UNDERSTANDING AND ESTIMATING URBAN MOBILITY COST AND ITS EFFECTS ON SAVINGS: A CASE STUDY OF ISLAMABAD

By

Syed Saddam Haider

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Supervisor

Muhammad Aqeel Anwar

PIDE School of Economics
Pakistan Institute of Development Economics
Islamabad

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Pakistan Institute of Development Economics

Pakistan Institute of Development Economics, Islamabad

PIDE School of Economics

CERTIFICATE

This is to certify that this thesis entitled: **"Understanding and Estimating Urban Mobility Cost and Its Effects on Savings: A Case Study of Islamabad"** submitted by **Syed Saddam Haider** is accepted in its present form by the School of Economics, Pakistan Institute of Development Economics (PIDE), Islamabad as satisfying the requirements for partial fulfillment of the degree in Master of Philosophy in Econometrics.

Supervisor: Mr. Aqeel Anwar Ch. Signature: ____________

External Examiner: Dr. Atiq Ur Rehman Signature: ____________

Head,
PIDE School of Economics: Dr. Shujaat Farooq Signature: ____________

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Date: **20/01/2022**

Student Name: **Syed Saddam Haider**

Dedication

Dedicated to my loving parents and always supporting siblings

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I bow my head and pay a great devotion to Allah, who is the beneficent, gracious, omniscient, almighty, and a great judge of this world and worlds after this, for His guidance that made me capable of doing this Task.

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ABSTRACT

Contemporarily, with the emergence of big data and new technologies, it has given rise to new challenges and opportunities for the researchers when applying novel methodologies. The purpose of this research is to adopt big data and technology to estimate travel time, mobility cost and its impact on individuals' saving in Islamabad. Data was extracted/collected form BYKEA, Google and a survey conducted in Islamabad. In doing so, the I divided the study area (Islamabad) into multiple zones. On the basis of which an initial frame work was developed to extract, analyze and visualize the data. The result found average travel in Islamabad along all the possible travel flow to be 35 mins, which fluctuate to 37 min during peak hours. Moreover, average mobility cost was calculated to be 22.5 per cent of an individual income, 12.5 per cent in monetary terms whereas the additional 10 per cent in time related cost. Ride-hailing was found to be the most expensive mode of mobility followed by car, public transport and motorcycle. Furthermore, the study also identifies major mobility patterns in the city and provided further recommendation for research.

Keywords: *Cities, Mobility, Mobility Patterns, Mobility Cost, Travel Time, Google, BYKEA, Cars, Ride hailing*

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LIST OF ABBREVIATIONS

BRT Bus Rapid Transit

Maas Mobility-as-a service

TOD Transit Oriented Development

ITA Islamabad Transport Authority

ICT Islamabad Capital Authority

GIS Geography Information System

USA United State of America

ITA Islamabad Transport Authority

EOI Expression of Interest

API Application Programming Interface

GPS Geographical positioning System

HIES Household Integrated Economic Survey

GNP Gross National Product

ICT Islamabad Capital Territory

UC Union Council

Lat Latitude

Lng Longitude

MP Master Plan

CDA Capital Development Authority

CHAPTER 1
INTRODUCTION

Over time cities have evolved, there needs have become more and more complex. Every modern city has extensive systems in place for mobility, housing, education, sanitation, utilities, land use and communication. Out of which, mobility is the most important one because cities rely on specialization and an economic system that is based on wage labour, which to function require regular mobility between home and workplace, and other necessities like education, entertainment etc. (Schrank, 2001) define mobility as;

> *"Mobility is the ability to reach a destination in a time and cost that are satisfactory"* (Schrank, 2001, p. 5)

In simple terms, it's getting from point "A" to point "B" by any means. It starts with walking, then cycling, then buses and trains, public transports and end up on individual personal transport vehicles like cars and motorbikes. With each mode associated are some cost, namely mobility cost which is further classified into internal, external and social costs, variable or fixed costs, market or non-market costs and direct or indirect costs (Litman, 2003). Estimating which is an important exercise.

In contemporary literature, mobility is considered a major facilitator of economic growth. There is a plethora of empirical evidence that establishes econometric relationship between mobility and different economic metrics i.e labour market and commodity market to name a few (Rodrigue & Notteboom, 2021) and (Putra & Arini, 2020). According to (Krol, 2017) "greater mobility results in better job matches, lower business costs and faster product deliveries to customers. This increases productivity; an essential driver of business expansion and economic growth". Moreover, taking into account the three-sector-model[1] by (Fisher, 1939) the transition toward a developed economy is followed by a paradigm shift towards modern manufacturing practices, distribution, and services from a primary and secondary sector-based economy. While roads, ports etc. are prerequisites for manufacturing, efficient mobility is essential for the service sector within the city (Mansell, 1985).

1 However, the three-sector model received several criticisms. According to David et. al (2020) due to its limitations the model is an inappropriate representation of the economy in the 21st century.

However, if mobility cost is high can create certain complications. Speaking to the 6th Urbanization and Poverty Reduction Research Conference Adlam Abera[2] indicated that "Transportation costs are huge constraints". Which significantly influence the city's economic structure, especially of those in developing countries. For example, higher mobility cost has a disproportionately negative impact on labour cost and commodity prices in the labour and commodity market (Rodrigue J.-P. , 2020). Similarly, higher mobility cost has serious implications for poverty. In the US, expenditure on mobility is the second-highest household expenditure, putting a financial burden on lower-income households (Santos, Methipara, Liss, & Reuscher, 2014) (FHWA NHTS, 2009).

According to (Hadi, 2020) the contemporary urban design and lack of comprehensive transportation system are at blame for higher mobility cost in cities, especially those in developing countries. For instance, what kind of transportation is used depends on how land is used and how cities are designed: Single-family houses on large lots intensify the demand for cars. A good example will be Islamabad, the city is designed in a proper iron-grid pattern of road networks, way before the explosion of private cars. Whereas recent studies show that these hierarchical patterns often negatively impact mobility in terms of cost. Moreover, the newly born capital, since 1960 has not been in a status-quo since and is continuously growing, currently hosting a population of around 2.2 million (Mahsud & Khan, 2010). It perfectly portrays how these designs force the traffic to take these road networks of hierarchical pattern, discouraging soft traffic i.e., pedestrian, bicycle, etc. and changing citizens' disclosure about movement within the city (Frantzeskakis, 1995). For example, the length of one sector is almost 2 kilometers. So, moving from one extreme to another isn't possible for an average pedestrian, regularly. Making the need for a car inevitable.

Around 0.7 million vehicles are registered in Islamabad. An official of excise and taxation Islamabad talking to Daily Times states that the department registers 6000 vehicles a month, some 200 a day (Chaudhry W. , 2016)

Similarly, the problem is not that of Pakistan or any developing country only, the growth of the automobile industry in the United States during the third quarter of 20th century, for example, influenced people preference towards larger houses thus a larger part of population started to settle outside of city - suburbs. Furthermore, the zoning codes divide

[2] Edlam Abera Yemeru is the Chief, Urbanization & Development, United Nations Economic Commission for Africa.

suburban, business and industrial districts, which means people have to travel between work and shop. This model makes mass transportation impossible to offer commercially and large areas of the USA are deserts for public transit. No wonder the USA, at 0.64 cars per capita, is the largest rate of ownership in the country. If compared with Pakistan, the country has 0.01 per capita (Dargay, Gately, & Sommer, 2007)

Though Europe is an exception for the fact that most of European cities were built before the explosion of cars on roads, which makes it denser and compliment the idea of mixed-use space making it more walkable. As a result, there are fewer vehicles on the road and fewer miles travelled by driver (Southworth, 20015).

This research will primarily inquire about the question: what is an individual mobility cost in the city of Islamabad? While the mobility literature is predominantly influence towards estimating the external cost of mobility, the presence of a general cost or internal cost is rarely included in the analysis. Internal cost portends both direct and indirect cost an individual pay for his/her mobility. This involves estimating travel time and subsequently value of time, which is estimated based on the data extracted from Google DistanceMatrix API and trip level data collected from local ride hailing companies i.e BYKEA. In addition, to estimating the distance related cost, which involve fuel cost, maintenance etc. In doing so this research will also look into how people move around in Islamabad. For example, what is the dominant mode of mobility in Islamabad e.g., car, motor etc. and what is mobility preference in different age groups. Further, the thesis looked into the relationship (effect) of mobility cost on saving. To do this moderation analysis technique was employed.

1.1 Research Objectives

1. To estimate average travel time in Islamabad.
2. To estimate mobility cost in Islamabad.
3. To evaluate the impact of mobility cost on saving behavior of individual.

1.2 Research Questions

1. What is the average travel time of an individual in Islamabad?
2. What does an individual end up paying for his/her mobility in the city of Islamabad?
3. How mobility cost impact individual saving behavior?

1.3 Organization of the study

The organization of this study includes 6 chapter. The chapter 1 is introduction which build the case of this study by introducing the topic and why it is important. The second chapter look on different traditional and contemporary literature about mobility, travel time and saving. Followed by chapter 3 which highlight different methods/techniques and data used for the analysis. Chapter 4 contains the result and discussion, whereas chapter 5 build up a qualitative aspect for the study. Lastly, the number chapter 6 is conclusion of the study with recommendation, limitation and future direction.

CHAPTER 2
LITERATURE REVIEW

2.1 Cities

The city is probably the oldest and one of the most enduring inventions of our civilization. Cities evolves every time. They respond to crisis and historically they emerge from crisis stronger than ever before. More than 82 per cent of people in the Northern America live in cities compared to 74 per cent in Europe. Moreover, 50 per cent of Asian population also lives in cities, similar to that of global average (Muggah & Khanna, 2018). Pakistan also shares the same number; the country has three out of the ten largest cities in the world. Further, around 60 per cent of global economic output is generated in cities, to be specific, in 600 cities. The number was just 400 a decade ago (Cities and Urbanization: Urban Economics, 2021). Thus, most often, it's really hard not to talk about cities.

A city has three main verticals and if it is not catered or say planned properly can become a nightmare for both dwellers of the city and authorities in-charge. This includes water management, mobility and solid waste management. However, contemporary with the out-burst of vehicles on road and its influence on the dynamic of urban planning has brought mobility to a limelight.

So, what is mobility, why it is so important and what are the different factors associated with it. Simply put "Mobility is the ability to reach a destination in a time and cost that are satisfactory". The cost can be of different types i.e., internal or external. Internal cost is the one that are borne by the individual himself i.e., fuel cost, maintenance, toll related cost etc. while external cost is the one that is not borne by the individual himself rather by the other people i.e., congestion cost, pollution.

2.2 Mobility

The mobility literature can be traced back to the era of industrial revolution, with major development in transportation sector. However, the concept of mobility is archaic in itself for the fact that human race is consistently on the move, starting from the plateaus of Africa. Although it has evolved significantly over time and become more and more complex due to the changing dynamics of human settlements and advancement of technology in different means of transport. To which, it is glaringly important for the city manager and policy maker to trace people mobility in the city to make informed decisions.

2.3 Types of Mobility

For passenger and freight mobility (either through car or public transit) urban settings are one of the most diverse environments to take place. Most of the time passenger and freight flow compete for the use of accessible space and transportation resource but in some case there compatible with each other for instance railway service.

2.3.1 Individual Mobility

Individual mobility include movement through car, riding motorcycle, biking or even walk or swimming – any form of mobility in which movement is the result of a personal preference. Majority of people take a walk to get round and meet their basic mobility needs, given the kind of urban setting is in consideration. Person versatility may be preferred in some cases, although it may be hindered in others. Walking, for example, accounts for only 3 percent of all activities in Los Angeles, compared to whopping 88 percent in Tokyo's central district. It's because the density and architecture of LA is not as conducive to human pedestrian movement as Tokyo.

2.3.2 Collective Mobility (Public Transit)

Collective mobility includes service like public transit, buses and taxies, most of which are regulated and managed by government bodies with the aim to make certain areas of the city more available to the general public. It is called public transit for the fact that anyone can use them as long as they pay a fare. Its quality usually depends on the ability to move vast groups of people and achieve economies of scale.

2.3.3 Freight Mobility

In essence cities are market place and are dominant centers of consumption. Thus require a significant movement of freight on daily basis to fulfill different requirement of the city. Delivery trucks typically move around large docks, railyards, depots, and also to and from main businesses, manufacturing centres, factories, and retail companies. The advancement in package delivery to customers at door step has significantly boosted the e-commerce business. Freight mobility within cities is often underestimated, but it is an important aspect of a growing sector of city logistics.

2.4 Evolution of Urban Mobility

Running, cycling, or using public transit both have different degrees of suitability for satisfying mobility needs. Around the world, various transit technologies and infrastructures have been implemented, resulting in a complex set of mass transportation networks. In developed countries, there have been four general stages of economic development, each associated with a different form of urban migration, with a fifth currently underway.

2.4.1 The Age of Walking-Horsecar (the 1800s – 1890s)

After the industrial revolution, walking was the most common mode of transportation. Walking settlements were usually less than five kilometres in circumference, allowing for a 30-minute stroll from the centre to the outskirts. The land was used in a variety of ways, and the population density was high (e.g., 100 to 200 people per hectare). The city was compact, with a more or less concentric structure. Nonetheless, the industrial revolution resulted in an increase in population due to rural-to-urban migration, advanced building methods that allowed for higher densities, and new types and locations of jobs. The first public transportation, in the form of omnibus service, increased the circumference of the city but had little impact on the overall civic layout.

The railroad aided the first significant shift in urban morphology. New neighborhoods, also known as trackside suburbs, arose as small nodes geographically isolated from both the city and one another. The nodes corresponded to rail station locations and were located a significant distance from the city centre, normally up to a half-hour train ride. Train lines were also built within the city limits, and horse-drawn carriages were introduced as a form of public transportation.

2.4.2 The Age of Electric Streetcar – Transit (the 1890s – 1920s)

According to Hunt (2013), the invention of the electric traction motor revolutionized mass transportation. The first electric trolley line was built in the late 1800s, and it was soon followed by many towns. The electric trolley's running speed was three times that of horse-drawn cars, and it generated little pollution. The streetcar city was able to expand 20 to 30 kilometres along the streetcar tracks, forming an irregular star-shaped pattern. The outskirts of cities become hotbeds of residential growth. Trolley corridors evolved into shopping strips that came to define the city's major commercial districts. The city centre becomes even more of a mixed-use, high-density zone. Land use trends mirrored racial stratification, with the middle class concentrating in the outer suburbs and the working class still concentrated in the central city.

When the number of vehicles on the road grew in the first half of the twentieth century, the reliability of streetcar services diminished as cars infringed on their right of way. Furthermore, several cities had laws prohibiting fare hikes, meaning that many streetcar lines had become unprofitable, resulting in a shortage of upkeep and spending in new facilities. Many streetcar lines died as a result of these causes in the latter half of the twentieth century.

2.4.3 The Age of Automobiles (the 1930s – 1950s)

In the 1890s, the car was invented in European and North American cities, but only the elite could afford it. From the 1920s onwards, ownership rates soared, thanks to cheaper costs made possible by assembly-line manufacturing techniques. Land construction trends shifted as cars became more prevalent. Developers were drawn to green-field areas between commuter rail corridors, and the general public was drawn to these single-use zones, which avoided much of the city's annoyances, including congestion, crowding, and a shortage of parking. Nonetheless, since suburban developments did not yet account for a significant portion of the urban landscape and towns were already dense and transit-dependent, this period traditionally marked the peak share of public transportation in urban mobility.

2.4.4 The Age of Freeway (the 1950s – 2010s)

The widespread adoption of the car, as well as the creation of highway networks, had significant effects on urban mobility in the second half of the twentieth century. Highways were constructed to link the central business district to outlying areas, and full or partial ring roads were constructed in many instances. The automobile's personal versatility marked a paradigm change in terms of lifestyle, consuming habits, and suburban locations. The car significantly decreased the friction of distance, resulting in urban sprawl. With few facilities available to these new suburban areas, the development of the suburb provided a new environment in which public transportation did not suit well. Ridership on public transportation has declined, and bus providers have faced financial problems. Transit facilities in North America and Europe eventually became subsidized, publicly-owned companies. Any tramway services were being decommissioned, and the only remaining rail lines were those that were isolated from road traffic, including subway networks.

New light rail services have been implemented, but vast parking lots at suburban stations could increase ridership. Additionally, commercial operations continued to suburbanize, resulting in the development of additional passenger and freight mobility networks. The car quickly became the primary mode of transportation in all North American cities, as well as in an increasing number of industrialized and emerging economies, beginning in the 1970s. A massively parallel mechanism has been taking place in China since the 2000s. Automobile usage continues to expand in lockstep with rising incomes.

2.4.5 The Age of Integrated Mobility (the 2010s onward)

Urban mobility modes have remained largely isolated throughout their development, owing to the fact that they are owned and managed by independent bodies such as bus authorities, car operators, and trucking corporations that hardly communicate. This relationship is evolving as information and communication systems spread. A higher degree of convergence benefits emerging urban mobility schemes, resulting in greater resources usage. On-demand vehicle networks, for example, pool individual drivers and align their accessibility availability with customer demand through a network available via a mobile device. This convenience resulted in an increase in preference for for-hire services in many high-density markets.

Self-driving cars are another advancement that will increase mobility opportunities and improve the use of car infrastructure. This period is also marked by the rise of e-commerce and its accompanying home delivery, emphasizing the importance of city logistics and last-milfreight distribution. Information technologies have also allowed the pooling of capital in the more traditional sector of food delivery, swapping business-specific deliveries with fleets of on-demand vehicles.

2.5 Mobility in Context of Islamabad

Islamabad the capital city of Pakistan with population of well over 2 million according to the 2017 census is the 10 most populous city in the country. It is one of the few cities around globe which has been fully planned from the outset and which continues to maintain the original urban structure. Thus, the city has unique mobility needs. According to a government study around 47 per cent of the total workforce commute daily to different government offices (Pre-feasibility Study on Bus Rapid Transit Project

Islamabad, Pakistan, November 2012). Moreover, around 700,000 trips originate and ends with in the city in addition to the 500,000 the comes out – side of the city (EOI for Islamabad Bus Service Project, 2017).

To overlook this volume of mobility, the city has a dedicated transport authority, namely Islamabad Transport Authority (ITA).

2.5.1 Personal Vehicle

In general, the tendency of personal vehicle ownership has significantly gone north across the country. In 2015 only 6 per cent of the households in the country owned a car, while ratio jumped to 9% in 2020. Furthermore, more than half of the country, 53 per cent households reported to have own a motorcycle compared to just 41 percent in 2015 (PBS, 2020). Making it the world 5th largest motorcycle market (Haq, 2022).

Moreover, similar numbers prevail in the Capital. Personal vehicles are the primary mode of mobility in the city. As of 2019 there are around 9,79,398 vehicles registered in Islamabad. An official of excise and taxation Islamabad, while talking to the News states that the department faces 200 – 300 vehicle registeration case per day. Moreover, the motorcycle registration figure stands at 2, 78, 062 (APP, 2019).

2.5.2 Public Transport

Public transport is an important of a larger transportation system in any city, especially in that of developing countries where the income level is low and people largely rely on public transport for their regular mobility. Public transport accounts for about 35 per cent of the total traffic in Islamabad, with 75 per cent of the users coming from low-income households. However, due to the abysmal state of public transportation in the city 90 per cent public show dissatisfaction with the existing public transport services (EOI for Islamabad Bus Service Project, 2017).

2.5.2.1 Routes

According to Islamabad Transport Authority (ITA) the city of Islamabad has 44 proposed routes for public transport (Detail list and route area can be seen in "Appendix – A"). However, only 15 routes are functional currently while the rest of 29 routes has yet to see any bid for the route permit. Further, from consultation with official from ITA and "*Munshi*" in the stands, I was able to map 10 of the 15 functional routes (See Figure 1.1).

These routes include route no. 101, 136, 122, 122-A, 125, 126, 127, 127-A, 111 and 120. Route area of these routes are as followed:

Table 1.1 Public Transport Routes & Average Travel Time

S.no	Route Name	Route Area	Travel Time
1.	101	Mandi More-Faisal Mosque	90*
2.	136	PWD stop-Secretariat stop	90*
3.	110	Bharakahu-Mandi more	50*
4.	122	Khanna pul-to-Secretariat via Zero Point	45*
5.	122-A	Khanna pul-to-Secretariat via Chak Shehzad, Rawal Dam	40*
6.	125	Aabpara-Bari Imam	15*
7.	126	Aabpara-Chak Shehzad	20*
8.	127	Chattar park-F-8 Markaz	90*
9.	127-A	Bhara kahu-G-11 (New Khatchehri)	75*
10.	111	Rawat-F-8 Markaz	110*

*The integers are average travel time (mins) reported by the *Munshi*.

