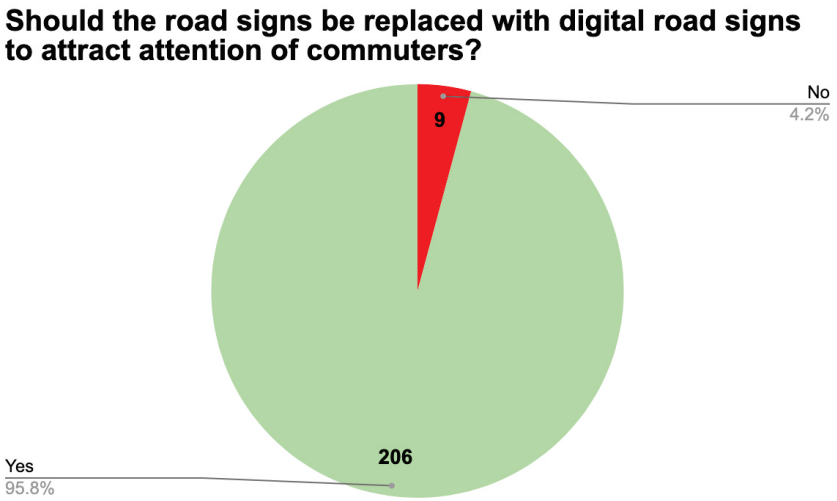
The government should set up the development of Islamabad Intelligent Traffic Management Center (ITMC) on immediate basis. Since cameras and sensors used by the Safe City are primarily used for law and order purposes, the ITMSC will have to place additional cameras at the identical infrastructure of Safe-City. The Safe City may provide live-feed to a parallel command and control center for ITMC placed under the ITP. The Islamabad Traffic Management System, at the Safe City will have a dedicated state-of-the art data center. The data-center will be managed for collection, organization and processing of data for the development of AI-enabled technological interventions and broader research and development purposes. With the availability of round the clock situational awareness and large amounts of data, ITMSC can develop Artificial Intelligence (AI) enabled solutions where needed, such as, management of Traffic signals and the traffic at large. The Islamabad Intelligent Traffic Management Center System can have Memorandum of Understanding with its counterpart body in Dubai for capacity building and the training of staff.

Digital Road Signs

The use of Digital Road Signs helps maintain safer roads and safe commutes for commuters. A study from Ontario, Canada, found that such road signs have helped reduce car collisions by 12 per cent.[19] Ontario was also manufacturing such road signs domestically. As a part of this study's survey, as shown in Graph 42, nearly 95.8 per cent of the traffic officials were of the view that the existing road signs should be replaced by the digital road signs, whereas, 4.2 per cent respondents did not favour such a proposal.

[19] "New Electronic Highway Signs Easier For Drivers to Read," *News Ontario,* November 4, 2009, https://news.ontario.ca/en/release/9671/new-electronic-highway-signs-easier-for-drivers-to-read.

Graph 42. Respondents Favoring Use of Digital Road Signs for Safer Commute



Best Practices around the World

Sweden (Stockholm)

In Stockholm, an electronic road pricing plan charges drivers to enter the center city between the hours of 06.30 and 18.30 hrs on weekdays. Buses, taxis, eco-fuel automobiles, emergency personnel, and drivers entering and leaving from the remote island of Lidingö are all exempt from the pricing plan charges. Within the first two years, peak-period traffic levels within the toll collection zone decreased by 25 per cent (removing 1 million vehicles per day), and daily toll receipts reached around US$ 300,000. Congestion toll profits have been utilized to develop other transportation and transit facilities.[20]

[20] Wong, Rland. "*Seven ways cities around the world are tackling traffic.*" July 31, 2014. https://www.weforum.org/agenda/2014/07/seven-ways-cities-around-world-tackling-traffic/.

China (Dalian and Zhangjiakou)

A report released by World Economic Forum "The Future of Urban Development Initiative: Dalian and Zhangjiakou Champion City Strategy," in collaboration with the China Center for Urban Development (CCUD)[21] identified three key urbanization concepts for the Chinese cities: transportation planning and management, urban energy management, and sustainable industrial growth, and offered 19 policy recommendations and case studies to assist Dalian and Zhangjiakou. Some of the notable recommendations to overcome the congestion included the following:

- To maximize intra-city traffic efficiency, develop an intelligent transportation system (ITS) for traffic management.
- Preferential policies to promote the use of public transportation.
- Public transportation that is more adaptable.
- Encourage people to avoid driving during rush hour.

China (Hong Kong)

Hong Kong initiated Public Light Buses (PLBs) that efficiently provide standard bus lines to the general public to the areas that are hard to reach.[22] PLBs are usually faster and more reliable with higher frequency and offer non-stop service as they have a carrying capacity of 16 seats. Mini Buses can react swiftly to market requirements and provide a more efficient and comfortable "final mile" route. It is a solution to the "last mile" problem as well as a way to regulate unlawful transportation in megacities.

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[21] World Economic Forum. "*The Future of Urban Development Initiative: Dalian and Zhangjiakou Champion City Strategy.*" July, 2014. https://www.weforum.org /reports /future-urban-development-initiative-dalian-and-zhangjiakou-champion-city-strategy.

[22] Wong, Rland. "*Seven ways cities around the world are tackling traffic*." July 31, 2014. https://www.weforum.org/agenda/2014/07/seven-ways-cities-around-world-tackling-traffic/.

United Kingdom (London)

Transportation planner provide Electronic Journey Planner for London[23] to give rapid route suggestions in the UK capital, with users able to choose from a variety of the modes of transportation, including walking, metro train, bus, over-ground train, riverboat transport, and cycling. Private mobile application developers produced further mobile versions of the route planner, delivering the very same expertise on the go with the added benefits of GPS tracking, taxi booking, and real-time traffic monitoring, giving commuters more freedom to pick between different modes of transportation.

London also introduced congestion charges to overcome congestion issues in the city center. The congestion charge is a daily fee for driving a vehicle in central London between the hours of 7 a.m. and 6 p.m., Monday through Friday. This was implemented in 1993, to alleviate car congestion, encourage people to use public transportation, and reduce air pollution in the capital. The daily tariff of congestion charge is £11.50 that allows vehicles to drive around, leave, and re-enter the charging zone as many times as they want in a single day.[24]

United Arab Emirates (Dubai)

Dubai's transport network and roads are overseen by the Roads and Transport Authority (RTA), an autonomous government entity. The RTA is in charge of providing public transportation, vehicle registration, awarding licenses to Dubai citizens, managing traffic

[23] Wong, Rland. "*Seven ways cities around the world are tackling traffic*." July 31, 2014. https://www.weforum.org/agenda/2014/07/seven-ways-cities-around-world-tackling-traffic/.

[24] UK, H. "Hertz in 60 seconds - London – What is Congestion Charge?" accessed February 15, 2022. https://www.youtube.com/watch?v=DdpcYbaTq88.

flow, and engaging in road building. The RTA is also in charge of ensuring that the Emirate's roadways are beautiful, well-built, and well-maintained.[25] RTA has also improved marine transit, offered a new fleet of public buses, and provided a variety of traditional and smart services that have all contributed to increased safety and reduced pedestrian fatalities.[26] Dubai has also set up an Intelligent Traffic Management System to improve situational awareness around traffic management issues and to report and penalize traffic violations.

[25] Blog, Cars. "All About RTA Dubai." accessed February 22, 2022. All about RTA Dubai, https://www.dubizzle.com/blog/cars/all-about-rta-dubai/.

[26] "Roads and Transport Authority." *RTA-Dubai*, accessed February 22, 2022. https://dubaicareers.ae/en/Employers/pages/Information.aspx?ID=28.