Lastly, on average 15-20 trips are made along each routes daily. However, route load cannot be estimated because the flow along these routes is very saturated, plus most of the trips is not end-to-end and only cover a certain portion of the route depending upon time of the day and load along the route.

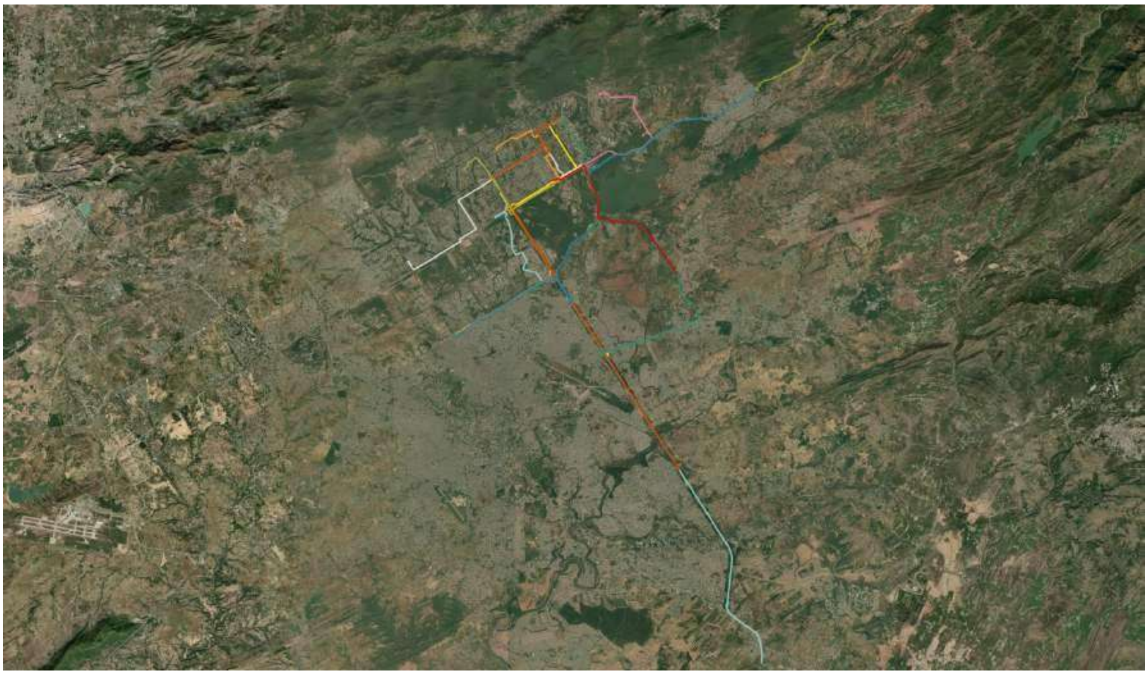

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Figure 2.1 Public Routes in Islamabad

2.5.2.2 Bus Rapid Transit Rawalpindi – Islamabad

Bus Rapid Transit (BRT) Rawalpindi – Islamabad was inaugurated in Jun, 2015 and the transit is facilitating mobility within and between the twin cities. Its length is 22.5 kilometers with a total of 24 stops, 14 in Islamabad and 10 is Rawalpindi as shown in Figure 1.2 The project incurred a cost of 4566 billion rupees with a extension under way from Peshawar More (Kashmir highway) to New Islamabad Airport.

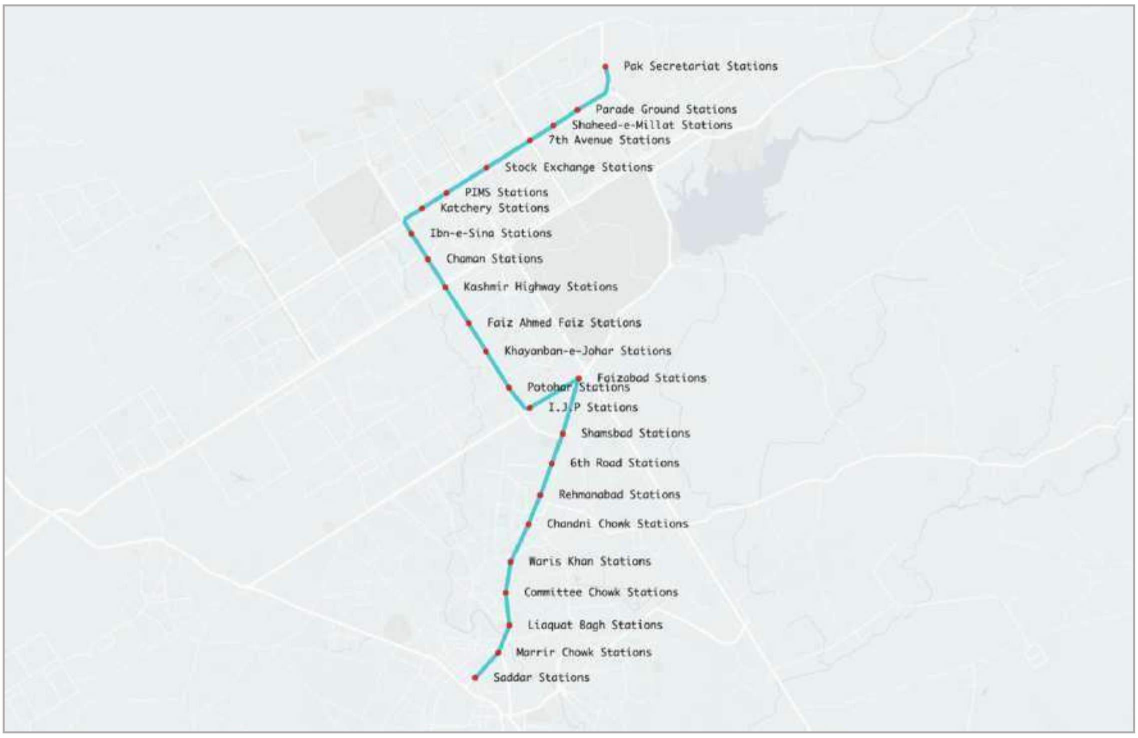

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Figure 2.1 Bus Rapid Transit Rawalpindi-Islamabad Route

Moreover, the transit has moved around 196 million passengers over the period of five year from 2015 to 2019. The transit authority has fleet of 68 buses in for Islamabad-Rawalpindi red line.

Monthly Ridership of BRT Rawalpindi – Islamabad (2019)

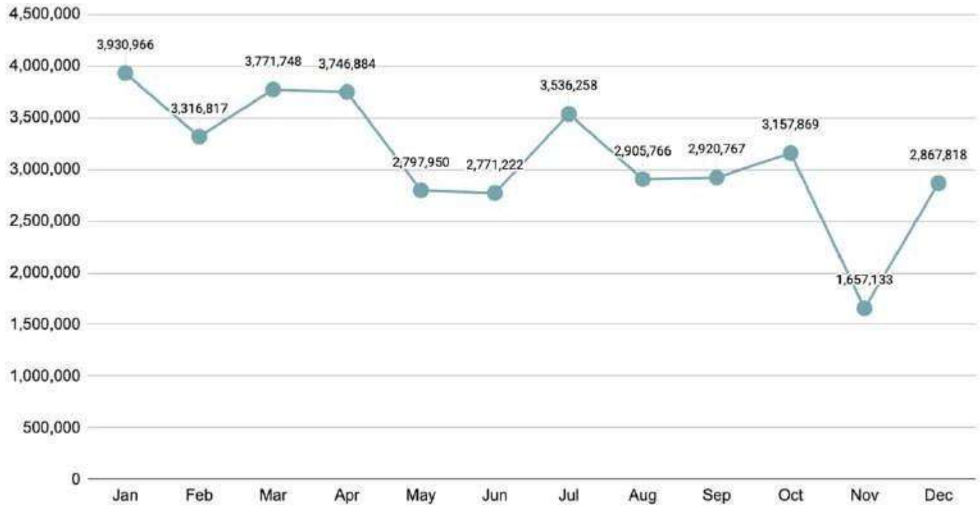


Figure 2.2 Monthly ridership of BRT Rawalpindi – Islamabad in 2019

(Source: Bus Rapid Transit Rawalpindi-Islamabad, Punjab Metro Bus Authority)

If we add up the numbers in Figure 1.3 the transit alone in 2019, has managed to move around 37.3 million people, in and between the twin cities. An average of 103837 trips[3] per day and 3,115,100 per month. A detail break-down of each month can be seen in the above graph.

Ridership Breakdown of Rawalpindi and Islamabad Per Day

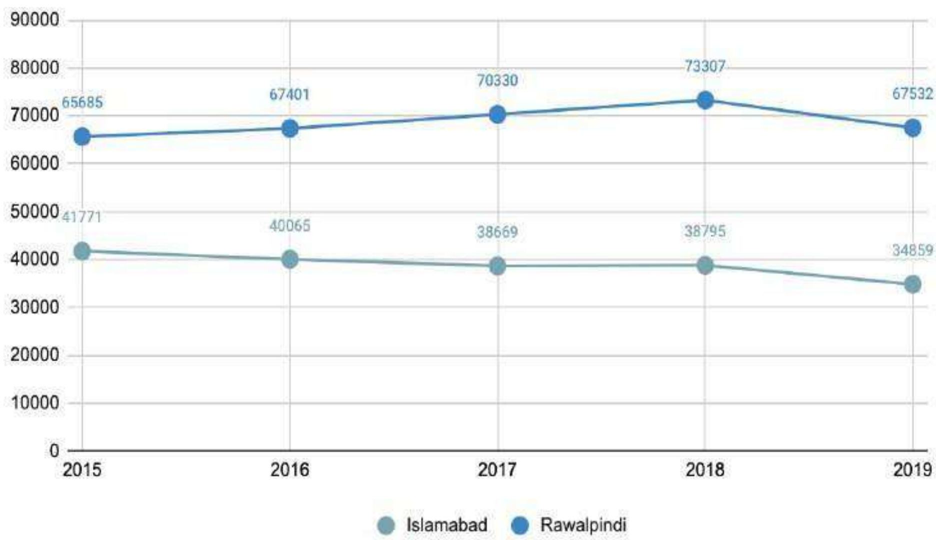


Figure 2.3 Breakdown of ridership for Rawalpindi – Islamabad Per Day

(Source: Bus Rapid Transit Rawalpindi-Islamabad, Punjab Metro Bus Authority)

3 Trips refers to an single ride taken by an individual via a one-time token or e-card swip

Next, analyzing the Islamabad ridership separately. It can be observed that Islamabad has comparatively less ridership as compared to Rawalpindi with daily average of 41771, 40065, 38669, 38795 and 34859 in year 2015, 2016, 2017, 2018 and 2019, respectively.

2.5.3 Ride-Hailing Services

Things has drastically changed compared to what it was or we used to saw a couple of decades ago. From healthcare to education, to businesses all major sectors or even say industries have transformed, changing the very concept of service delivery. Interestingly, what caused this paradigm shift is largely extrapolated to the ever-increasing integration of internet and digital technology in one's daily life. For example, more recently the online food delivery has disrupted the conventional in-dine hoteling. It is note that for every single dollar spent on online food delivery 50 cents is predated from in-dine hoteling. Whereas, the 50 cents are additionally generated in the economy. Similarly, mobility or more prominent now a days mobility-as-a service (Maas) is no exception in this regard.

2.5.3.1 Global Ride-hailing Industry: Fast Facts

In the last decade, the ride-hailing industry has literally exploded. Lyft in Northern America, Didi in China, Careem in the middle East and Uber predominantly around the world, and all being multibillion-dollar companies, have contributed to increase the popularity of ride-hailing/Sharing. Moreover, in addition to these aforementioned companies there are tens of other competitors that operate in different national and international markets i.e., BYKEA, Ola, GrabTaxi, etc. However, to get a sheer idea of how big the ride-hailing industry is? Let crunch some numbers:

- The global ride-sharing industry is worth approximately $61 billion dollars, up from $51.7 billion in 2017. The market is set to grow at a healthy rate and is projected to be around $220 billion by 2025.
- 540 million people used ride-hailing in 2021 worldwide, as compared to 207 million in 2007
- Uber and Lyft accounts for about 14% of Vehicle Miles Traveled (VMT) in US, which is 500 million VMT per month in 2016.
- Moreover, worldwide Lyft employs approximately in 1.4 million, and operates in 350 cities
- Similarly, Didi makes an average of 30 million rides per day.

2.5.3.1 Ride-Hailing Industry in Pakistan

Pakistan saw it first ride-hailing service in 2015, with a Middle East ride hailing company Careem kick starting its operations in the country. Till 2019 the app has generated a massive 236 million trips with 100 million just in 2019, at the same time facilitating around 90,000 captains with their livelihood. Moreover, a large portion of the captains working more than 40 hours per week making it a full-time job. During the same time period Careem has rolled-out $55 million to its captains that to after subtracting fuel related expenditure. In addition to this Careem also employ 300 full time employees.

Careem's operation spans over 15 different cities across the country, with Islamabad, Lahore and Karachi being the major ones with 17000, 18,000 and 15000 captains, respectively. Moreover, collectively the captain s have traveled a whopping 2.2 billion kilometers with 920 million just in 2019 (The Socio-Economic Impact of Careem, 2021).

Careem was quickly followed by other ride-hailing apps i.e., Uber, ShahiSawari and SWVL. In the process many local players also emerged, for example BYKEA. It is local developed start-up which focuses on bikes as the primary service. The app has over a million user and 10,000 to 12,000 riders with about 3,500 actives at any time of the day (Hamid, 2018).

Lastly, with the numbers reported by all these companies Islamabad seems to be the hotspot for ride-hailing services. Mainly due to the abysmal state of mobility services in the city. In talks with the executives from two major ride-hailing companies BYKEA and Careem revealed to have average 27,000 and 1,00,000 trips month, respectively.

2.6 Travel Time

(Zhu, Kong, & Lv, 2009) defines travel time as:

> *"The total necessary elapsed time for a vehicle to travel from one point to another over a specified route including stops and delay"* (Zhu, Kong, & Lv, 2009, p. 1)

The literature on travel time can be mainly categorized into two portions. One, is the work done on the estimation of travel time, while the portion focus on travel time prediction. However, this section will primarily look into the work on estimation of travel using different traditional as well as novel methodologies and underlying data source.

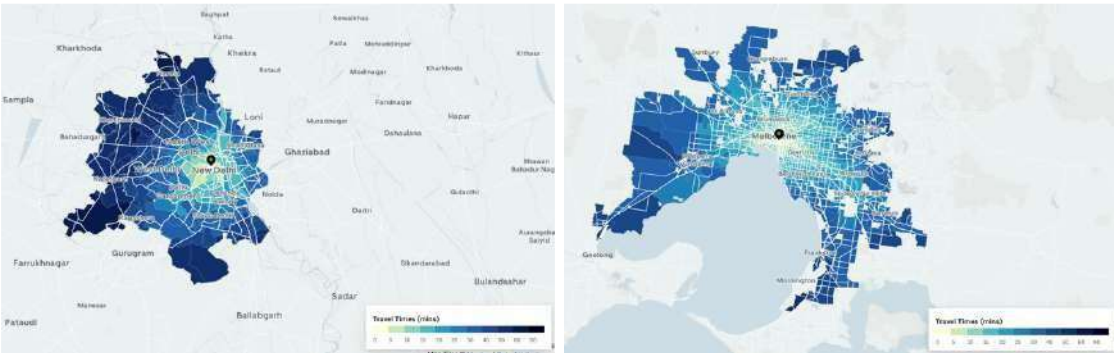
(Mori, Mendiburu, Álvarez, & Lozano, 2015) classify this traditional estimation models into three main themes based on the underlying tools used i.e., travel time estimation from point detectors, internal detector and fusion of different sources. Firstly, the estimation with point detector includes the use of single loop detector and double loop detector. The single loop detectors can be further classified into three classes i.e., theory-based, data-based and hybrid/mix method. The theory-based approach estimates travel time from the flow data by applying different variable in the *"traffic flow theory"* (Nam & Drew., 1996); (Oh, Jayakrishnan, & Recker, 2006); (Zhang, 2006) and (Celikoglu, 2007). Similarly, data-based approach as from its name suggest involves statistical interference and machine learning. (Palacharla & Nelson., 1999). Whereas mixed method combines both the former approaches. For example, (Dailey, 1997) presented a special hybrid method to estimate travel time where traffic flow theories were incorporated in data-based model in order get flow values i.e., occupancy, speed etc. Moreover, coming to the double-loop detector it can trace speed, flow and occupancy, however, only on a single point.

Secondly, travel time estimation with interval detector is somewhat more advance and dynamic then point detector. Moreover, it underly 2 main instrument, the probe vehicles and the AVI detector. The probe vehicle is tagged with GPS, simultaneously recording spend and location data with time stamp (Li & McDonald, 2002). On the other hand, AVI is similar to surveillance system which detect and trace an object, number plate in this case, and record information on it.

Lastly, the fusion method in contrast to the afore mentioned doesn't rely on one method to feed data into the model, which significant increase to reliability of the data (Choi, 1999). Moreover, this method works on two different algorithms. The first solicit data from multiple methods into one model, whereas, the second construct different model for each method.

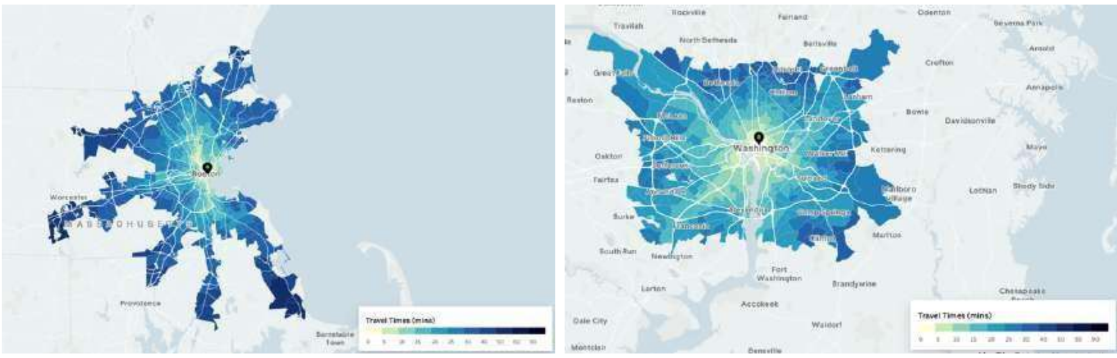
Furthermore, apart from these orthodox method/technique and tool, contemporarly extensive studies are undertaken with the help of advance techniques and methodology. For instance, the use of GPS data, plus traffic data. In addition, with growing interest, companies are now compiling data for such use e.g., in USA most taxi service store origin-destination and time spent in reaching from point O to point D. Similarly, ride-hailing companies generate some very rich datasets. For example, Uber Movement is one such initiative. It has estimates travel time in around 51 cities across based on the trips/ride made through Uber app, which include; Atlanta, Boston, Cincinnati, Dallas, Guadalajara, Los Angeles, Mexico City, Miami, New York City, Orlando, Pittsburgh, San Francisco, Seattle, Tampa Bay, Toronto, Washington D.C., Bogota, Buenos, Santiago, Sao Paulo, Amsterdam, Barcelona, Berlin, Bristol, Brussels, Kyiv, Leeds, Lisbon, London, Madrid, Manchester, Paris, Rome, Stockholm, Vienna, West Midlands, UK, Cairo, Cape Town, Johannesburg and Pretoria, Nairobi, Taipei, Bangalore, Hyderabad, Kolkata, Mumbai, New Delhi, Auckland, Brisbane, Melbourne, Perth and Sydney (Uber, 2018).

Visualization from New Delhi, Melbourne, Boston and Washington, D.C. can be seen below:



Source: *Uber Movement Data*

Figure 2.4 Uber Movement Travel Time Matrix for New Delhi and Melbourne



Source: *Uber Movement Data*

Figure 2.5 Uber Movement Travel Time Matrix for Boston and Washington

According to Uber, there travel time estimation is based on actual trips made by customers through the app. Uber Movement aggregate these trips between an origin-destination zones based on their GPS time stamps. Moreover, a similar kind of data source is made available by the Google through it Distance Matrix API, however, requires complicated queries to extract data from the database. The API allow you to customize origin-destination of the trip, mode of mobility and time across which you want to extract the data. It also allows to configure road alignment for the trip. (Dumbliauskas, Grigonis, & Barauskas, 2017) work was the first study to explore Google Distance Matrix API in a systematic to develop a skim matrix for the city of Kaunas[4]. Furthermore, the study also analyzed travel time fluctuation and identified peak hours of the city. Python and Geographic Information System (GIS) were the main tools utilized by the city. Similarly, (Weiss, et al., 2020) put the API to analyze the accessibility of healthcare facilities around the world. The finding revealed that 8.9 per cent of the global population cannot access healthcare facilities by car/motorized transport with in 1 hour. The number even goes higher in case of pedestrian, 43.3 per cent of global population cannot access nearby health facility in 1 hour.

Moreover, several studies have been carried out to cross compare these novel methodologies. For example, the work of (Wang & Xu, 2011) employed GIS as well as Distance Matrix API to estimate a travel time Matrix for Baton Rouge. The comparison found Google Distance Matrix API to more affect as compared to GIS. The Distance Matrix API gives more room for customization and is up to date, whereas, GIS has outdated road network, and misses on present road condition, which is critical for any travel time analysis. Moreover, GIS is expensive and required major technical expertise, the results also found travel time computed through GIS to be less as compared to the results of Distance Matrix API. Similarly, to check the validation and consistency between these methods (Wu, 2019) compared the Google Distance Matrix API with Uber Movement travel time data for Sydney, Australia. The study finding this also suggest that the travel time data for Distance Matrix API was systematically higher than Uber Movement. The average travel time ratio (DistanceMatrix API/Uber Movement was 1.262. Given both technique underly GPS technology, the author accounts this difference mainly to the nature of the data source i.e., Google Distance Matrix API is based on crowd sourcing, whereas Uber Movement generate raw data through the trips made by it app.

[4] Kaunas is the second-largest city in Lithuania after Vilnius and an important centre of Lithuanian economic, academic, and cultural life.

2.7 Mobility Cost

In this regard, several studies have been carried out towards estimating different types of mobility in cities and across cities. For example, (Caiati, et al., 2016) has attempted to estimate mobility for Bolongo city using open data. The study methodology mainly focuses on origin – destination matrix and traffic count. Moreover, similar attempts are made by (Vidović, Mandžuka, & Brčić, Estimation of urban mobility using public mobile network, 2017) & (Vidovic, Sostaric, Mandzuka, & Kos, 2020) but instead utilizes public mobile network. Furthermore, over the past thirteen years significant indexes has been developed to quantity different aspects of mobility in different cities. For example, the work of (Camagni, Gibelli, & Rigamonti, 2002); (Miranda & Correia, 2007); (Costa, 2008); (Frei, 2006); (Travisi, Camagani, & Nijkamp, 2010); (Moeinaddini, Asadi, & Shah, 2015) and (Patterson & et.al, 2014).

Going down the line, different mode of mobility was adapted to get around. For example, walking, horses, horsecars, electrics rails, car, buses etc. each linked with a set of social and economic costs. In most cases, it is partially assumed by the users in terms of fuel, maintenance related costs. However, there are several indirect costs mainly involving accidents and time related cost as well as cost related to infrastructure provision and maintenance etc. (Rodrigue J.-P. , 2020). Based on their attributes (Litman, 2003) has categorized this cost into internal, external and social costs, variable or fixed costs, market or non-market costs and direct or indirect costs.

However, work in the domain estimating mobility cost began with the novel study of (Keeler & Small, 1975) followed by (Hanson, 1992); (MacKenzie, Dower, & Chen, 1992) & (Kageson, 1993). The keeler, et al study was primarily focused towards estimating external cost i.e., marginal congestion costs, public services, noise, air pollution, facilities, accidents, parking, and user costs rises from different modes of transport, namely rail, buses and automobile in the San Francisco Bay area. Similarly, (MacKenzie, Dower, & Chen, 1992) & (Kageson, 1993) studies also tend's towards the external cost with slight difference in categorizing different attributes of external cost. For instance, incorporating oil import cost and land loss related costs. Moreover, (Kageson, 1993) find that out of car, electric train and airplane, cars have the highest per/mile mobility cost – external.5 Whereas, talking of (Hanson, 1992) work it is more of a roadmap and describes costing methods.

Similarly, throughout the end of twentieth century and early twenty first century a major portion of costing literature was influenced towards external cost except the work of (COWI, 2009). The study is conducted for Copenhagen, Denmark and adopts cost benefit analysis to estimate the mobility cost of cycle and car. The result found that the mobility cost of opting for car is almost six times higher (3.74 DKK) as compared to cycling (0.60 DKK).6

Though the literature is very much silent on a comprehensive study that incorporate both internal and external cost of mobility or even internal cost. However, an extensive literature can be found on estimation of different components of internal cost individually and doesn't complement each other. For instance, skimming through literature travel time or value of time is the most research component of internal cost. Moreover, Jakob, Craig & Fisher (2006) has further classified internal cost into direct and indirect, and fixed or variable cost. The initial empirical research work into the valuation of travel time started in 1960s, with pioneering studies being conducted in both the United State and Britain. For instance, the work of Warner, (1962); Lisco, (1967); Beesley, (1965) and Quarmby (1969).

2.8 Mobility Cost and Private Savings

A simple definition of saving in current period can be "*Current disposable income (I) minus current consumption*" (Rashmi, 2016). Broadly, saving is classified into 3 main levels based on its aggregation on each level i.e., private saving, public saving and national saving. A detail portrayal of this classification can be seen Figure 8.

Researchers/economists have extensively explored the interaction between saving at all 3 level with different socio-economic factors and is considered as one of the main components in economic growth (Harrod, 1939); (Domer, 1946); (Solow, 1956). However, in this section will be only focusing towards exploring the literature on private saving, and that to in the context of developing countries.

5 According to the study the total external cost of car was 0.060 dollars per mile, 0.015 for electric train and 0.037 for aircraft. The external cost incorporates Air Pollution, CO_2, Noise and Accidents.

6 DKK or Danish Krone is the official currency of Denmark, Greenland, and the Faroe Islands. It was introduced on 1st January 1875.

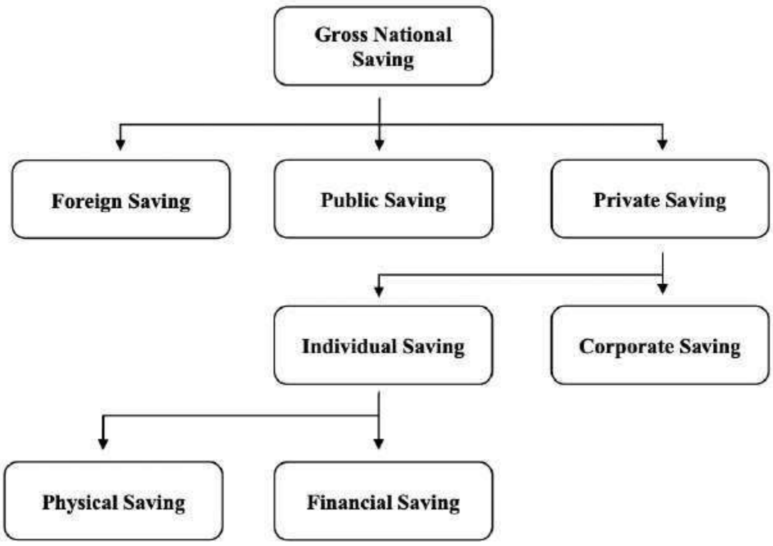


Figure 2.7 Classification of saving at different levels

Private saving is said to be a function of income, the conventional saving function. Early theories in this regard were "the general theory" (Keynes, 1936), "the permanent income hypothesis" (Fried, 1957) and "the life-cycle hypothesis" (Modigliani, 1986), explaining the income, consumption and saving behavior of individuals. These theories led to some rigorous empirical research on saving behavior. For example, the work of (Deaton, 1990) and (Carroll, 1997). The former analyzed saving behavior of individuals across different countries and pointed out a major dichotomy between developed and developing economies. He observed that people/individuals in developing economies save more as compared to people/individuals due to the lack of certainty about future income. These findings of Deaton were later taken as the theory of precautionary motives. Similarly, the later also investigate this saving behavior/pattern and proposed the "buffer stock model". According to him:

> "*Buffer-stock savers have a target wealth-to-permanent-income ratio such that, if wealth is below the target, the precautionary saving motive will dominate impatience, and the consumer will save, whereas if wealth is above the target, impatience will dominate prudence and the consumer will dis-save"* (Carroll, 1997, p. 2).

Moreover, followed-up work in this regard identified additional variables to be determinants of private saving. For example, (Ang, 2009) employed ARDL model to analyze saving behavior across China and India for a time period of 42 years from 1963-

2005 and 50 years from 195-2005, respectively. The author found age dependency to be negatively related with saving, whereas pension related benefit had positive impact on saving but only in India. Similarly, (Chamon, Liu, & Prasad, 2013) and (Liu & Hu, 2013) work also found that income uncertainty, pension reforms, high life expectancy has positive impact on the saving behavior of individuals in China. The former used the data from 1989-2009, whereas the later employed sub-administrative (Provincial) level data from 1990-2009.

In line with (Ang, 2009) findings, (Nawaz, Chaudhry, Shehzad, & Sheikh, 2021) found similar result for Pakistan using ARDL and Granger Causality technique. The study suggests a negative relationship between saving and young-age and old-age dependency. Talking of the Pakistan, the country has one the lowest saving rate in the region. With public saving mostly being negative due the continuous fiscal deficit, the national gross saving is primarily driven by private saving. Even with in private saving individual saving accounts for almost 85 per cent of the variation (Khalid, 2020). According to the Household Integrated Survey (HIES) 2018-19 individual saving rate was 9.2 percent compared to 13.5 percent reported in the 2011-12 HIES survey.

However, in-terms of the empirical research the literature is relatively scare in case of Pakistan. Primary reason being the un-availability of frequent data and using proxies/estimates from i.e., national accounts etc. Nevertheless, work on saving in the country can be trace back to the study of (Qureshi, 1981), where he estimated saving function for Pakistan. His study found a positive relation between saving and interest rate (average), government securities/bonds (long-term) and call money rate[7]. Qureshi's work was followed (Khan, Hasan, & Malik, 1992) & (1994). Their work primarily inclined toward national saving; in the first study they nulled the Harberger Laursen Metzier effect[8] in case of Pakistan. While, their second study was focused on the determinants of national saving. The results found that national saving is strongly, positively, related to GNP per capita, term of trade, openness of the economy and interest rate (real) while dependency ratio and debt to GNP are disproportionate to national saving.

In between (Kazmi, 1993) made a comparison of India and Pakistan. In his result he accounted the difference in saving rate to multiple socio-economics factors i.e., interest

[7] The call money rate is the benchmark interest that banks charge brokers who are borrowing the money to fund margin loans

[8] Harberger-laursen-Metzier effect is the conjecture that a terms of trade deterioration will cause a decrease in savings and deterioration of the current account

rate, tax, inflation, external aid, export and import, population, growth in real GNP and expenditure on education and defense. Moreover, (Siddique & Siddique, 1993) in different economic variable also analyzed the impact of different demographic variables on saving. For example, household age, human capital, income and family size and physical. The study concluded with saving disproportionally related with population growth.

Further, (Husnain A. , 1995) identified financial awareness as one of the main reasons in long-run private saving behavior and suggested that financial literacy/awareness and population can push the saving rate north. Similarly, same results are revealed in both rural and urban area, income being the main determinant of private saving (Ahmad & Asghar, 2008). Lastly, numerous studies were conducted in between and afterwards i.e., (Ahmed, Atiq, & Butt, 2006); (Sajid & Sarfraz, 2008); (Khan & Hye, 2010); (Chaudhry, Faridi, Abbas, & Bashir, 2010); (Munir, Maqbool, Sarwar, & Shaheen, 2011) and (Farhan & Akram, 2011)

Lastly, the literature on the relation of saving and income very scares. Some really literature that identify this relation includes the work of (Ali, S. M, 1985). The study primarily used HIES data on a major variable i.e., Food, Clothing, Footwear, Rent, Fuel/Lighting, Furniture, Personal, Medical Care, Education, Recreation, Transport, and other. The study found that transportation cost is income elastic with value (1.667). Similarly, the study also computed elasticity of saving, where its value is (-0. 48) indicating that mobility cost is negatively proportional to saving.

Currently, HIES 2018-19 reported that 6.89 per cent of the income is spent on transportation related expenditure in urban areas of Pakistan. This number can be even higher in case of Islamabad, as the city lacks a comprehensive transportation system plus the topology of the city further increase this cost. Thus, this tries to look into is the mobility cost has any (moderation) effect on the saving functions of individuals in Islamabad, because keeping everything constant if mobility cost increases/decreases it effect will translate into individual saving behavior.

CHAPTER 3
DATA AND METHODOLOGY

In this chapter, the discussion is mainly focused toward the research design, data sources and different empirical models employed to achieve the objectives mentioned in chapter 1 of this Study.

3.1 Travel Time (t_t)

In this section, I have laydown different analytic techniques and empirical models to estimate and carry out a spatial analysis of travel time and travel time fluctuation during peak hours for the data that was solicited from different sources (as discussed in section 3.1.2) for the city of Islamabad.

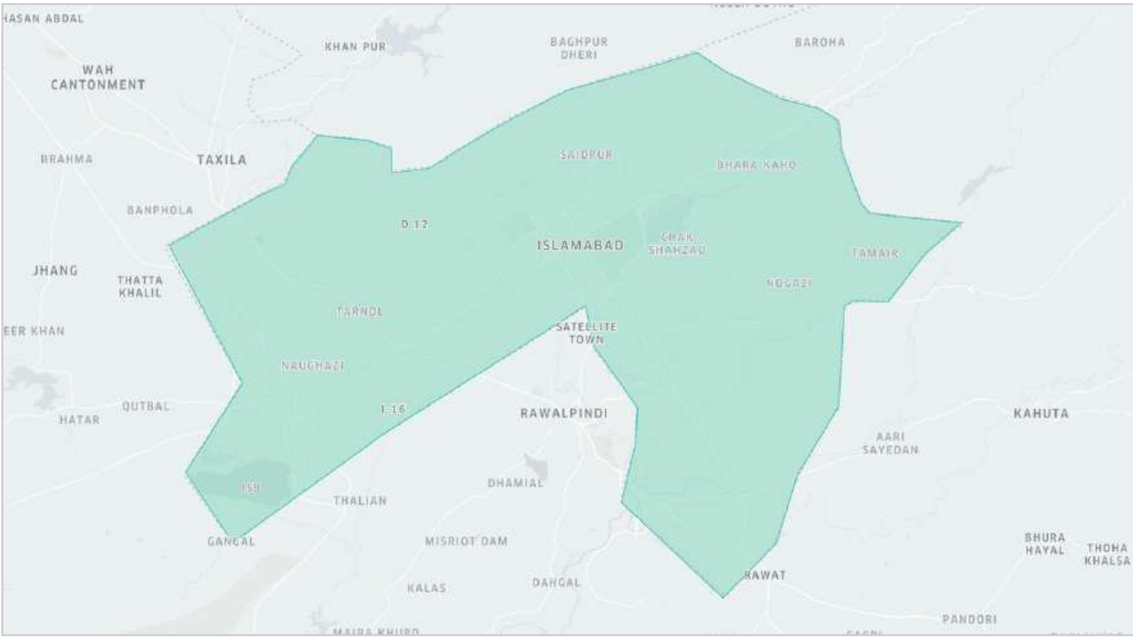


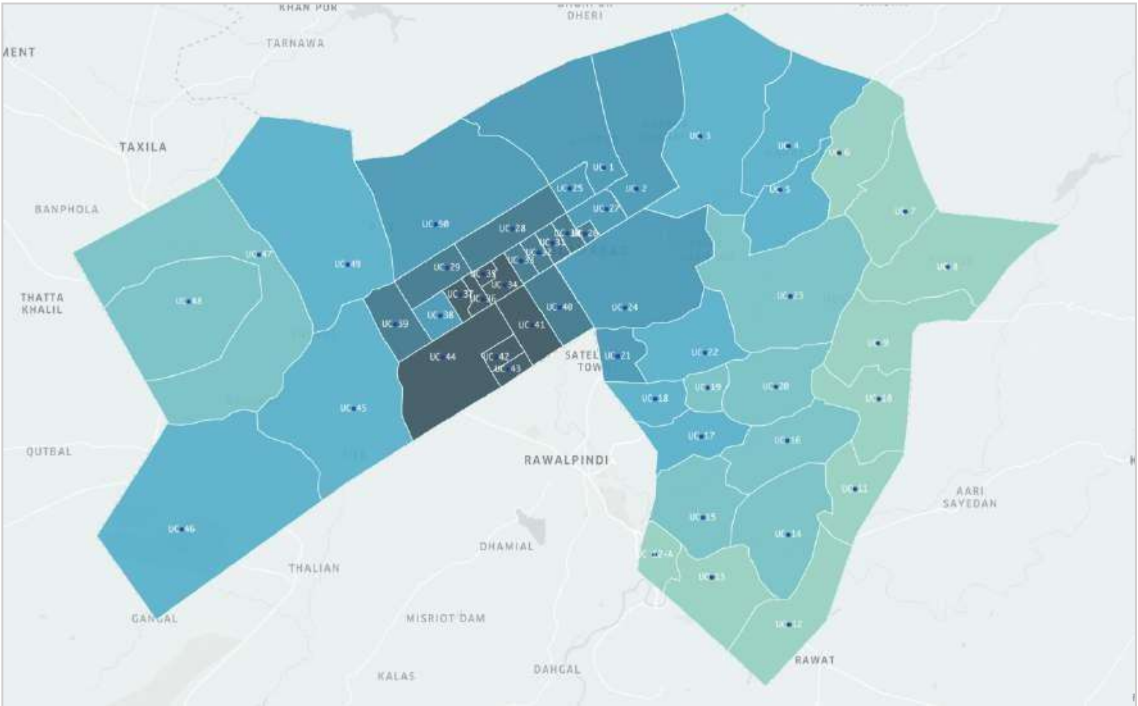
Figure 3.1 Administrative Boundary of Islamabad Capital Territory (ICT)

3.1.1 Analysis Technique

Inter-city (zone) or intra-city (zone) in either case travel time is a spatial as well as intertemporal phenomena. Cognizant of which, the study has developed a framework/technique to analyze it. In doing so, Islamabad Capital Territory (ICT) the study area for this study was divided into different sub zones according to Origins and destinations.

3.1.1.1 Origin-destination Zones

For the purpose of analysis, the study area was divided into 51 different zones based on Union Councils (UC), a sub administrative boundary with in a district (as shown in Figure 9.). Each UC serves as a zone. Moreover, to trace travel time and travel time fluctuations between each zone. The center point of each zone was identified and location address of each point was geocoded into coordinates, longitude and latitude using an open-source code in google sheets (coding can found in Appendix – B).



*Author Generated

Figure 3.2 Union Council Boundaries (ICT)

As a next step all possible pattern flows were identified between the zones, where each zone serves as an origin with the remaining 50 zones as possible destinations (Detail of each can be found in Appendix – C).