Major Findings

Hypotheses Findings

H1: Structural factors, such as inadequate road infrastructure, lack of policy implementation and enforcement, poor traffic management, and insufficient allocation of resources, contribute to traffic issues in Islamabad.

It was found in the light of the data collected from the surveys and the primary data shared by key stakeholders such as, the ITP and the CDA, that the existing policy measures were not sufficient to address the issues of traffic, including congestion and enforcement of the traffic rules. Thus, it is proven that the foregoing hypothesis hold truth.

H2: Rise in Islamabad's population is leading to an increase in the number of vehicles in Islamabad.

The empirical data concerning the ongoing sprawl in Islamabad city and its vicinities, and the rising number of new vehicles has proven a positive correlation between the two variables while holding the hypothesis valid.

H3: Lack of public transport is incentivizing the public's preference to own some kind of an automobile for personal commutation.

Rise in the number of private automobiles in the absence of an integrated public transport system also indicate that the policies at present or the lack thereof, necessitates the purchase and use of personal automobiles for commuters. Thus, this hypothesis also stands valid.

H4: Lower rates of violation charges are leading to lower compliance with traffic rules.

In the absence of the relevant data with the ITP to correlate the two variables; lower violation charges and lower compliance with the traffic rules, the hypothesis could not be verified.

H5: Lower number of traffic police officials is contributing towards weak enforcement and compliance with traffic rules.

There is a sufficient data showing that the number of traffic police officials is drastically reducing against the rising number of automobiles and the local population. As per the ITP, this is crippling the ability of ITP to effectively manage traffic and ensure compliance with the traffic rules. Hence, empirical opinion survey and qualitative data both validate the hypothesis.

H6: Unplanned rise in the number of automobiles in Islamabad is putting strain on existing road infrastructure.

The existing infrastructure is lagging behind by 25 years to support the influx of automobiles on Islamabad's roads.[27] Therefore, the foregoing hypothesis once again stand authenticated in the light of the existing data and insights.

Resource shortage faced by the ITP

The Islamabad Traffic Police lacks the requisite number of field personnel to manage the traffic. The existing size of ITP personnel at 691 has remained unchanged since 2006. For every 1165 citizens, there was one traffic police personnel in 2006, and the ratio has risen to one traffic police personnel for 2734 citizens in 2020. Transport wise in 2006, there was one traffic police personnel for every 211 vehicles with the ratio rising to one traffic police

[27] Azam K. Lodhi, Personal Interview, Islamabad, December, 9, 2021.

personnel for 627 vehicles in 2020. For ITP, in 2006, there were 33 uncovered areas and the number of such areas has risen to 231 in 2021; representing a 600 per cent rise. Similarly, the police lack requisite vehicular resources to enforce compliance with the traffic rules by violators. Following table display the resource deficit very aptly:

Summary of Resource Scarcity faced by ITP

Items	2006	2021	Per centage Increase
ITP Personnel	691	691	-
ITP's 4-wheel vehicles	69	63	-8.70%
ITP's Motorcycles	72	97	34.72%
Population	805235	2003368	149%
Total Vehicles Registered in Islamabad	169788	1205546	610%
Daily Average Vehicle Entry in Islamabad	274987	497591	81%
Uncovered Areas/Points	33	231	600%

Source: *"Concept Paper on Revamping of Islamabad Traffic Police (ITP)," ITP*

Intelligent Traffic Management Center

- 93.5 per cent of the general commuters and 95 per cent of ITP officials asked for setting up of an Intelligent Traffic Management System to monitor and surveil the traffic flow/violations through an integrated array of cameras and sensors.

Absence of Integrated Organization for Traffic Management

The city managers in Islamabad do not have an effective integrated organization at place to holistically address the traffic related issues. Most areas of the traffic management, such as, building of infrastructure, management of congestion, registration of new vehicles and management of public transport are being covered under a silo-based approach by different government departments. The existing mechanism of interagency coordination also remains dormant. Consequently, need is felt for a holistic institutional approach to cope with the traffic management issues by involving Islamabad and the residents of twin cities.