Figure 3.3 (a). Possible destinations from Zone 1 (L), Zone 2 (M) & Zone 3 (R)

Figure 3.3 (b). Possible destinations from Zone 4 (L), Zone 5 (M) & Zone 6 (R)

Figure 3.3 (c). Possible destinations from Zone 7 (L), Zone 8 (M) & Zone 9 (R)

Figure 3.3 (d). Possible destinations from Zone 10 (L), Zone 11 (M) & Zone 12 (R)

Figure 3.3 (e). Possible destinations from Zone 13 (L), Zone 14 (M) & Zone 15 (R)

Figure 3.3 (f). Possible destinations from Zone 16 (L), Zone 17 (M) & Zone 18 (R)

Figure 3.3 (g). Possible destinations from Zone 19 (L), Zone 20 (M) & Zone 21 (R)

Figure 3.3 (h). Possible destinations from Zone 22 (L), Zone 23 (M) & Zone 24 (R)

Figure 3.3 (i). Possible destinations from Zone 25 (L), Zone 26 (M) & Zone 27 (R)

Figure 3.3 (j). Possible destinations from Zone 28 (L), Zone 29 (M) & Zone 30 (R)

Figure 3.3 (k). Possible destinations from Zone 31 (L), Zone 32 (M) & Zone 33 (R)

Figure 3.3 (l). Possible destinations from Zone 34 (L), Zone 35 (M) & Zone 36 (R)

Figure 3.3 (m). Possible destinations from Zone 37 (L), Zone 38 (M) & Zone 39 (R)

Figure 3.3 (n). Possible destinations from Zone 40 (L), Zone 41 (M) & Zone 42 (R)

Figure 3.3 (o). Possible destinations from Zone 43 (L), Zone 44 (M) & Zone 45 (R)

Figure 3.3 (p). Possible destinations from Zone 46 (L), Zone 47 (M) & Zone 48 (R)

Figure 3.3 (q). Possible destinations from Zone 49 (L), Zone 50 (M) & Zone 51 (R)

Merging all these possible patterns between the zones give us a final framework along which travel time both historical and in traffic can be estimated (as shown in Figure 27.). More importantly the framework allows the study to carry any aggregated analysis of the travel time data

Figure 3.4 Final Framework for travel time analysis

Every illuminated point in the above figure represents centroid of the respective zone and each highlighted line show the possible flow between the zones

3.1.1.2 Empirical Approach

As implied in sub-section of section 3.1.1 zoning is important perquisite for estimating in-bound travel time in a city, otherwise a disaggregate analysis[9] portray a vague result, which can eventually mislead policy decisions. So, this study is estimating travel time between different O-D pairs/zones. Moreover, the study is also computing travel time for different mode of travel and based on different traffic conditions. In case of driving travel time both forward and backward trip is estimated. The computation formula for with and without traffic is as followed:

(Mode of travel is driving)

Without traffic

$$\text{tr\#\$\%\& ()*\% ((}_{\text{t}}\text{)} = \frac{\text{" \$}_{\text{ij}}}{n} + a + 0 \qquad \textbf{(3.1)}$$

Where,

X_{ij} = travel time between a origin zone (i) and destination zone (j)

α **= Mode of travel is driving**

β **= traffic flow Constant**

With traffic

$$\text{tr\#\$\%\& ()*\% ((}_{\text{t}}\text{)} = \frac{\text{" \$}_{\text{ij}}}{n} + a + 0 \qquad \textbf{(3.2)}$$

Where,

X_{ij} = travel time between an origin zone and destination zone

α = Mode of travel is driving

β = traffic flow Variable

(Mode of travel is Biking)

$$\text{tr\#\$\%\& ()*\% ((}_{\text{t}}\text{)} = \frac{\text{" \$}_{\text{ij}}}{n} + a + 0 \qquad \textbf{(3.3)}$$

Where,

X_{ij} = travel time between a origin zone and destination zone

Z_{ij} = O-D Zone pairs

α **= Mode of travel is biking**

β **= traffic flow Constant**

[9] Disaggregated analysis refers to an analysis which is not based on certain specific sets of origins and destinations, rather focus on singular asymmetric pair of origins and destination.

3.1.2 Data Sources

In case of travel time estimation and the estimation of travel time fluctuations during peak hours this study utilizes secondary data leveraged from multiple sources, including both government and private entities/sources. The data leveraged is longitudinal, and dis-aggregated in nature. More details about the data and data sources are as followed:

i. BYKEA was approached for trip-level data on its daily rides: data of about 5000 random trips was obtained, which depicts mobility patterns for a typical working day. The data obtained includes latitude (`lat`)/longitude (`lng`)of both pick-up and drop-off location of all the trips. Plus, travel time, distance and charged fare for each trip.

ii. Distance Matrix API, Google Map Platforms webservice was utilized to obtained historical and live data on distance, travel time and travel time (In-traffic) between the pairs of O-D pairs/zones, as identified in sub-section 3.2.1 of section 3.1.1. `URL` was the primary tool involved in accessing Google database

BYKEA and Google Distance Matrix API was used because the two are real time data sets, providing information on distance and time between a set of origin and destination. The time and distance are of actual routes and trips made between different origins and destinations.

3.1.2.1 Data Collection/Extraction Techniques

A very normative approach was put in place when collecting data from Ride hailing companies. Careem Pk and BYKEA head of company/CEOs were reached out as a first point of contact and were briefed about the study, its importance and possible policy implication. To which, subsequently, I was connected with relevant data analytics/business Intelligence team at each of these company. However, only BYKEA was able to provide the requested data.

In contrast to the first data sources, the second source (Distance Matrix API) involved extensive coding and query writing at multiple stages of extracting the data. Moreover, Google Map Platform being a paid service required this study to setup a billing account with Google Cloud Platform and obtain/generate an API key. An API key is combination of unique lower- and upper-case alphabets and number that allows the user to access Google historical and live databases. The API is also unique to each user.

Step by Step guide:

The step-by-step process of setting up Google Distance Matrix API is as followed:

```
Sign up Google Cloud Platform > Account Sign In > Setup
billing account > API Library > Activate Distance Matrix API
> Go to Credential > Generate unique Distance Matrix API key
> Set up API key protection > API key ready to use
```

After the aforementioned steps are completed, there are eight different instrument/tools through which the Distance Matrix API could be requested i.e., `URL`, `cURL`, `JavaScript`, `Python`, `Java`, `Ruby`, `Go` and `Postman`.

Where `outputFormat` may be either of the following values:

- `json`, indicates output in JavaScript Object Notation (JSON); or
- `xml`, indicates output a XML

The input of origin and destination can vary in different forms i.e., Coordinates (`lat`, `lng`), Plus Codes (Global Code, Compound Code) and Encoded Polyline. Multiple origin and destinations can be accommodated, given the query doesn't exceed 8192 characters.

This study utilizes the `URL` as an instrument for Distance Matrix API requests and `xml` as `outputFormat`. Moreover, origins and destinations as coordinates. Query for the request is as followed:

URL query for travel time without traffic:

URL

```
https://maps.googleapis.com/maps/api/distancematrix/json
    &destinations=lat1,lng1%7Clat2,lng2%7Clati,lngj
    &mode=driving
    &origins=lat1,lng1%7Clat2,lng2%7Clati,lngj
    &key=INPUT_YOUR_API_KEY_HERE
```

URL query for travel time with traffic:

URL

```
https://maps.googleapis.com/maps/api/distancematrix/json
  ?departure_time=now
  &destinations=lat1,lng1%7Clat2,lng2%7Clati,lngj
  &mode=driving
  &origins=lat1,lng1%7Clat2,lng2%7Clati,lngj
  &key=INPUT_YOUR_API_KEY_HERE
```

(All queries executed and `outputFormats` are included in the Appendix – D)

3.2 Mobility Cost and Saving Behavior

In this section, the discussion is mainly focused on the underlying empirical approach to estimate mobility cost of an individual in Islamabad Capital Territory and subsequently analysis it effect on that of individual saving function.

3.2.1 Variable Construction

Variables necessary for theis study were carefully selected from the literature review in line with the objectives of the study.

As demonstrated that, the estimation of mobility cost involves two groups of variables; internal cost and external cost. Literature is influenced towards estimating external cost. Whereas to estimate the total cost of mobility, it is necessary to look at both internal and external costs, simultaneously. Furthermore, we reviewed the literature to find that, internal cost and external cost incorporate several variables. Namely, fuel cost, accident-related cost, value of time, vehicle purchasing costs, registration costs, insurance cost, repair & maintenance cost, road user charges, air pollution, health damage, climate change cost. These variables can be further categorized it into direct or indirect costs and fixed or variable costs, as highlighted in many studies.

Moreover, estimating all these variables at once is behind the scope of this study. Therefore, as a first step this study will only take into accounts the major variable which significant accounts for the total cost. For example, of all mobility related external costs evaluated in the literature, external accident, air pollution and climate change are the three largest (Maddison, 1996), comprising 77% of the overall costs (Becker, 2002). One has however to keep in mind that the degree of confidence varies between the different variables like fuel cost can be calculated quite precisely, whereas climate related costs are less certain. Similarly, the variables should also share some synergy with local dynamic. For instance, parking and insurance costs significantly adds up to the mobility cost, whereas in case of Pakistan these variables are insignificant for the facts these concepts rarely exist in the country. Thus, all factors taken into account, this study has filter down the variables into two main indicators of mobility cost, rather than all, to provide a more comprehensive framework for estimation.

The first type of indicator used in this study is distance related one, namely distance related cost ($Dist_c$). In this category, we include two variables: fuel cost (F_c) and maintenance related cost. Fuel cost is understood as a default variable in this study—the variable embodies the amount of fuel consumed and the cost of fuel. It can be in any form petrol or diesel. Furthermore, the rationale behind the inclusion of Var (Maintenance) is in detail study of Zofío et al. (2014), which identify that the repair and maintenance cost has significant share 4.92% and 4.24% in the total mobility cost, respectively. Both the Var (F_c) Var (Maintenance) are category as variable cost and is inversely proportional to the model of vehicle.

The second type of indicators is time related ones. It is crucial to evaluate the time related cost when assessing mobility cost in a city, because it can significantly vary depending the design and infrastructure available in the city. For this reason, we selected two variables to estimate value of time: travel time (T_t), and hourly wage rate (W_r). Travel time (T_t) in its broadest sense consists of evaluating the time necessary to travel from any origin O to any destination D and estimating it important for management and appraisal of transport investment decisions.

3.2.2 Empirical Approach

Model 1

Firstly, an empirical model is developed to estimate and carry out an analysis of mobility cost;

$$\mathbf{1}_{\&} = \sum(3)4(_{c} + \mathbf{t}_{\&}) \qquad (5.7)$$

As we already know, Mc stands for mobility cost. Whereas $Dist_c$ stands for the distance related cost and $Time_c$ for time related cost.

$$3)4(_{c} = \sum(8_{c} + 1\#)9(\%9\#9{:}\%) \qquad (5.;)$$

Now the $Dist_c$ mainly consist of F_c, as obvious fuel cost and maintenance. Although maintenance costs have relatively a share in the total cost. According to Zofío et al. (2014) the cost shares of tires and maintenance costs are 4.92% and 4.24% of the total mobility cost, respectively.

$$t)*\%_c = \sum(t_t * \ =_{()} \qquad (5.>)$$

Tt stands for travel time, whereas W_r stands for Wage rate.

Model 2

Secondly, in order to check the effect of mobility cost (M_c) on Saving Behavior, moderation analysis is carried out. For which, an interaction variable between mobility cost and Income is generated and added to the model. Thus, Model (1) is developed as follow:

$$S_{(} = a + 0_{)}(M_c) + 0_{+}(M_c.A) \qquad (5.B)$$

Where, I is income, M_c is the mobility cost, and S_r is the saving rate. $M_c.I$ is the interaction variable generated by multiplication of mobility cost by income. The framework for Model (2) is depicted in Figure 1.

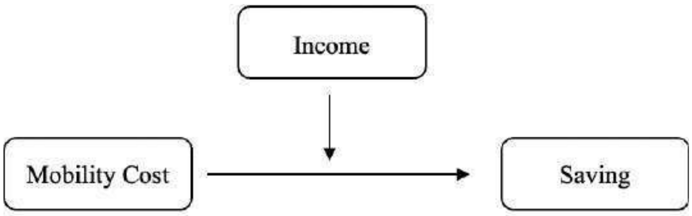


Figure 3.5 Framework of Model 2

3.2.3 Data Collection/Extraction Techniques

Qualitative or quantitative in either kind of research, data is required to carry out analysis and respond to the research question or say to achieve the research objectives. Similarly, as obvious from the above discussion this research will be based on primary data which will require the researcher to go into the field and collect the required data first hand through questionnaire-based survey, face to face interviews will be conducted with the individuals. Moreover, it is not possible to carry out analyses for a complete survey of the population. Therefore, determination of a specific study areas and accurate sample is something to think about.

3.2.1 Study Area

The study area for this research is the Islamabad Capital Territory (ICT). A city hosting population of about 2,001,579 individuals with diverse demographics (Census, 2017). Breaking down into the age structure;

Table 3.1 Distribution of population in different age groups

Age Group	% Age of total Population
0 - 14 years	36.01
15 - 24 years	19.3%
25 - 54 years	34.7%
55 - 64 years	5.55%

Majority of the population is young, with a median age of 22 years, and 21.9 years and 22.1 years, that of male and female respectively.

3.2.2 Sample Size

"What is an appropriate sample size for any study?" is perhaps the most often asked question in sampling. The answer is straightforward, but impacted by a number of factors i.e., population size, research design, and sampling error. In addition to desired level of precision, confidence level and an estimated proportion of the attribute in the population.

Now one can either use a sample size of similar study, which is an easy option given a similar study are present in literature. The other way around is to use an estimation technique/formula, such as the case in this study. As mentioned in the above section the population under consideration is large. So, Cochran's sample size formula will be employed, as it yields accurate results especially for large population.

The Cochran formula is;

$$n_o = \frac{Z^2pq}{e^2}$$

Where,

- e is the desired level of precision,
- p is the estimated proportion of population which has the attribute in question,
- q is $1 - p$.

Given that this study is only considering individuals in the two main strata of the population 15 – 24 and 25 – 54, which accounts for around 54% of the population. So, p = 0.54. Now let say we want 95% confidence, and at least 5 percent—plus or minus—precision. A 95 % confidence level gives us Z values of 1.96, as per the normal tables, so it yields us a sample size of "382"

3.2.3 Sampling Technique

Any research carried out represents a specific set of population. In other words, the research finding is generalized to the whole population based on the sample data collected from that population. Basically, it is a statistical technique used to draw down the scope of the research as it is nearly impossible for a researcher or even an institution to collect responses from the whole population. As it requires a huge number of resources and time, which in most of the cases are scarce.

There are a number of sampling techniques available and one can use it accordingly. Given the nature of this research, as mobility is not an issue of a particular segment of society rather every one requires mobility on a daily basis, it was a real challenge for the study to come up with a sample that could be representative for the whole population. In doing so, as a first step the I utilized the BYKEA's trip level data for extracting activity hotspot in the city (As shown in figure 01 below).

Figure 3.6 Mapping of trip origin & destination

The above figure is a visualization of around five thousand individual trips. Now, if one is familiar with the city design or say commercial and residential zoning of Islamabad it is easy to observe even from a general glimpse that activity is either centric around the markaz of each sector or other commercial markets like Blue Area.

As a second step, the above visualization was layered on the UC map (figure1) to find out the number of trips originated and destined in each zone using Arc GIS. Moreover, the total sample calculated earlier using Cochran formula was divided on all zones according to the activity in each respective zone, as shown below (detail list can be found in appendix A). The sample was collected through simple random sampling.

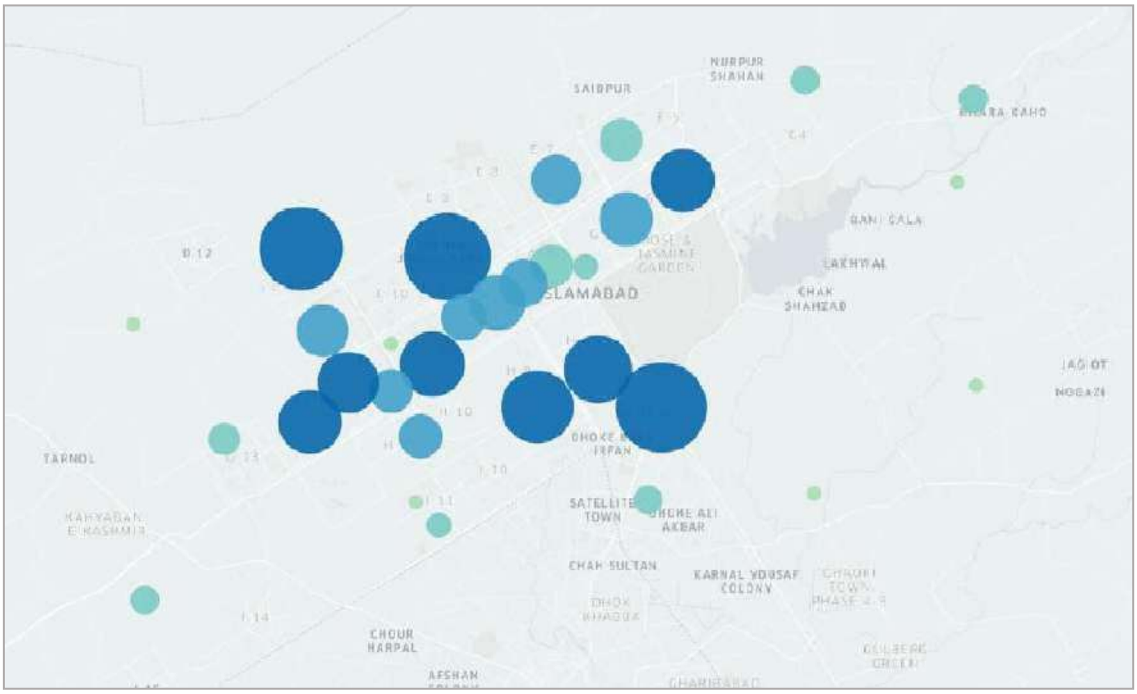


Figure 3.7 Distribution of sample size

The dark blue color shows the areas with highest sample size share, followed by the lighter blue with relatively less sample share and green being the lowest.

3.3 Qualitative Analysis

In this section, discussion is mainly focused on qualitative assessment of the research problem/gap and the underlying objective of this study by interacting with relevant stakeholders and experts both from the academia and industry. Moreover, different policy documents and regulation were also put to a review. This helped the me in broadening my policy horizon by understanding the real situation on the ground, policy dynamic of the problem and view of different stakeholder.

The policies and regulations reviewed for this exercise include the following documents:

1. Islamabad Master Plan
2. ICT Zoning Regulations (1992)
3. Revised Modalities & Procedures (2020)
4. The Islamabad Laws[10]
5. Islamabad Residential Sector Zoning (Building Control) Regulations-2005
6. Planning parameters for construction of Medium Rise Residential Apartments in Zone -II, Zone-IV and Zone-V

Moreover, to carry out the interactions the I developed an interview guide based on the objectives of the study and the underlying problem. Interviews arrangements were kept as semi structured in nature, so as to better reflect on the situation and at the same time not get secluded from the main objective/discussion of the interview. The guide can be found in the appendix E. Moreover, the interviews weren't conducted on a specific time during the research, rather interviewee were reached out on different stages of the thesis.

List of the interviewee for this exercise include the following name:

1. **Nasir Javed**, Urban Planner
2. **Nadeem Khurshid**, Urban Planner
3. **Qazi Omar**, Director BRT Capital Development Authority
4. **Route Clerk**, Islamabad Transport Authority
5. **Fatima Ahmed**, Director Government Relation and Policy Careem
6. **Umair Khan**, Manager Government Relation and Policy Careem
7. **Muhammad Hadi**, EZ Bikes
8. **Taimoor**, Area Manager (North), BYKEA
9. **Assad Sulaiman**, General Manager SWVL
10. **Syed Muhammad Hasan**, Assistant Professor LUMS
11. **Momin Uppal**, Assistant Professor LUMS
12. **Zubair Khalid,** Assistant Professor LUMS

[10] (**The Islamabad Laws** contains various Rules, Regulations, By-Laws and important notifications mainly concerning the Capital Development Authority and the Islamabad Capital Territory Administration)

13. **Sana Riaz**, LUMS.

CHAPTER 4
RESULTS AND DISCUSSION

Pertaining to the objectives stated in chapter 1 the main goal of this study is to estimate in-bound travel time in Islamabad, plus gauge the average cost associated with different modes of mobility. Thus, in doing so the different dataset that were collected/extracted earlier from different sources will be put to use in a systematic and precise way. However, before proceeding to travel time and mobility cost, first, it is important to trace mobility pattern/flow in the city. In simpler words to actually understand how people are moving around in Islamabad and then redirect the discussion toward travel time and mobility cost.

4.1 Mobility Patterns

Around the Globe, cities are emerging as a viable research subject. Computation and the use of big data has become a critical component in this realization. Similarly, exploring mobility patterns based on huge volumes of multi-source data, in particular, is critical to understanding the creation of social-economic phenomena in our cities. However, the understanding is still relatively scares (Xia, Wang, Kong, & wang, 2018). Especially in that of cities in the developing countries i.e., Pakistan. Thus, this section will primarily focus towards understanding how people moves around in Islamabad and identify activity hotspots in the city, if any.

4.1.1 Activity Hotspots in Islamabad

With the increasing awareness of technology and the advent of more tech-based business enterprises in the local market i.e., ride hailing and online food delivery service. The data is becoming more and more pervasive in our everyday lives and more diverse in use. As a result, the opportunities to evaluate our mobility patterns via fresh lenses appear to be limitless.

Similarly, this study has leveraged data from a ride hailing company, namely BYKEA. Initially, using this trip level data I mapped it spatially using Kepler.gl. An open-source tool in Python. The visualization can be seen in Figure 4.1 It shows the mapping of 5000 trips made through BYKEA on a typical day. The visual underly about 10,000 unique coordinates, both of the origins and destinations. To construct the visual both the origin and destination of each trip is connected in displacement, and when regressed illuminate the high-density spots. Moreover, with the help of underlying base map it can be observed that high density areas are mostly “Markaz’s” or other commercial center like Blue Area and Faizabad.

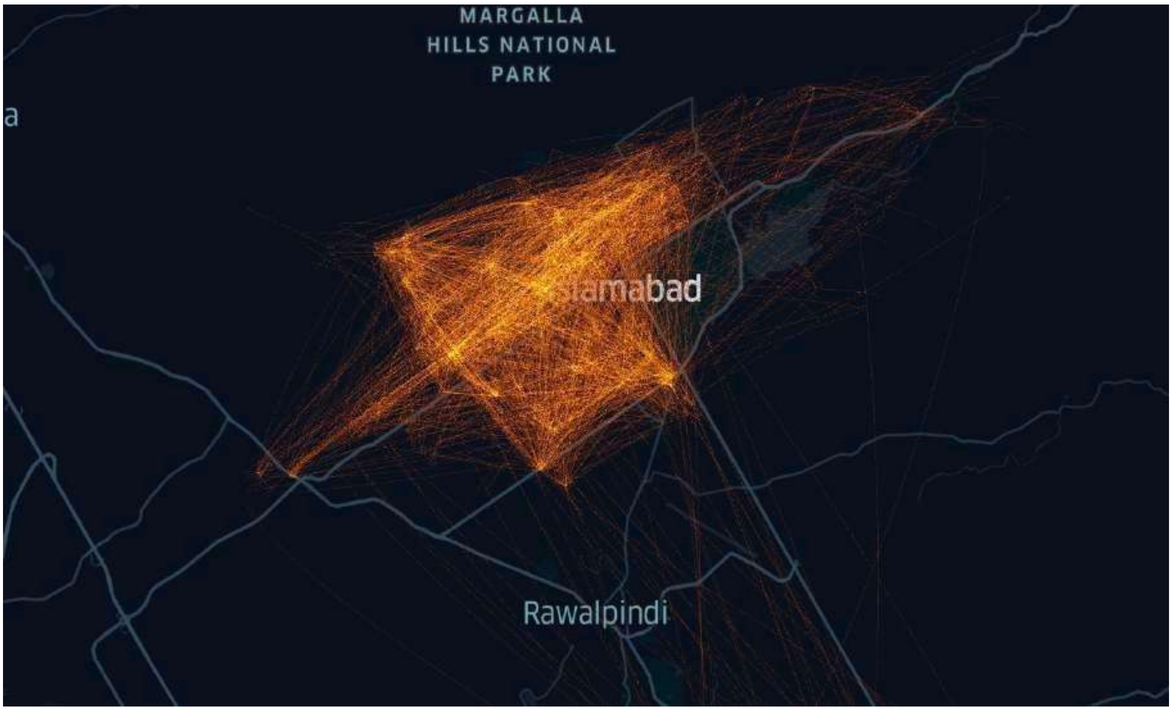


Figure 4.1 Mapping of BYKEA Individual Trips on typical work-day

Further, to have even a more discrete look at these high-density areas, I divided Islamabad into numbers of hexagon tiles, as shown in Figure 32. and Figure 33.

The reason for this segregation is that the use of tiles or a vector tile set is very handy, when visualizing big data on a map. Huge amount of raw geographical data can be condensed into vector tiles, which is important for complicated data visualisations. It also gives fine control over how you want to aggregate/ condense your data into these tiles (This can be observed in the difference between Figure 4.2 and Figure 4.3.

Moreover, the tiles calibrated for this study are 100-meter resolution geographic units with a zoom-level of 18 spatial resolution, and raw data (Coordinate’s, Lat/Lng) is aggregated by time span and location within each geographic unit to show total daily mobility activity with a scaling factor. As shown in Figure 3.2 the tiles with high elevation and a yellower shade represent areas with higher mobility activity, whereas the dark red shade and no elevation show low-level of activity

Similarly, visualization in Figure 3.3 has comparatively a small tile size but proportionately high scaling factor involved. As a result, we can see more clearly where the activity is high

Figure 4.2 Activity hotspots in Islamabad (1)

Figure 4.3 Activity hotspots in Islamabad (2)

and where it is comparatively low, as compared to Figure 4.2. Thus, it can be concluded that mobility/activity hotspots in Islamabad are dispersed across the city and lacks a single core.

4.1.2 Mobility flow between major Origins-Destinations

Further, inferring the users' journeys is a critical component of mobility modelling. When we talk about activity hotspots, we're referring to the journeys that lead from an origin location to a destination point and finish up at an activityin site. This flow between O-D, as an abstract representation of the object`s movement or interaction, has been used to reveal the urban mobility and human-land interaction pattern. Thus, as an important spatial analysis approach, this study also extended to OD flows to identify the dominant trends and spatial structures of urban mobility in Islamabad

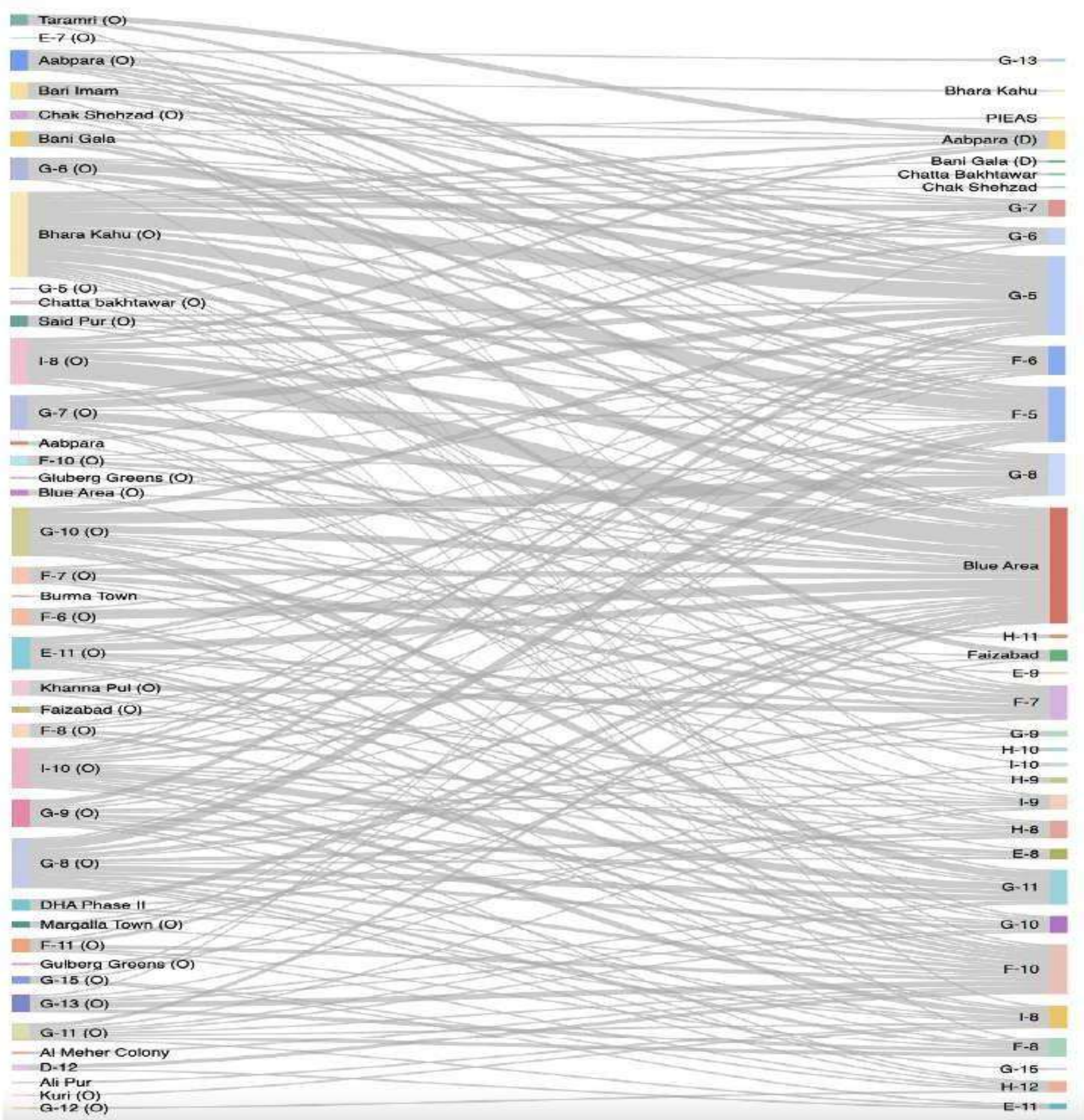


Figure 4.4 Major trip Origin-Destination

The Figure 4.4 shows all major cluster of origins on the left side whereas and all major destinations on the right side. For example, Bhara Kahu, I-8, G-7, G-8, G-10, I-10 and E-11 are among some of the major origins accounting for almost 50 per cent of trip generation. Similarly, Aabpara, G-5, F-5, G-8, Blue Area, F-10, F-7 and G-11 are some of the most popular destinations attracting almost 50 per cent of the load.

4.2 Travel Time

Estimating travel time has become an increasingly important practice in cities around the world due to it substance value in policy decision for city managers. However, exercising this practice is a complicated task. Primarily due to the underlying tools and datasets that are need to estimate travel time in a city. The most frequent tools used by different studies include sensors, cameras image processing and infrared to name few.

Table 4.1 Travel Time O-D Matrix

Zone ID	UC 1	UC 2	UC 3	UC 4	UC 5	-	UC 47	UC 48	UC 49	UC 50	UC 12-A
UC 1	-	7 mins	19 mins	21 mins	27 mins		47 mins	50 mins	39 mins	23 mins	48 mins
UC 2	8 mins	-	13 mins	16 mins	22 mins		46 mins	48 mins	38 mins	23 mins	40 mins
UC 3	24 mins	17 mins	-	10 mins	16 mins		1 hour 3 mins	56 mins	54 mins	38 mins	50 mins
UC 4	28 mins	20 mins	14 mins	-	15 mins		1 hour 5 mins	1 hour 0 mins	57 mins	41 mins	49 mins
UC 5	26 mins	18 mins	17 mins	11 mins	-		1 hour 3 mins	58 mins	55 mins	39 mins	47 mins
-											
UC 47	46 mins	47 mins	58 mins	1 hour 1 min	1 hour 4 mins		-	42 mins	23 mins	30 mins	1 hour 12 mins
UC 48	50 mins	47 mins	54 mins	57 mins	1 hour 1 min		42 mins	-	39 mins	42 mins	58 mins
UC 49	37 mins	38 mins	49 mins	52 mins	56 mins		23 mins	38 mins	-	22 mins	1 hour 5 mins
UC 50	21 mins	22 mins	33 mins	36 mins	39 mins		28 mins	45 mins	19 mins	-	51 mins
UC 12-A	45 mins	43 mins	47 mins	49 mins	52 mins		1 hour 17 mins	58 mins	1 hour 8 mins	52 mins	-

* Detailed list for all UC's can be seen in appendix E

However, this research focuses more on the use of big data and technology to estimate the commute time. It estimates average commute time along all the possible flows between the 51 zones as shown in Figure 3.4.

Table 4.1 shows the travel time O-D matrix (Skim Matrix) for Islamabad. As discussed earlier the matrix in practise is usually calculated by macro-modelling software. However, this approach make use of big-data collected from smartphones with GPS and therefore it reflects the reality with utmost confidence. The below figure shows a more detail view of the matrix

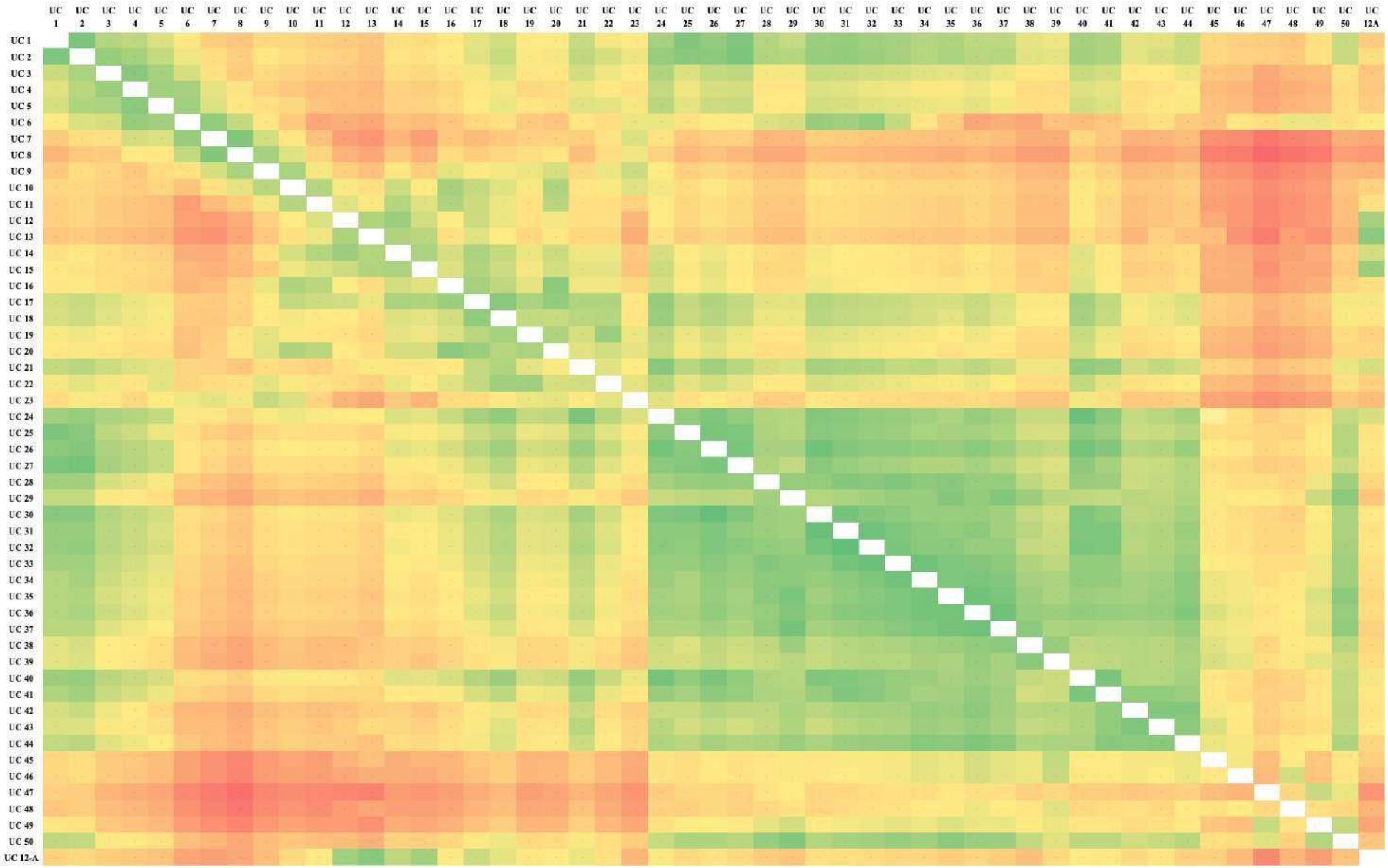


Figure 4.5 Heatmap of travel time matrix

Every value on the heat map Figure 4.5 is represented by a colour scheme, with green representing the lowest frequency and red representing the greatest. The matrix diagonal is empty since the study does not account for intra-zonal travel time, whereas other values range from 2 to 91 mins. When looking at the matrix, most of the zones with numbers more than 30 are presented in dark colours (Red), indicating lengthier journey times. This is correct, as the stated zones are suburban zones outside of the administrative territory of the city. While bright colour (Green) predominates in urban zones, journey times are shorter.

Table 2.2 Descriptive Statistics of Travel Time

	Mean	Min	Max	Std
Travel Time	35	2	91	13

Moreover, the matrix identifies mean travel in the city to be 35 mins, which is obtained by averaging the mean travel time along all the possible flow form all he 51 zones. However, the min travel time was reported to be 2 min while than maximum at 91 min.

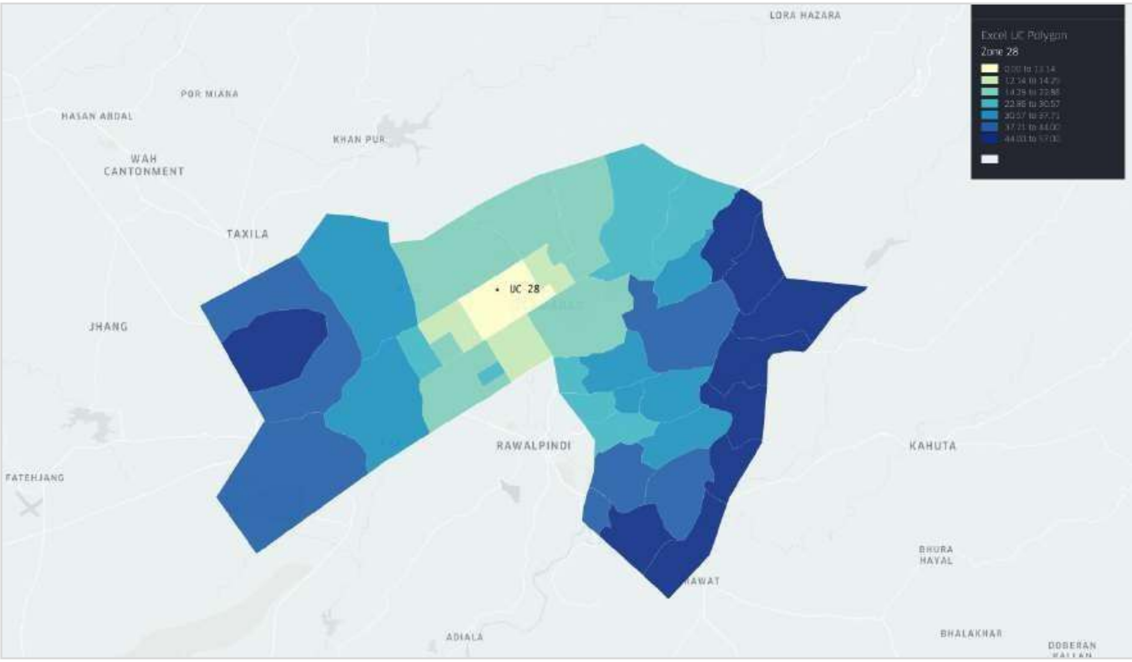


Figure 3.6 Spatial distribution of travel time

Similarly, visualizing the travel time on a map we took the centre UC as the focal point, as in this case UC 28 and mapped the data. This help us to analyze the travel time with reference from the centre of the city. In Figure 3.6 it can be observed that as we move off the urban area the travel time start to increase significantly. The maximum travel time in urban area reached up to 22 mins, whereas reaches to 57 min in the peripheries. Moreover it is also included that for 50 per cent of the population the city center is not accessible with 30 min using a motorized transport