Congestion

Factors Impacting Congestion

Traffic congestion on existing road infrastructure is on the rise because of the following factors:-

- Population
- Urban Sprawl
- Rise in the Number of Vehicles
- Lack of Public Transport
- ITP's Resource Deficit

Congestion Frequency

- Over 53 per cent of the respondents experience congestion between 2-5 times a day.
- Over 28.6 per cent experience it once during the day.
- Nearly 10 per cent of the respondents experience it more than 5 times a day.

Congestion Duration

- Nearly 33 per cent spend between 21-40 minutes in traffic congestion. The cumulative proportion time spent between 11-40 minutes is 66 per cent.
- Almost over 21 per cent of the population spends more than 40 minutes in the traffic congestion.

Congestion Timings

- Over 11 per cent of the respondents denied the existence of the problem.
- 88.3 per cent have reported experiencing congestion in Islamabad.
- About the timings of the day, 75 per cent respondents complained of experiencing higher congestion between 8 AM – 12 PM.
- Over 80 per cent of the respondents experience congestion between 4 PM – 7 PM.
- Over 15 per cent of the respondents experience congestion during 12 PM – 4 PM.

Vehicular Flow and Congestion at Islamabad Expressway
An 11-Hour Projection of the Traffic Volume from Rawat-to-Islamabad. (10:00 to 21:00 hrs)

Rawat- Islamabad Expressway – Islamabad			
Location	Light Vehicle	Heavy Vehicles	Total Vehicles
Rawat to Islamabad Naval Anchorage Fly over	20,922	2,618	23,540
PWD to Islamabad	43,384	5,060	48,444

Koral Chowk Flyover to Islamabad	63,338	4,664	68,002

An 11-Hour Projection of the Traffic Volume from Islamabad-to-Rawat. (10:00 to 21:00 hrs)

Islamabad- Islamabad Expressway – Rawat/GT Road			
Location	Light Vehicle	Heavy Vehicles	Total Vehicles
Islamabad to GT Road Naval Anchorage Flyover	20,900	2,552	23,452
Islamabad to PWD and GT Road	37,400	3,410	40,810
Islamabad to Koral Chowk and GT Road at Koral Chowk Fly over	56,210	2,420	58,630

Inadequate Infrastructure

The city administration has started constructing a new infrastructure to cater for the rising number of traffic; however, some of the measures are still inadequate at some places. More specifically, the Islamabad Expressway, with heavy traffic volume, lacks enough space to cater for smooth flow of traffic, especially during the rush hours. The inadequate infrastructure is also compounding the issue of congestion along the route, especially in the absence of sufficient public transport for daily commuters.

Lack/Inadequacy of Public Transport

The inadequacy of public transport has resulted in the increased reliance on private transport leading to increasing traffic density on

road infrastructure. Over 83 per cent of the people have called for the improvement in the public transport system through the extension of the routes and the development of an integrated public transport system. With a population of 2 million residents, the city, at present, is not offering public transport along the major routes of Islamabad. At present, two of the routes on Islamabad's Metro Bus system have been operationalized, i.e., from Saddar to Secretariat and from N5 Station to Chaman Station. The remaining five major public transport routes are awaiting operationalization. As a consequence, commuters are left with no option but to rely on their private transport.

Policy Recommendations

Addressing the Capacity/Resource Deficit of Islamabad Traffic Police

Increasing the Existing Personnel Strength

The strength of Islamabad Traffic Police should be immediately raised to 2700 police personnel from the current strength of 691.

Direct Recruitment of ITP Personnel

Islamabad Traffic Police should be mandated under the law to have independent recruitment of personnel. All ranks between BPS 01 up to BPS-07 should be recruited directly by the ITP, whereas, from BPS-09 to BPS-16 to be recruited by the Federal Public Services Commission. However, the testing regime, both by the ITP and FPSC, should be proportionate to the requisite aptitude, intelligence and academic skills.