Table 4.3 Travel time of bike

	UC. 1	UC 2	UC 24	UC 25	UC 26	UC 27	UC 28	UC 29	UC 30	UC 31	UC 32	UC 33	UC 34	UC 35	UC 36	UC 37	UC 38	UC 39	UC 40	UC 41	UC 42	UC 43	UC 44	UC 45	UC 49	UC 50
UC 1	~	5	12	6	9	6	15	18	12	10	12	14	15	14	15	15	20	23	12	14	22	23	20	25	20	15
UC 2	5	~	10	8	10	5	12	15	10	10	12	14	15	12	15	14	20	22	10	15	20	20	20	30	25	18
UC 24	12	10	~	12	8	12	18	15	9	10	12	13	15	15	13	16	18	18	4	11	18	18	10	25	28	18
UC 25	6	8	12	~	7	8	15	15	10	11	10	10	15	14	14	16	15	15	11	14	18	19	15	29	29	19
UC 26	9	10	8	7	~	7	13	13	5	9	11	11	12	13	11	12	15	17	6	9	15	15	10	25	25	15
UC 27	6	5	12	8	7	~	12	15	8	10	10	12	14	14	14	15	20	20	10	10	19	18	15	30	30	18
UC 28	15	12	18	15	13	12	~	10	10	9	8	5	9	9	10	10	15	20	10	12	18	18	15	25	24	13
UC 29	18	15	15	15	13	15	10	~	15	15	13	12	12	9	10	9	10	17	17	18	15	18	15	25	20	10
UC 30	12	10	9	10	5	8	10	15	~	6	9	11	10	10	13	14	18	10	8	11	18	18	14	28	27	15
UC 31	10	10	10	11	9	10	9	15	6	~	5	8	9	10	9	10	15	20	8	8	15	15	12	29	25	15
UC 32	12	12	12	10	11	10	8	13	9	5	~	7	8	8	10	10	19	19	7	8	18	15	10	25	25	14
UC 33	14	14	13	10	11	12	5	12	11	8	7	~	5	8	9	9	16	15	10	10	15	15	10	26	25	10
UC 34	15	15	15	15	12	14	9	12	10	9	8	5	~	6	7	6	10	15	10	10	14	12	9	25	25	10
UC 35	14	12	15	14	13	14	9	9	10	10	8	8	6	~	5	7	10	15	10	12	12	10	9	25	20	8
UC 36	15	15	13	14	11	14	10	10	13	9	10	9	7	5	~	5	10	12	10	10	12	9	5	18	20	10
UC 37	15	14	16	16	12	15	10	9	14	10	10	9	6	7	5	~	9	13	10	14	14	12	10	25	20	8
UC 38	20	20	18	15	15	20	15	10	18	15	19	16	10	10	10	9	~	9	15	15	13	14	10	20	25	15
UC 39	23	22	18	15	17	20	20	17	10	20	19	15	15	15	12	13	9	~	17	16	15	15	15	20	23	20
UC 40	12	10	4	11	6	10	10	17	8	8	7	10	10	10	10	10	15	17	~	7	19	19	16	36	38	22
UC 41	14	15	11	14	9	10	12	18	11	8	8	10	10	12	10	14	15	16	7	~	8	8	10	25	26	18
UC 42	22	20	18	18	15	19	18	15	18	15	18	15	14	12	12	14	13	15	19	8	~	5	5	22	25	15
UC 43	23	20	18	19	15	18	18	18	18	15	15	15	12	10	9	12	14	15	19	8	5	~	8	20	25	15
UC 44	20	20	10	15	10	15	15	15	14	12	10	10	9	9	5	10	10	15	16	10	5	8	~	20	25	12
UC 45	25	30	25	29	25	30	25	25	28	29	25	26	25	25	18	25	20	20	36	25	22	20	20	~	30	25
UC 49	20	25	28	29	25	30	24	20	27	25	25	25	25	20	20	20	25	23	38	26	25	25	25	30	~	18
UC 50	15	18	18	19	15	18	13	10	15	15	14	10	10	8	10	8	15	20	22	18	15	15	12	25	18	~

*Time is mins

The above table represent travel time matrix of bikes for Islamabad. The matrix is computed based on the trips level data leveraged from BYKEA. Moreover, due to the size and spatial distribution of data the matrix is only limited to urban area i.e., UC 1, UC 2, UC 24, UC 25, UC 26, UC 27, UC 28, UC 29, UC 30, UC 31, UC 32, UC 33, UC 34, UC 35, UC 36, UC 37, UC 38, UC 39, UC 40, UC 41, UC 42, UC 43, UC 44, UC 45, UC 49 and UC 50.

Table 4.4 Descriptive Statistics of Travel time (Bike)

	Mean	Min	Max	Std
Travel Time (Bike)	14	4	38	5

The matrix reports average travel time for bikes in the urban UC's to be 14 mins. The minimum time reported was 4 mins, whereas the maximum reported time was 38 min. the standard deviation was observe at 5.

Table 4.5 Travel Time O-D Matrix (Peak Hours)

Zone ID	UC 1	UC 2	UC 3	UC 4	UC 5	-	UC 47	UC 48	UC 49	UC 50	UC 12-A
UC 1	-	7 mins	19 mins	21 mins	27 mins		47 mins	53 mins	39 mins	23 mins	53 mins
UC 2	8 mins	-	14 mins	18 mins	24 mins		54 mins	59 mins	45 mins	27 mins	57 mins
UC 3	24 mins	17 mins	-	10 mins	16 mins		[illegible] mins	[illegible] mins	54 mins	38 mins	59 mins
UC 4	30 mins	23 mins	15 mins	-	16 mins		1 hour 10 mins	1 hour 11 mins	1 hour 0 mins	44 mins	1 hour 7 mins
UC 5	27 mins	20 mins	17 mins	12 mins	-		1 hour 5 mins	1 hour 6 mins	56 mins	40 mins	1 hour 5 mins
-											
UC 47	46 mins	47 mins	1 hour 0 mins	1 hour 6 mins	1 hour 7 mins		-	43 mins	23 mins	30 mins	1 hour 26 mins
UC 48	54 mins	51 mins	1 hour 1 min	1 hour 8 mins	1 hour 8 mins		42 mins	-	39 mins	47 mins	1 hour 9 mins
UC 49	37 mins	38 mins	49 mins	58 mins	57 mins		23 mins	39 mins	-	22 mins	1 hour 15 mins
UC 50	22 mins	22 mins	33 mins	41 mins	39 mins		28 mins	54 mins	18 mins	-	56 mins
UC 12-A	49 mins	48 mins	51 mins	59 mins	58 mins		1 hour 26 mins	1 hour 13 mins	1 hour 17 mins	1 hour 0 mins	-

Further more the average travel time it the city increase during peak hours. The travel time matrix during peak hours can be seen in Table 4.5

Table 4.6 Descriptive Statistics of Travel Time (Peak Hours)

	Mean	Min	Max	Std
Travel Time (Peak Hours)	37	11	71	16

The average travel time in the city during peak hours fluctuates to 37 mins compared to 35 during normal hours of the day. The minimum and maximum time also increased to 11 mins and 71 mins. The standard deviation was reported at 16. Moreover, comparing these figures with other major cities around the world.

The average travel time in New York is 35 mins, followed by New York, with an average trave time of 34 mins. Similarly, Hartford and Buffalo has an average travel time of 22.3 mins and 20.3 mins, respectively (Desjardins, 2018). Moreover, analyzing the travel time data with population density shows a positive relation among the two. This means higher the population density in a city can lead to higher travel time due to complication that comes with population i.e., congestion, higher car ownership etc. similarly, city with lower population tend to have lower travel time. A graphical representation can be seen

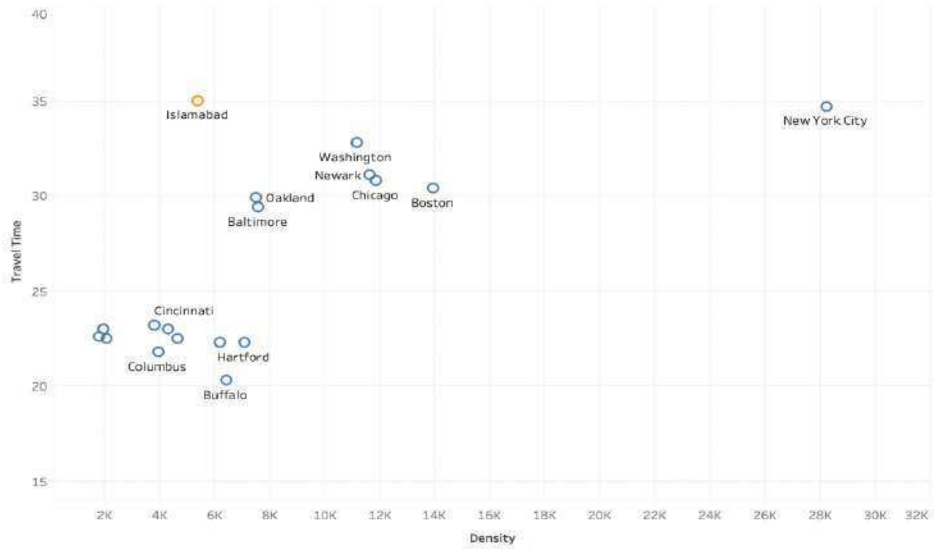
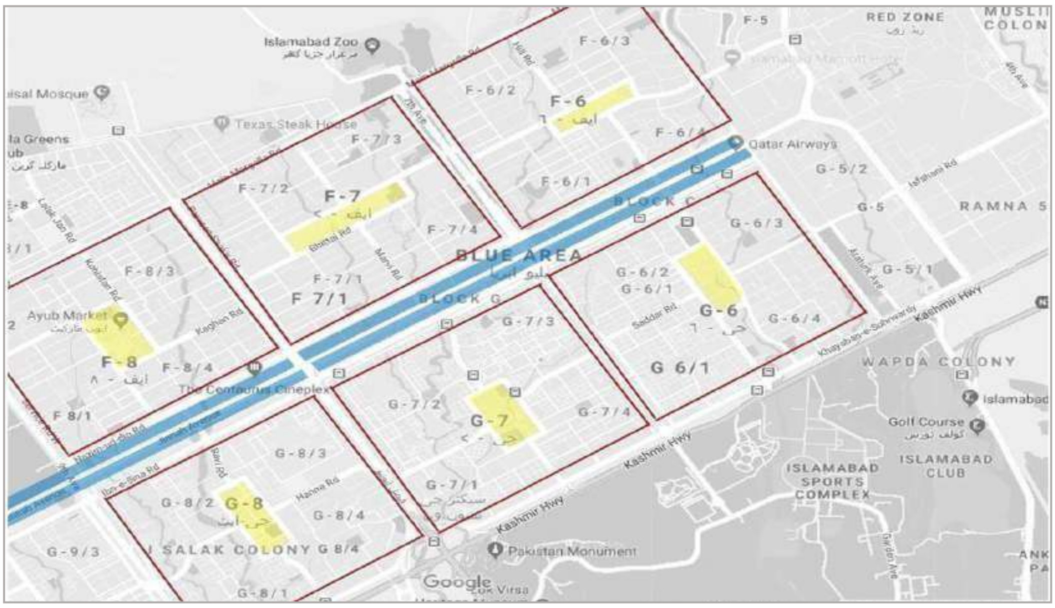


Figure 4.7 Comparison with other cities

in Figure 4.7 However, looking at Islamabad, the city average travel time is comparable with New York and long Island. While in terms of population the city lies in group with Hartford and Buffalo.

This seems a bit contradictory, however (Haque & Rizwan, 2020) identify land use as one of the main determinants of trip characteristics i.e travel time, distance. Islamabad follows a hierarchal grid design primarily based on different income groups. Doxiadis called these groups as “income ghettos”. This division in the master plan of Doxiados created a social divide across the sectors and different economic conditions prevailed in each sector.



(Source: Snapshot taken from Google maps)

Figure 4.8 Boundaries of major sectors, Blue Area and Markaz in each sector

Moreover, the establishment of commercial centres *"Markaz"* across each sector created a dichotomy between the community in Islamabad. Because of the *"Markaz"* location within each neighborhood, they become associated with a certain class of people. As a result, the city lacked an "inclusive city centre" such as *"Bazars"* typically in the centre of a city. Also, the proposed core of the city, more prominently the Blue Area, does not serve as a common city centre for individuals from all sectors; rather, it serves as a physical divide between the elite and the less fortunate sectors situated across it (Abbasi, 2019).

This dichotomy is now coupled with contemporary zonal regulations by the city's development authority, namely Capital Development Authority (CDA) confining residential, commercial or work-related activities to dedicated zones (Hasan & Anwar, 2020). These land-use pattern coupled with contemporary zoning regulation is one of the main reasons behind increasing trip length in Islamabad.

Further, in addition to this land-use pattern that adds up to the commute time in Islamabad. (Hadi, 2020) also puts the continuous sprawl of the city to blame. According to (Liu, din, & Jiang, 2021) the urban area of Islamabad has sprawled from 6.22 per cent of the total area in 1990 to 32.74 per cent in 2018, an increase of 426.21 per cent in 28 years. This huge change is mainly due to the large residential plotting schemes, built with no focus on space for work/offices, schools and education, that too, 20 – 40 km away from the city centre. As a result, increasing the travel distance for the commuter.

Table 4.7 Descriptive Statistics of Travel Distance

	Mean	Min	Max	Std
Length of the trip	20*	31	58.1	9.18

*The integers are calculated in kilometer (km)

Estimates of this study suggest the average travel distance of a trip in Islamabad to be 20 km. This means an average person has to travel 40 km for a round trip in Islamabad. Thus, increasing their average commute time and subsequently the mobility cost associated with it. Journey distance is the most obvious factor affecting the commute time; thus, a lot of employers compensate their employee for long distance commute in many European cities.

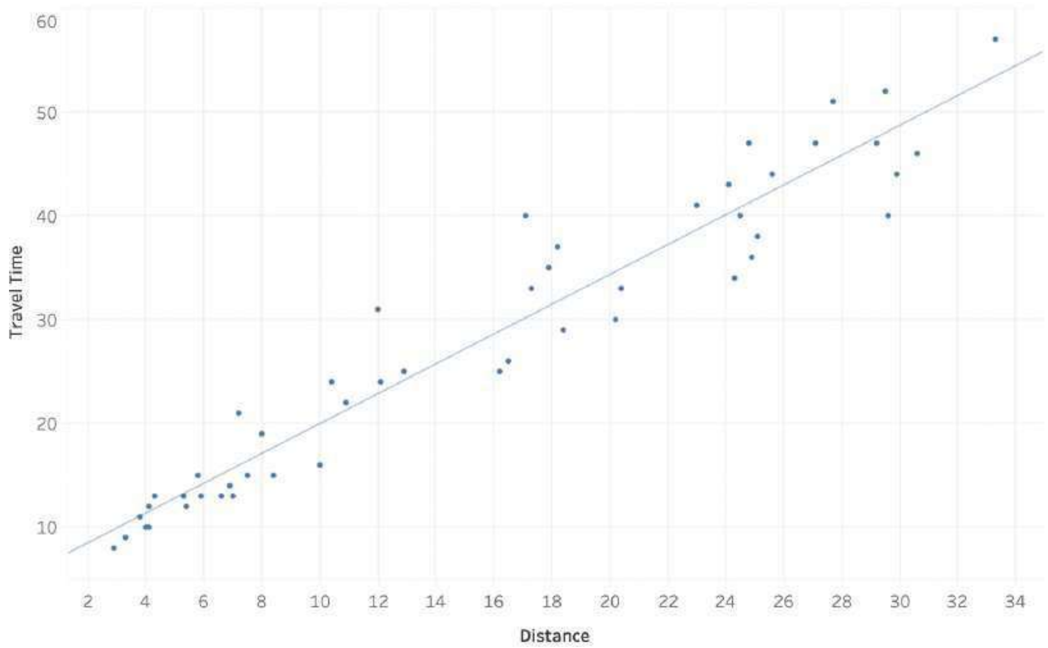


Figure 4.9 Travel time and distance

The estimated travel time correlates well with the distance from the city center (with a R^2= 0.92). Moreover, the regression model of travel time against corresponding distances by Google has a slightly steeper slope (1.43). Meaning, and a 1 km increase or decrease in an individual journey will affect his travel time by 1.43 mins.

4.3 Mobility Cost

3.3.1 Summary Statistics

The analysis leverages trip-level dataset provided by BYKEA, a motorcycle-based ride hailing service in Pakistan. The dataset has information on 5000 unique trips i.e., coordinates of the trip origin and destination, along with travel time, km travelled and fare charged for the trip. In addition, the dataset also proved to be useful in developing the survey design. It helped in identifying activity hotspots in the city on the bases of which the survey was carried out. The time period for the survey was 25 days, from Nov 5th to Nov 30th, 2021.

Now, before delving into the study's primary findings it is important to evaluate some preliminary summary statistics of the sample. As a first step, different types of information on the respondents are broken down into various categories in order to understand the sample's demographic characteristics and as well as set the stage for the main analysis.

Count of Gender

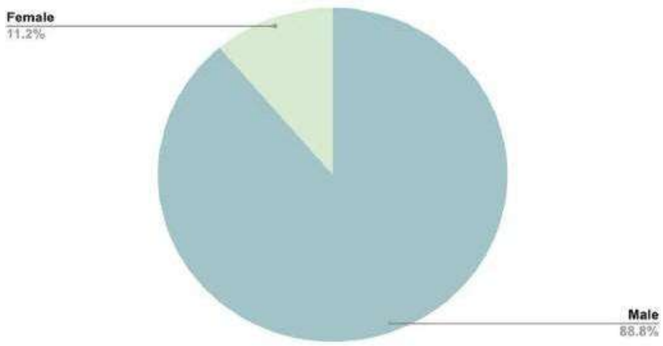


Figure 4.10 Gender ratio among the sample

The sample reports 11.2 per cent of the respondents to be female compared to 88.8 per cent of male respondents, as shown in Figure 4.10 An observable difference can be seen between the number of male and female respondents. This aperture has 2 major reasons. First, it is primarily for the fact that most of the females approached during the survey drive were reluctant to participate, even those willing to participate would be hesitant share information. Secondly, as evident during the course of this study and also repeatedly mentioned in different reports women mobility is major issue in our society.

Major Age Groups

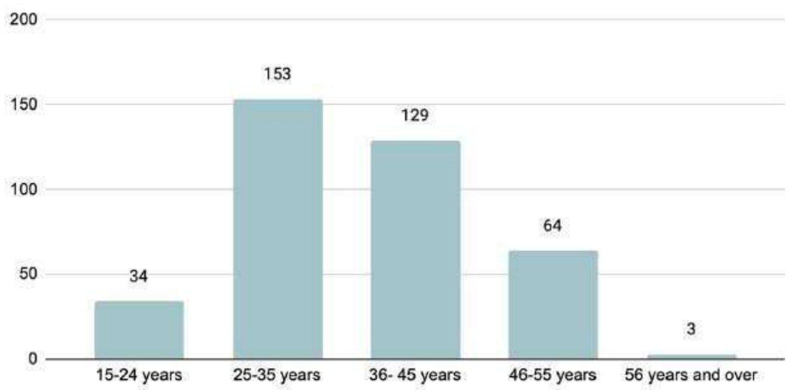


Figure 4.11 Count of age between different age groups

Next, the count of age is considered. Figure 4.11 shows the respondent count of age in different age groups. The highest share of respondents 39.9 per cent are between the age of 25-35 years, followed by 37.7 per cent in the age group between 36-45 years. Similarly, the age groups 46-55 years, 15-24 years, and 56 years and over has a share of 16.7 per cent, 8.9 per cent and 0.8 per cent, respectively. Thus, a major number of respondents 282 out of 382 are between the age of 25 to 45.

Occupational Trend

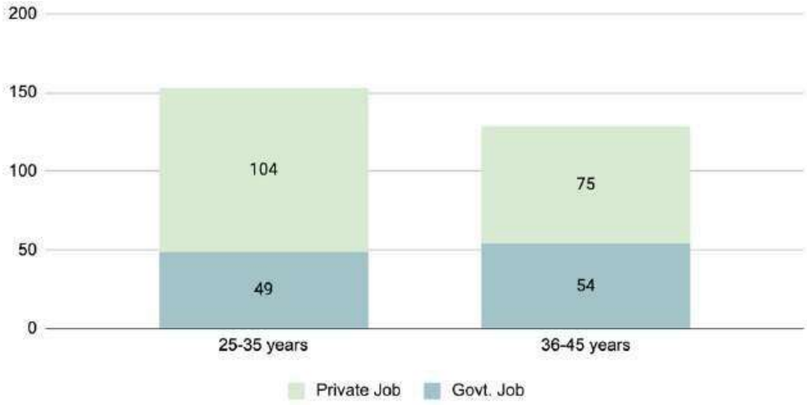


Figure 4.12 Count of age between different age groups

Analyzing occupational trend in major age groups reveal a tendency towards government job in the higher age group, whereas the respondent with age less than 35 years are more prone to private jobs. For example, 68 per cent of the respondent in the age group between 25-35 years are involved in private jobs, compared to 58 per cent aged between 36-45 years. Figure 4.12 shows a detail break down.