Refresher Training for Existing Personnel

A comprehensive refresher training regime should be introduced for the specialized training of traffic officials on modern lines.

Increasing the Transport Pool of Police Vehicles

The transport pool of police vehicles should also be scaled up as per the workload and the assessment by the Islamabad Traffic Police.

Islamabad Roads and Transport Authority

- The ongoing traffic planning, management and standardization requires an integrated and holistic intervention. To this end, empowerment of Islamabad Roads and Transport Authority (RTA) with major restructuring is required. The office of RTA

should be autonomous, and independent in operations. Following to be put under proposed Roads and Transport Authority:

- Roads and Engineering planning and development.
- Constructions permits on roads, and residential areas along highways, and other related development.
- Metros and Public Transport.
- Public Transport Licensing.
- Vehicle registration.
- Vehicle fines and fitness certificates.
- Vehicle transfer.
- Driving License issuance and renewal.
- Road's beautification.
- Management, development, and issuance of NOC for parking facilities.
- Commercial advertisement alongside Roads and Metro facilities.
- Islamabad cab, taxi and ride-hailing regulation.
- Traffic Services, including management of traffic signals.
- A central payment system or solution for the usage across Metro, and other parking facilities (one card, all pass) to overcome a disintegrated payment solution for commuters on public transport or while using charging facilities.
- Road sign issuance and permits.
- To enhance RTA's outreach and help improve its learning curve, Islamabad RTA should have an effective, operational research and development wing to solve complex policy issues. International collaboration with similar organizations in advanced countries should

be formalized to improve RTA's capacity to tackle roads and transport related issues in the national capital.

Infrastructural Development

- The existing bottlenecks of the traffic on main highways, especially on the Islamabad Expressway up to Rawat, require the development of additional lanes and construction of additional flyovers/underpasses to overcome the ever-increasing influx of automobiles. A similar intervention may also be needed along Park Road connecting Rawal Chowk Interchange with Taramari Chowk.
- A comprehensive survey to be conducted by Islamabad Traffic Police and CDA in Islamabad and on roads/highways leading into the city to identify badly engineered U-turns and intersections. Infrastructural improvements could later be planned based on the above survey/assessment.

Establishment of Islamabad Intelligent Traffic Management Center (ITMC) under Islamabad Traffic Police

An organization named as Islamabad Intelligent Traffic Management Center (ITMC) should be established to:

Deploy AI-enabled and data science-based tools to assess traffic-related issues including congestion on the roads.
Report traffic-related violations.

Provide situational awareness to the Islamabad Traffic Police on the running traffic situation and coordinate any field deployment for the redressal of traffic related issues.

The ITMC should be placed under the Islamabad Traffic Police. Whereas, ITMC should develop AI enabled technological solutions

and undertake round the clock situational awareness. The management of traffic can be looked after by the Islamabad Traffic Police. The relationship and coordination between ITP and ITMC should be symbiotic and seamless. The formation of this organizational relationship should consist of above-mentioned ethos from the outset.

Expeditious Development of Integrated Public Transport System

With the support of the government, appropriate bus service should be initiated with adequate numbers at the earliest and must commensurate with the flow of the traffic supply from Rawat, Taxila, and Barakahu. To this end, public transport on proposed routes under the recent study conducted by NESPAK in collaboration with United National Development Programme (UNDP), should be introduced as soon as possible.