Residential Status

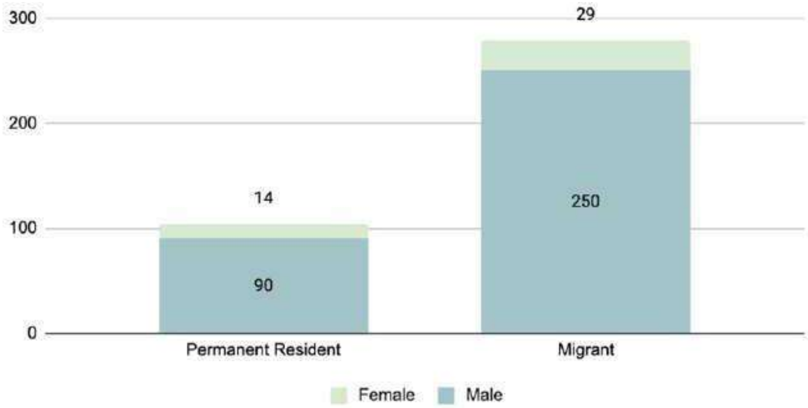


Figure 4.13 Count of residential status

Moreover, Islamabad being the capital and a purposed built city to run the country affair has a predominantly largely population of migrants from around the country. Similar numbers were also reflected in the sample for this study. These integers can be tally with the Figure 4.13. Where we can observe that only 114 of the total respondents, 27.2 per cent classify themselves as permanent residents of Islamabad compared to 279, 72.2 per cent as migrants.

House Ownership Status

Figure 4.14 Count of house ownership status

Similarly, looking at the house ownership data 45.7 percent lives in their own house, whereas 54.3 percent pays rent. As shown in Figure 4.14

Table 4.8 Relationship between Residential Status and House ownership status.

	Residential Status			House Ownership Status	
	Male	Female	Overall	Own house	Rented
Permanent Resident	73.5 %	67.4 %	27.2 %	80.8 %	19.2%
Migrant	26.5 %	26.5 %	72.8 %	32.6%	67.4%

However, if we analyze the housing ownership status for that of the permanent residents and migrants. The numbers start to make sense. As shown in Table 4.8 it can be observed that the tendency of owning a house is much higher among the permanent resident's 80.8 per cent as compared to 32.6 per cent among the respondents how has migrated to Islamabad.

Migrant vs Permanent Resident: Primary mode of Mobility

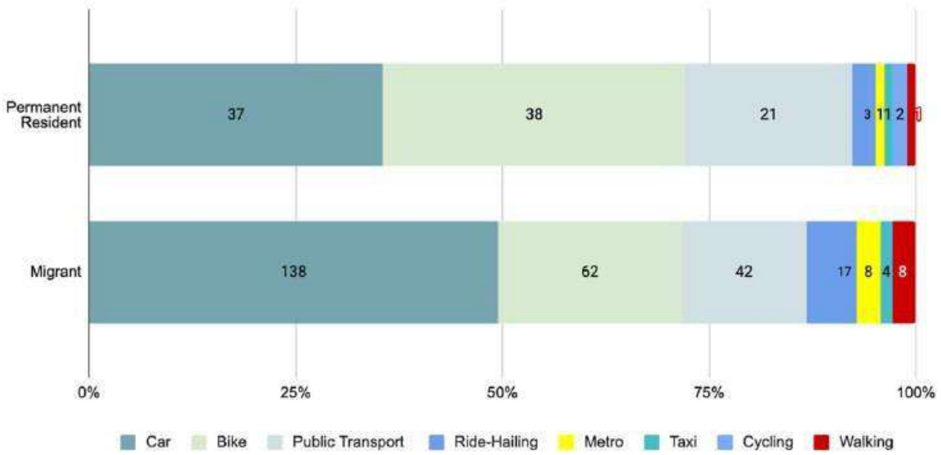


Figure 4.15 Count of house ownership status

Further, looking at Figure 4.15 shows the use of different mode of mobility among migrant and permanent resident. It can be observed that the ratio of car ownership is higher among the migrant as compared to permanent residents. Around 50 per cent of the respondent with status as migrant reported car as their primary mode of mobility, whereas the number was reported at less the 40 per cent among permanent resident. However, the use of motor bike and public transport was reported higher among permanent resident, around 56 per cent, 36.5 per cent bike and 20.1 per cent public transport as compared to just over 27 per cent, 22.2 per cent bike and 15 per cent public transport among the respondents with migrant status.

Main Modes of Mobility

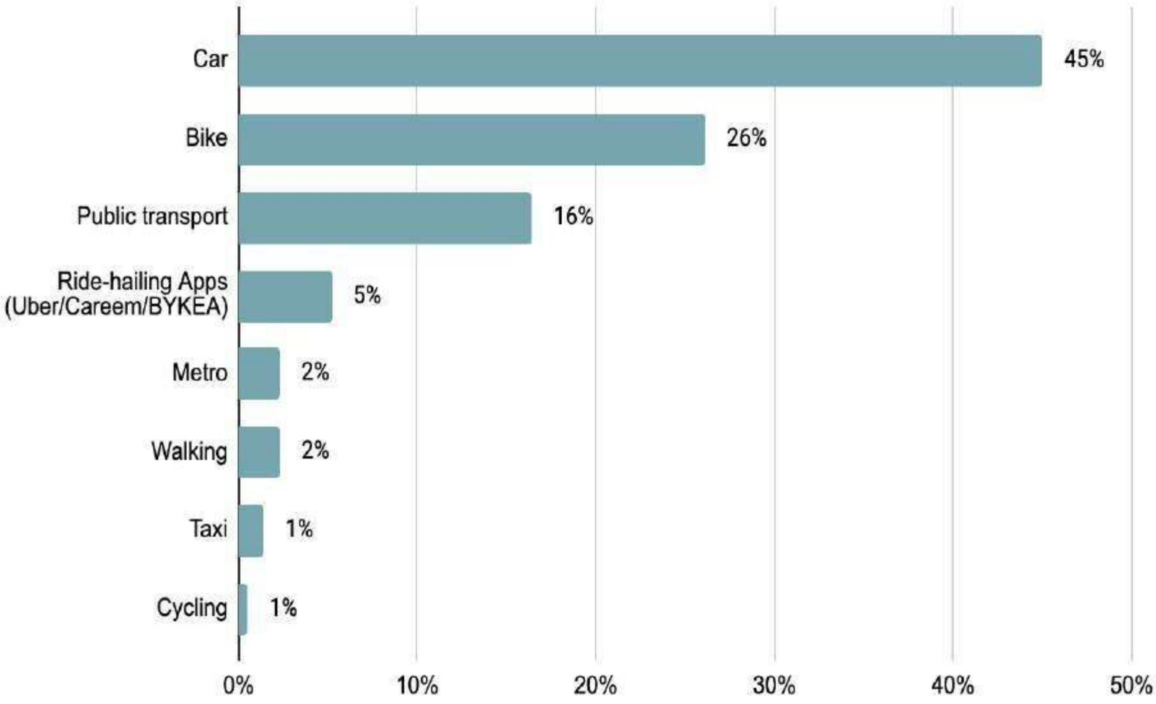


Figure 4.16 Count of the main mode of mobility

Lastly looking into different modes of transport it is evident that car is a predominant mode of mobility with 175 respondents, 45.1 per cent reporting that they use cars as their daily vehicle for commute. Second to it is bike, with a share of 21.7 per cent followed by public transport, ride-hailing services, walking, metro and taxi service each with a share of 18.9 per cent, 6.5 per cent, 3.3 per cent, 2.5 per cent and 1.3 per cent, respectively as shown in Figure 4.16

Mode of Mobility across different Income Groups

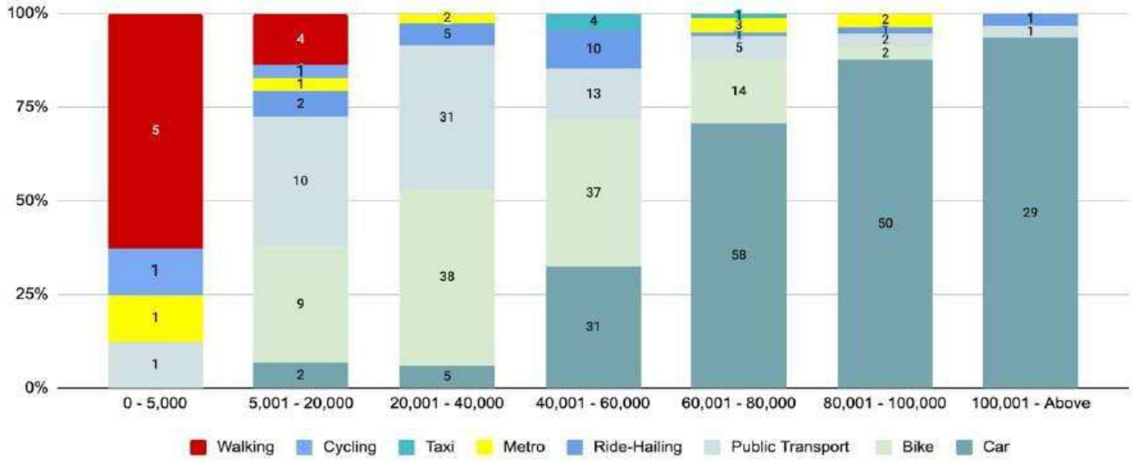


Figure 4.17 *Count of the main mode of mobility across different income groups*

Mode of mobility differs across different income levels, main reason being the direct and indirect cost associated with each mode. As illustrated in Figure 4.17 the trend in each income group can be observed. In general, the lower income groups tend to adopt the mode of mobility which is considered to be less expensive as compared to higher income groups.

The first income group "0 – 5000" has not reported a single respondent with car as their daily mode for commute. Further, respondents from income group "5,001 – 20,000", "20,001 – 40,000", and "40,001 – 60,000" reported bike and public transport as their primary mode of commute. Whereas, as in income group "60,001 – 80,000", "80,001 – 100,000" and "100,001 – Above" more than 65 per cent of the respondent note car as their primary mode of mobility.

3.3.2 Results

This section includes the result of the overall analysis, as well as an examination of the different cuts of the data. This includes mode of transport, different age and income groups with the primary goal to understand the dynamic of mobility cost and its variation across different modes of transport.

In doing so, there are four main variables, namely Income (I), Savings (S), Fuel Cost (Fc) and Maintenance Cost and the sample on these variables are aggregated at a monthly level. It contains 382 observations. Descriptive statistics can be observed in Table 4.9

and Table 4.10, including the monthly expenditure on fuel/fare and maintenance, in addition to the average monthly income and monthly average savings.

Table 43.9 Descriptive Statistics of Income and Saving.

	Mean	Median	Std. Dev.	Min	Max
Panel A: Income (Rs)	63,386	60,000	36,677	5000	3,50,000
Panel B: Saving (Rs)	6,302	5,000	8,098	0	50,000

Moreover, the samples average saving rate in Islamabad was found to be 8.8 per cent of individuals income.

Table 4.10 Descriptive Statistics of Fuel Cost/Fares and Maintenance Cost.

	Mean	Median	Std. Dev.	Min	Max
Panel A: Fuel cost (Rs)	5,881	5,000	3,123	0	20,000
Panel B: Maintenance cost (Rs)	2,521	2,000	1,792	0	15,000

Mobility Cost

The results of the mobility cost estimation are presented in Table 4.11 It contains the distance related cost and time related cost. Both the cost is estimated for regular major trip on a typical day, which this thesis assumes to be the work trip. The distance related cost includes two major costs/variables fuel cost and maintenance cost. These two-costs opted are based on an extensive literature review and evaluating local context (For more details refer to section 3.2.1 of chapter 3). Similarly, the time related cost is estimated based on the opportunity cost for the individual/respondent time spent while driving. It was assumed that all the individual/respondents working hours are 9:00 am to 5:00 pm and based on this, their hourly wage was calculated. The assumption of work trips and the 9:00 am to 5:00 pm timing is based on the fact that Islamabad was built as an administrative city, and after all these years still a large population is engaged in white-collar jobs, which shares the typical 9:00 am to 5:00 pm timing. Thus, if an individual/respondent takes 1 hours while commuting for home to work and back to home, his opportunity cost for this one-hour driving is his hourly wage.

Table 4.11 Mobility cost via different modes of mobility

	Distance Related Cost			Time Related cost	Overall
	Fares/Fuel Cost	**Maintenance Cost**	**Total**		
Car	12 %	3.9 %	15.9%	10.40 %	26.3 %
Bike	9.56 %	4.41 %	13.9%	7.7 %	21.4 %
Public Transport	11.61 %	-	11.61%	13.1 %	24.71 %
Ride-Hailing	16.64 %	-	16.64%	8.24 %	24.88 %
Metro	4.9 %	-	4.9 %	12.22 %	17.12 %
Taxi	12.07 %	-	12.07%	10.6 %	22.67 %
			12.50%	**10.03%**	**22.5 %**

Note. All values are estimated as percentage of income.

This study estimates an average 12.5 per cent of individual income is spent on mobility related expenditure in Islamabad. However, the figure varies with different mode of mobility. Individual using cars as their primary mode of mobility pays on average 15.9 per cent of their income in mobility related expenditure, followed by those using bike. Further, talking of collective mobility, the cost is 12.07 per cent, 11.61 per cent and 4.9 per cent among taxi, public transport and metro, respectively. And lastly, ride-hailing with the highest numbers 16.64 per cent.

Moreover, if the time related cost is also taken into account the figure inflates to 24.88 per cent in ride-hailing making it the most expensive mode of mobility to opt for. It is followed by public transport with 24.71 per cent, car with 26.3 per cent, taxi with 22.67 per cent, bike with 21.4 per cent and metro with 17.12 per cent. For detailed breakdown table can be referred.

The overall cost is estimated to be 22.5 per cent. Moreover, to get a comparison there exits studies on the estimation of mobility cost in different countries however they lack a common metrics along which it can be compared. Thus, to get an idea on the degree of the cost whether it is high, moderate or low we have taken some number from the Pakistan Bureau of Statistics (PBS), Household Integrated Economic Survey (HIES). The survey reflects on different household expenditure. In 2019-19 survey, it reports that a household in urban area spends about 30.64 per cent on food related expense, 28.62 per cent on housing, water, electricity and gas related expenses, followed by clothing and footwear, restaurant and hotels, and education with 6.85 per cent, 6.56 per cent and 5.50 per cent, respectively.

Now comparing it with mobility cost figures, if we even consider the distance related cost, 12.50 per cent, which is the out-of-pocket expense it becomes the 3rd highest household expenditure following food and housing related expenses. Moreover, if we also consider the time related cost, the mobility cost will still remain as the 3rd highest household expenditure. Thus, it can be concluded that expense on mobility (mobility cost) constitute about a major portion of individual household expenditures, following food related and housing expenditure.

4.4 Mobility Cost and Saving

To investigate the effect of mobility cost on saving a moderation analysis was performed. The dependent/outcome variable was saving (*S*). The independent/predictor variable for the analysis was mobility cost (M_c). The moderating variable evaluated for the analysis was income (*I*).

Table 4.12 Model Summary

R	**R-sq**	**MSE**	**F**	**df1**	**df2**	**p**	***N***
.5856	.3429	43.9566	64.3702	3.0000	370.0000	.0000	374

Saving	coeff	se	t	p
constant	-.7051	.9578	-.7362	.4621
MobilityCost (M_c)	-.0382	.1059	-.3610	.0071
Income (*I*)	.0922	.0136	6.7681	.0000
Int_1 ($M_c.I$)	.0025	.0011	2.2427	.0255

The Table 4.12 represents linear relationship between saving and mobility cost. The estimation confirms that mobility cost has a negative relationship with saving because increase in the mobility cost or say shifting from one mode to another mode of transportation lead to decrease in the saving of an individual. Moreover, the study believes that this relation is significantly moderated by different levels of income. Thus, an interaction term of mobility cost and income was also introduced in the regression. As seen in Table 4.12 the result shows that income do moderate the relation between mobility cost and saving.

Table 5.13 Conditional effects of the focal predictor at values of the moderator(s)

Income (*I*)	**Effect**	**se**	**t**	**p**
27.7410	.0314	.0802	.3912	.0695
64.3235	.1231	.0553	2.2271	.0265
100.9061	.2149	.0551	3.9002	.0001

The Table 4.13 shows the effect of mobility cost given different level of income. It can be observed that as the income increases the effect mobility cost on saving increases, mean the effect of mobility cost in lower income group isn't that significant as compared to higher income group. There several can several reasons for this behavior. First, the mobility needs of people in low-income group is limited and prefer cheaper modes of mobility as compared to high income group, thus the effect translate higher in high income groups.

The second reason that explain this behavior is the (Deaton, 1990) theory of the precautionary motives, which states that a country or say people in general tends to save more when their future income is uncertain, mean people with low income whereas people wealth use to save less. Thus, that's is why mobility cost effect on saving increase as we go up in the ladder.

CHAPTER 5
QUALITATIVE FINDINGS

In this chapter, discussion is mainly focused on qualitative assessment of the research problem/gap and the underlying objective of this study by interacting with relevant stakeholders and experts both from the academia and industry. Moreover, different policy documents and regulation were also put to a review. This helped me in broadening my policy horizon by understanding the real situation on the ground, policy dynamic of the problem and view of different stakeholder.

To carry out these interactions I developed an interview guide based on the objectives of the study and the underlying problem. Interviews arrangements were kept as semi structured in nature, so as to better reflect on the situation and at the same time not get secluded from the main objective/discussion of the interview. Moreover, the interviews weren't conducted on a specific time during the research, rather interviewee were reached out on different stages of the thesis.

5.1 Review of Relevant Policy documents and regulation

Islamabad's master plan was completed in 1960, and CDA was handed administrative responsibility of the city under the CDA legislation of 1960. Originally, the city was intended to be a modest town for government employees and public workers. The master plan of the city was reviewed in 1986 and then in 2005, but neither assessment was authorised by the federal government, therefore no changes or modifications were enacted. The capital had several issues with the way it is expanding since the MP's major concentration was on zones 1 and 2, which resulted in planned growth in those zones but chaotic development in the others.

Furthermore, rigid zoning laws are a hindrance to the capital's long-term growth. According to clause 4 of the Revised Modalities & Procedures (2020) framed under the ICT (Zoning) Regulation, 1992 (As Amended) for Development of Private Housing/ Farm Housing Schemes in the Islamabad Capital Territory Zoning Plan, only 15% of land in any housing scheme can be developed vertically in zones 2, 4, and 5. Private housing schemes and commercial activities were not permitted in Zone-4 under the zoning code of 1992, but this was changed in 2010 when Zone 4 was split into four sub zones and private housing projects were permitted in the sub zones. Vertical development was opposed since it allowed for the construction of single-family homes (Ground+1+basement) and three-story apartments, offices, and commercial buildings (Ground+3+basement).

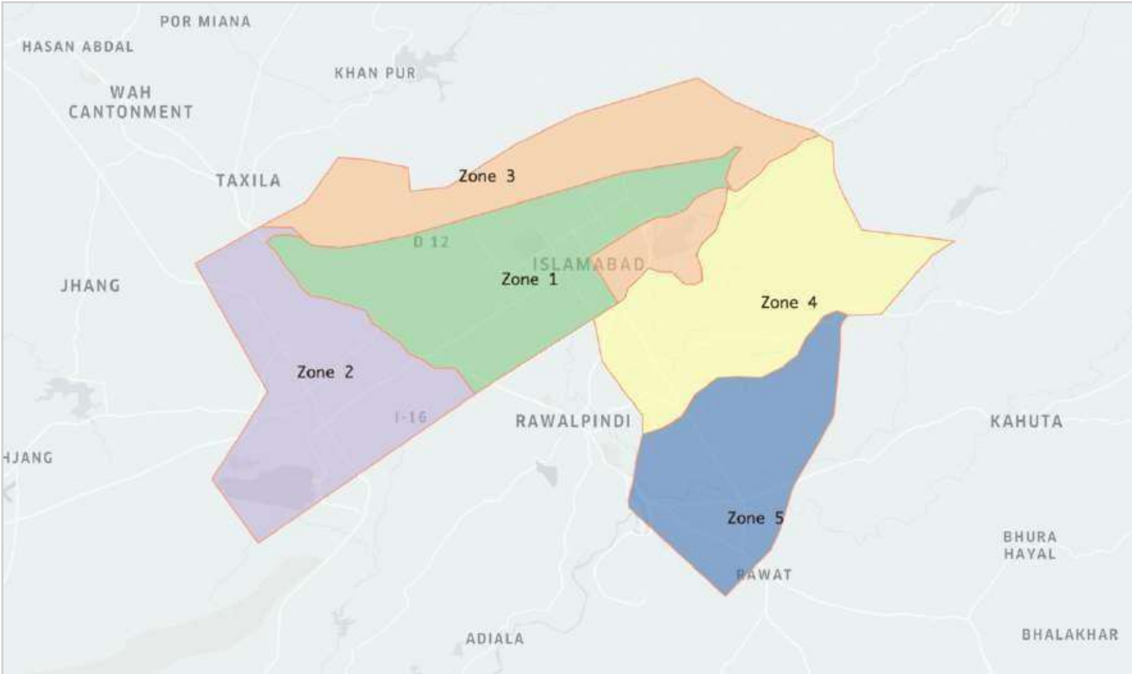


Figure 5.1 ICT Zones

These policies support single-family houses while discouraging high-density mixed-use city centres and residential zones. They were more in support of Euclidean zoning, which prioritises single-family homes as the best land use. Furthermore, under the zoning code of 1992, the CDA approved private housing plans and initiatives to help meet rising housing demand. Under the zoning regulation 1992 and revised Modalities & Procedures (2020) framed Under ICT (Zoning) Regulation, 1992 (As Amended) for Development of Private Housing/ Farm Housing Schemes, an extensive regulatory regime was given the authority to govern the development of private housing societies in Zone-2, 4, and 5 of ICT. The CDA was granted considerable authority to oversee the growth of housing societies.