Additionally, a feeder transport system should also be initiated from the Margalla Road at E-10 to link Shaheen Chowk with the Faisal Mosque and Murghzar Chowk. This route will feed commuters travelling on Metro Buses to Rawat, Barakahu and Saddar. A feeder bus system from sectors 1-10-to-1-9 to connect with the Potohar Terminal (Main Metro Bus); another from F-8 Markaz to Katchery Terminal and to a nearby terminal of the new artery from Faisal Masjid to Rawat, must be operationalized. (Refer map for proposed metro bus routes on page 33)

In addition to above, following measures are also proposed:

Shuttle Bus Service from Residential Schemes

Residential schemes within the sub-urban vicinities of Islamabad to operate a shuttle bus system should be initiated. The bus system

should either be connected with the proposed integrated Metro bus system, or travel towards Islamabad and back in particular timings.

Mandatory Public Transport Service from Large School Branches

To lessen the congestion during peak office and school hours, the commuters should be encouraged to travel in public transport rather than self-owned cars. Moreover, the schools should have their own transport system for school children.

Bicycle Sharing System at Metro and Public Transport Terminals

The BRT Peshawar has integrated the "ZU Bicycle sharing system," particularly for the ease of the commuters, students and citizens in which they can use the bicycles in order to commute to the nearest bus stations. A similar kind of bicycle sharing system can be introduced in the Islamabad Metro Bus system, which will be beneficial for the citizens to commute to the bus stations, and to their nearest destinations.

Congestion Charges and Parking Plazas

CDA should initiate the development of parking plazas in 25 spots at 6-7 locations in different sectors such as G9, F8, F10, Blue Area and I sectors identified by the Capital Development Authority's Traffic and Engineering Department. To encourage parking in the plazas, the fee for parking should be lower compared to parking facilities on the road.

It is proposed that the parking charges on roads and plazas be charged under the congestion charges. The revenue generated should be used for improving the public transport infrastructure.

Following additional measures can be exercised at key locations to overcome the issue of congestion related to parking in Islamabad: - CDA should direct Air University and Bahria University to construct their own parking plaza inside their university premises in order, instead of parking the cars alongside the Margalla Road.

Future approvals for any public or private university should strictly be conditioned on the provision of proper parking infrastructure and shuttle service for students and staff alike.

E-Challans

The E-Challan system should be extended to the entire Islamabad city and the highways coming from Rawalpindi. An integrated network of radar sensors and cameras is needed to achieve this objective. The sensors should detect various kinds of violations; such as those related to traffic signal violation, over-speeding, lane discipline violation, driving on hard shoulders; illegal U-turns, and yellow-box violations. The cameras deployed for spotting the violations should have the ability to record the footage of a violation along with taking images.

Revising Challan Charges for Traffic Violations

The existing charges on traffic violations are very low and appear ineffective on the drivers and commuters. To do so, it is suggested that the violation charges be revised and scaled up four-fold.

Standardization of Driving License Regime

Driving license regime, under the RTA, needs standardization at par with the international level. Moving the domain of driving license to RTA will alleviate the burden on the Islamabad Traffic Police. The policy will help improve the quality of compliance and understanding of the traffic signs, and rules.

Standardization of Learning of Driving

The driving standards should be improved through the employment of standardized learning experience, and proper curriculum. The methodology for training learners should be consistent with the training curriculum and driving standards established by Islamabad RTA. The learning regime should be similar to the one adopted in Dubai.

The driving centers should impart standardized training by the use of sensors and other radar technology to evaluate the driving skills of the candidates with the limited intervention of human-evaluation. Having an internationally competitive regime will raise the driving standard in the capital city and can serve as a role model for replication across all the cities in Pakistan. These driving centers and their training/curriculum aspects should be overseen by the RTA.

Use of Hybrid or Electric Buses and Electric Charging Stations and Batteries

In order to ensure eco-friendly public transport, the government should prioritize procuring hybrid or electric buses to cut down the carbon emissions. If the government plans on buying electric buses, then it should procure electric charging stations or terminals from suppliers. Electric batteries and charging stations in Pakistan would be a more sustainable and industrial-friendly approach. Doing so will also allow the government to ensure technology-transfer and cut down on the import bill.

Action Matrix

Problem	Pathways to Solution	How to Implement Each Solution	Actors Responsible	Implementation Timelines
Lack of Capacity Building and Resource deficit faced by the ITP for management of the traffic	Raising the size of ITP Police Force. Raising the number of vehicles available to the ITP. Training Regime on modern lines.	Empowering the ITP to raise the number of police force through direct recruitment. Allocation of required vehicles as per the ITP's needs to the traffic police force Refresher training sessions for existing personnel of the ITP	Ministry of the Interior Islamabad Police Islamabad Traffic Police	**July - Oct 2022**
Absence of a central body to manage traffic related issues	Establishment of the Islamabad Roads and Transport Authority.	Shifting of different departments from existing government agencies, such as the vehicle registration under Excise and Taxation Department, driving license regime Islamabad Traffic Police, and the roads and traffic engineering under CDA to their subsequent placement under the Roads and Transports Authority.	Ministry of Planning, Development and Special Initiatives Ministry of Interior Islamabad Excise and Taxation Department Capital Development Authority Islamabad Traffic Police	**February 2023**
Absence of state-of-the art body to manage traffic under ITP	Establishment of the Islamabad Intelligent Traffic Management Center under the ITP.	Set up of a technical branch for the development of AI enabled technical solutions for analysis and management of the traffic issues. Manual Traffic Management by the ITP.	Ministry of the Interior Islamabad Police Islamabad Traffic Police	**Oct 2022 - February 2023**
Infrastructural Development	Development of Signal Free Corridors and widened lanes.	Development of either Flyovers/Underpasses, and widened lanes at the Islamabad Expressway. Repair and maintenance of the Park Road connecting Islamabad with Taramari. Also the need to reduce the number of unnecessary U-turns along the road.	Capital Development Authority	**July-August 2022**

Action Matrix

Problem	Pathways to Solution	How to Implement Each Solution	Actors Responsible	Implementation Timelines
		A comprehensive survey to be conducted by the Islamabad Traffic Police and CDA in Islamabad and on roads/highways leading into the city to identify badly engineered U-turns and intersections. Infrastructural improvements could later be planned based on above survey/assessment.	Capital Development Authority and Islamabad Traffic Police	
Poor Integration of Public Transport in Islamabad	Development of an Integrated Public Transport System.	Introduction of Metro Bus Service along the proposed routes under NESPAK and UNDP study. Installation of the ZU Bike system to provide coverage for the last mile of the destination from the terminal. In addition, introduction of Feeder Bus System for connectivity along the main routes.	Capital Development Authority Ministry of Planning, Development and Special Initiatives Ministry of Finance	**12-24 months**
Absence of Additional Parking Facilities at Congested Areas of Islamabad	Provision of Parking Facility along with the Congestion Charges.	Development of Parking Plazas in the congested sectors. Identification of spaces along the roads with Congestion Charges facility. In addition, introduction of Feeder Bus System for connectivity along the main routes.	Capital Development Authority	**April 2024 (for Plazas)** **March 2023 (for Congestion Charges facility)**
Ineffective Mass E-Challan Service across Islamabad	Operationalization of Mass E-Challan Service across the Islamabad Capital Territory.	Installation and deployment of integrated network of additional sensors and cameras to report traffic violations under the E-Challan regime.	Islamabad Intelligent Traffic Management Center (IITMC) under Islamabad Traffic Police	**October 2022**

Action Matrix

Problem	Pathways to Solution	How to Implement Each Solution	Actors Responsible	Implementation Timelines
Absence of Standardized Driving Regime in Islamabad	Introduction and implementation of Standardized Driving Regime at part with international standards.	Proposed RTA to introduce driving regime, which should require driving centers to provide driving instruction training along a uniform standard. The license regime for drivers to be standardized along similar standards. Driving centers to fulfill a set of certification to offer driving instruction and training to learners.	Roads and Transport Authority	**April 2023**

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