The scrutiny of the Layout Plan (LOP), issuing of NOC, and periodical inspection of the quality of construction, among many other criteria, all offer CDA an overall framework to supervise housing societies. CDA has the authority to take ownership of a society if the sponsor fails to complete it on time. However, the CDA was unable to properly utilise these powers and put an end to the maniacs of unlawful housing associations. According to the Capital Development Authority (CDA), Islamabad has roughly 140 unlawful housing communities. Only 64 societies have been approved by the civic government, according to the list.

The Pakistan Institute of Development Economics (PIDE) conducted more research and discovered that just 22 of the 64 eligible societies had received a NOC. The Auditor General of Pakistan (AGP) conducted a special audit of the Housing Societies Directorate of the CDA from 2011 to 2016 and discovered major anomalies and non-compliance in the issue of NOCs (AGP, 2017). They granted NOCs without verification of land title, based on forged documents, or for regions not covered by ICT. In the previous 30 years, the CDA has only awarded 22 NOCs in Zones 2, 4, and 5. These plans only cover 6.8% of the total land area in these zones. 1.26 million kanals of land are in unlawful ownership and being sold under the guise of housing societies, with 99 percent of them being sold under the guise of housing societies. In these illicit societies, people have lost PKR 5200 billion (AGP, 2017) of their hard-earned money. These factors contributed to horizontal urban sprawl and inefficient land utilisation. In 2019, the federal government established a panel to study MP once more. The interim study acknowledged the problem of sprawl and advocated zoning amendments to encourage vertical growth in the capital. Also announced was the ICT residential sectors zoning regulation 2020. The bylaws permitted unlawful building owners in zones 2, 4, and 5 to bring their structures up to code. These bylaws do not apply in zone 3, where the destiny of unlicensed structures will be decided by a consultant. A framework for the Islamabad master plan 2040 was also established by the panel.

5.2 Interviews

From the discussion with all the interviewee it was concluded that there are several reasons that adds up to the increased travel time and mobility cost in Islamabad. Firstly, the design of the city was put to question, it follows the grid geometry, primarily seen in major US cities. This geometry is mainly influenced by the out-burst of cars on roads during the 19th century. Similarly, Islamabad was also designed with an elite and cars centric approach, and lacked any vision for vertical growth. Moreover, the second reason highlighted during the discussion was the evolution of the city over time. Islamabad was planned for a population of around the 300000, however, the city hosts a population well over a million now. Similarly, the masterplan which was espoused to be a guiding principle for any kind of development in the city was not implemented properly. Thus, resulting in an in-efficient allocation of land. An average mobility footprint of an individual should me not exceed the 10 km mark per day, ideally, but this figure is significantly high in case of Islamabad, mainly for the fact that the city administration doesn't allow any type of corner shop in any of it sectors. This creates the need of regular mobility even to acquire some basics commodities for daily use i.e., bread, toothpaste etc. In addition, the state of markaz is also obvious, which doesn't fulfill all need of the resident.

Secondly, the other major reason highlighted was the abysmal state of public transport in the city. The city has no proper system in place to facilitate mobility of individuals/residents from the lower income groups, who primarily use public transport. The route allocated to public transport are very limited and doesn't cater all parts of the city, plus the service is also very poor. The state of public transport has been deteriorating in the city for years but has never seen any attention form the authorities. Talking of authorities there is no specific authority in the city that look after public transport or in general oversee the mobility ecosystem. Instead, cars are glorified in the city as the most convenient mode of mobility by subsidizing it in all aspects i.e., free car parking, congestion, large investment on road infrastructure and pollution, to name few.

Lastly, to solve these problems all the discussants call upon a major shift in the policy planning of the city. It includes major recreation of the markaz to facilitate all primary needs of the resident i.e., medical, groceries etc. This will reduce the frequent need of mobility to other center, thus saving on travel time and the cost. Furthermore, focus on the public transport in the city, especially invest more aggressively in more sustainable mode of mobility i.e., buses. Mr. Nasir Javed suggests that the city should employ a bus fleet of at least 300 buses which will facilitate passenger all across the city, and in doing so will significantly decrease congestion in the city as well as the cost of mobility. At least the city administration should create an equilibrium between different modes of mobility, where both private cars and public transport are at same level and compete, because as of right now the regulation has created a certain competitive edge for a single mode of mobility and that is "private cars".

CHAPTER 6
CONCLUSION

Pakistan is ranked as the 5th largest country in terms of its population. According to the 2017 population survey 36.4 per cent are classified as urban, means around 80 million people are living in cities,with the highest urbanization rate in South Asia. However, the real question is, are our cities ready for such an influx of people? Simply No. Cities in Pakistan are facing insufficient public utilities, lack of affordable housing, commercial and office space, decaying public infrastructure, illegal and haphazard development, mushrooming slums and more importantly it lacks a proper mobility ecosystem that should cater the mobility need of the city dweller, which indeed also is the case of this thesis (Hasan & Anwar, 2020). Especially in Islamabad, a city that was planned to be "a city of the future" by its architect C.A. had no provision for public transport or for that any mode of transport in its masterplan.

Moreover, there are several other reasons that pertains to this abysmal state of the city, especially along the vertical of mobility. The very concept of cities is proximity, accessibility and is the functional integration of; vertical structure, density and mobility to name a few. However, in case of Islamabad the city has gone through some rapid horizontal expansion, rather than going vertical. Housing societies are developed in the city peripheries with no basic facilities like hospital, schools, office or entertainment spaces. The built area of Islamabad has increased by fourfold since 1990 (Haider, 2022). The country not even own a single skyscraper. The highest structure in the country is 300 meters[11]. Whereas the tallest structure built in Islamabad is 116 meters[12]. According to (Qasim, Khawaja, Haque, & Shahzad, 2021) only an NOC for the construction of a high rise take up to 3 years. Thus, this lack of proximity and rapid horizontal expansion has created a mobility dilemma with increasing travel time and cost for getting around in the city.

Land use is also an important factor in defining the socio-economic structure and behavior of people in the city, and thus has it due importance in city planning. Historically, in city a single patch of land has been utilized for multiple purposes. Mixed use of land is efficient, it creates density and interaction which lead to economics

[11] It is the Bahria Icon Tower in Karachi, 62 storey tower.
[12] Centaurus, Islamabad.

outcomes. Contemporarily, numerous cities in the world utilizes land for mix use. However, this is not the case in Pakistan and especially not in that of Islamabad. The city development is administered by Capital Development Authority (CDA) in retrospection to its "*master plan*" which follow strict zoning regulation in accordance to "*Islamabad Zoning Regulation, 1992*" for any kind of development, thus limiting different kind of activities to certain places, which necessitates frequent mobility between these points.

Cities around the world has an extensive system in place for mobility, many big cities are integrating different types of transportation systems to create a mobility ecosystem, with the aim to better user convenience, whereas the abysmal state of transportation is evident in Islamabad. Public transport in the city is in bad shape both in terms of its accessibility and quality of service, as a result people opt for private mobility services, thereby increasing traffic congestion. Similarly, ride-hailing is also becoming a major stakeholder in the mobility infrastructure of the city. However, every vertical is operating in silos, causing inefficiency.

All of these aforementioned factors necessitate the need for regular mobility and increase journey time. Thus, this research will give insight in the mobility patterns/flows, travel time and the cost of mobility in Islamabad, as there has not much been investigated in terms of understanding the subject in Islamabad or Pakistan in general. Moreover, the study invests in the idea of bringing big data and analytics in the contemporary research. For instance, the implementation of this research will benefit national exchequers with the millions of rupees spend on travel time studies conducted using conventional methodologies.

Moreover, in terms of travel time the travel time matrix generate by this study reports the average travel time in the city to 35 mins, which can fluctuate to an average of 37 mins during peak hours. This contribution can help the city administration to get more insight on traffic and congestion, and use the travel time matrix evaluate the accessibility of major places in the city. For example, the matrix tells us almost half of the city population cannot access the city center within half an hour with motorized transport. here, the center of the city refers to the geographical center of Islamabad, urban Islamabad, where normally all the amenities/utilities are clustered together or are in close proximity (For a more detail view kindly refers to Figure 36.). Similarly, the same can be assessed for hospital, school and market, and re-evaluate how we plan our cities and how it can be made more accessible.

Next, in the matter of cost, ride hailing was found to be the most expensive mode of mobility for daily commute, However, a very fraction of the population (5 per cent) uses it. Second come cars, followed by bikes, taxi, public transport and lasty metro, the least expensive mode of transport. However, in term of time related cost public transport is the highest, followed by metro, taxi, car, ride hailing and bike. From this the study conclude that the city administration needs to aggressively invest in an affordable as well as efficient mass transit system that could cater the need of the people and discourage private cars.

Lastly, the study calls for the implementation of the technique use in this thesis in different governmental studies that cost millions of rupees to national exchequer due to archaic methods and technique. Apart from this in general data science, big data and AI should be used in government department to make policy decision more effective and data driven.

6.1 Recommendations

Apart from the implementation of the technique develop in this study to estimate travel time. The study has several other recommendations to improve the mobility problem in Islamabad and work towards minimizing travel time and the cost of mobility in the city.

1. The study calls for an inclusive transport policy in the capital that integrate different modes of transportation in Islamabad and create a mobility ecosystem in the city. This requires the city to have a dedicate transport department that look into and cater the mobility needs of the residents.
2. Moreover, public transport should be at the center of this ecosystem, as shown in the finding of this thesis it is the least costly mode of mobility following metro, however, metro runs on high subsidies. Though the public transport route has higher time related cost but it is mainly for the fact that these routes were planned decades ago and doesn’t cater the need of the people. Thus, it is recommended that new routes should be planned directly connecting the mobility hotspots (as shown in figure 32 & Figure 33), plus should complement the existing metro route in order to increase it accessibility (as this thesis shows only 5 per cent of the population uses it). It will significantly decrease the travel time related cost.

3. In a long-run to further optimize travel time in the city and the use of private transport such as car, which is the costliest mode of mobility both in terms of out of the pocket and time related cost. The city administration needs to shift towards mix use of land and promote vertical growth of the city. For this CDA needs to adopt the concept of flexible zoning instead of strict zoning regulation.
4. Lastly, ride-hailing companies generate some valuable data from their trips. CDA, ITA and city administration in general should take benefit from it by analyzing mobility behavior in the city on regular basis and make informed policy decision.

6.2 Limitation of the Study

No study is 100 per cent accurate or complete, there is always a room for improvement. Similarly, this study also faced some limitation in term of scope and data. To pen down following are the main points:

- Apart from the survey data, mobility patterns were derived based on data from BYKEA which contains information on motorcycle only. However, BYKEA was not the only company approached for data Careem, SWVL and a few other ride-hailing companies were also approached.
- Google company, nevertheless, provides aggregated travel time data, which can be accessed via Google Distance Matrix API. Unfortunately, there is no information about the sample sizes employed to calculate the mean value, thus making the data reliability unknown. However, due to its underlying tool GPS and high smart phone, and internet penetration rate it has become an effective sensor of our daily whereabouts
- The study fails to look into travel time variability of public transport due to time limitation and highly saturated nature of travel flow data on public transport routes.

6.3 Future Direction

Empirical literature on mobility or for that matter any other vertical of cities is very scarce. Talking of cities, urban economics in general is the least researched and debated subject in local academia despite being highly relevant to policy decisions, resource allocation and Urban Planning. However, building up on this study travel time and mobility cost can be corelated with economics activity in Islamabad. As there is plethora of empirical research establishing a strong relationship between travel time and economic activity. Moreover, the same research can be undertaken for all major cities across the country and a comparison will be greatly beneficial in understanding the behavior of Pakistani cities.

Similarly using the same technique developed/employed in this research can be extended to estimate inter-city travel time between major cities of Pakistan. Furthermore, during this study it was observed that public transport is very fragmented in Islamabad, a comprehensive study can be carried out in this regard.

REFERENCES

(2017). *EOI for Islamabad Bus Service Project.* Capital Development Authority (CDA), Islamabad.

(2021). *The Socio-Economic Impact of Careem.* Oxford Economics.

(November 2012). *Pre-feasibility Study on Bus Rapid Transit Project Islamabad, Pakistan.* Executive Summary, Cities Development Initiative for Asia.

Abbasi, M. (2019). *Social Implications of the modernist Urbanism: Islamabad Master Plan By Doxiados.* Middle East Technical University, The Graduate School of Natural and Applied Sciences . Middle East Technical University.

Ahmad, M., & Asghar, T. (2008). Estimation of Saving Behaviour in Pakistan Using Micro Dara. *The Lahore Journal of Economics, 9*(2), 73-92.

Ahmed, M. h., Atiq, S., & Butt, M. S. (2006). The Impact of Demography, Growth and Public Policy on Household Saving: A Case Study of Pakistan. *Asia-Pacfic Development Journal, 13*(2), 57-71.

Ang, J. (2009). Household Saving Behaviour in an Extended Life Cycle Model: A Comparative Study of China and India. *The Journal of Development Studies , 45*(8), 1344-1359.

APP. (2019). Registered vehicles in ICT cross over 979, 398. The News.

Caiati, V., Bedogni, L., Bononi, L., Ferrero, F., Fiore, M., & Vesco, A. (2016). Estimating urban mobility with open data: A case study in Bologna. *2016 IEEE International Smart Cities Conference (ISC2)* (pp. 1-8). IEEE Xplore.

Camagni, R., Gibelli, M. C., & Rigamonti, P. (2002, Februrary). Urban mobility and urban form: the social and environmental costs of different patterns of urban expansion. *Ecological Economics, 40*(2), p.199-216.

Carroll, C. (1997). Buffer Stock Saving and the Life Cycle/Permament Income Hypothesis. *Quarterly Journal of Economics, 107*(1), 1-56.

Celikoglu, H. B. (2007). A Dynamic Network Loading Process with Explicit Delay Modelling. *Transportation Research Part C: Emerging Technologies, 15*(5), 279-299.

Chamon, M., Liu, k., & Prasad, E. (2013). Income uncertainty and household savings in China. *Journal of Development Economics, 105,* 164-177.

Chaudhry, I. S., Faridi, M. Z., Abbas, M., & Bashir, F. (2010). Short Run and Long Run Saving Behavior in Pakistan: An Empirical Investigation. *Journal of Money Investment and Banking, 6,* 57-66.

Chaudhry, W. (2016, August 03). More than 0.7 million vehicles registered in federal capital.

Choi, K. (1999). Data Fusion Methodology for Link Travel Time Estimation for Advanced Traveler Information System. *KSCE Journal of Civil Engineering 3 (1): 1–14., 3*(1), 1–14.

Cities and Urbanization: Urban Economics. (2021). (S. U. Design, Producer) Retrieved 09 2021, from World Economic Forum: https://intelligence.weforum.org/topics/a1Gb0000000LiPhEAK/key-issues/a1G0X000004Pz5WUAS

Costa, M. (2008). A Sustainable Urban Mobility Index. *Doctoral Dissertation Thesis, Doctorate of Transport Engineering*.

COWI. (2009). *Economic evaluation of cycle projects - methodology and unit prices.* COWI, City of Copenhagen.

Dailey, D. J. (1997). Travel Time Estimates Using a Series of Single-Loop Volume and Occupancy Measurements. *Transportation Research Board 76th annual meeting*, (pp. 12-16). Washington, DC.

Dargay, J., Gately, D., & Sommer, M. (2007). Vehicle Ownership and Income Growth, Worldwide: 1960-2030. *The Energy Journal, 28*(4), 143-170(28 pages).

Deaton, A. S. (1990). Saving in Developing Countries: Theory and Review. *The Annual World Bank Conference on Development Economics.* World Bank Economic Review .

Desjardins, J. (2018). *Visualizing the Average Commute Time in U.S. States and Cities*. Retrieved 2021, from Visual Capitalist: https://www.visualcapitalist.com/average-commute-u-s-states-cities/

Domer, E. (1946). Capital Expansion, Rate of Growth, and Employment. *Econometrica, 14*(2), 137-147.

Dumbliauskas, V., Grigonis, V., & Barauskas, A. (2017). Application of Google-based data for travel time analysis; Kaunas city case study. *Promet-Traffic & Transportation, 29*(6), 613-621.

Farhan, M., & Akram, M. (2011). Does Income Level affect Saving Behaviour in Pakistan? An ARDL Approach to Co-integration for Empirical Assessment. *Far East Journal of Psychology and Business, 3*(3), 62-72.

Fisher, A. G. (1939, June). Production, Primary, Secondary and Tertiary. *Economic Records, 15*(1), 24-38.

Frantzeskakis, J. M. (1995). Configuration, hierarchy and spacing of the urban road network in Islamabad. *Ekistics: The Problems and Science of Human Settlements, 62*(373/374/375), 236-241.

Frei, F. (2006). Sampling Mobility Index: Case Study in Assis - Brazil. *Transportation Research Part A: A Policy and Practice, 40*(9), 792-799.

Fried, M. (1957). *Introduction to "A theory of the Consumption Function"*. Princeton Univerty Press.

Hadi, H. (2020). *PIDE Urban Monograph Series No. 4: Mobility, Cars, and Cities.* Pakistan Institute of Development Economics.

Hadi, H. (2020). *PIDE Urban Monograph series; Mobility, Cars and Cities.* Pakistan Institute of Development Economics. Pakistan Institute of Development Economics.

Haider, F. (2022). Detection of Land Use/Land Cover Changes and Urban Sprawl in Islamabad, Pakistan: An Analysis of Multi-Temporal Remote Sensing Data. *Thesis*.

Hamid, T. b. (2018). *A Bykea ride is cheaper and faster than rickshaw ride*. Retrieved 8 2018, from Aurora: https://aurora.dawn.com/news/1143218

Hanson, M. (1992). *Results of Literature Survey and Summary of Findings: The Nature and Magnitude of Social Costs of Urban Roadway Use.* Federal Hoghway Administration, U.S. Department of Transportation.

Haq, R. (2022). Double Digit Rise in Energy Consumption Confirms Pakistan's Economic Recovery in 2021.

Haque, N. u., & Rizwan, M. (2020). *PIDE Urban Monograph Series No. 2: Rethinking Mobility(Urban Transport Policy) in Pakistan.* Pakistan Institute of Development Economics (PIDE).

Harrod, R. F. (1939). An Essay in Dynamic Theory. *The Economic Journal, 49*(193), 14-33.

Hasan, L., & Aqeel, M. (2020). *PIDE Policy ViewPoint No. 16: THE ISLAMABAD MASTER PLAN.* Pakistan Institute of Development Economics.

Husnain, A. (1995). Long-run Determinants of Private Saving Behaviour in Pakistan. *The Pakistan Development Review, 34*(4), 1057—1066.

Husnain, A. H. (1996). Private Saving and Its Determinants: The Case of Islamabad. *The Pakistan Development Review, 35*(1), 49-70.

Kageson, P. (1993). *Getting the prices right : a European scheme for making transport pay its true costs.* Stockholm : The Federation.

Kazmi, A. A. (1993). National Saving Rates of India and Pakistan: A Macro Econometric Analysis. *The Pakistan Development Review, 32*(4), 1313-1324.

Keeler, T. E., & Small, K. (1975). *The Full Costs of Urban Tranport Part III: Automobile Costs and Final Intermodal Cost Comparisons.* Institute of Urban and Regional Development, UC Berkeley, eScholarship.

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money.* International Relation and Security Network.

Khalid, U. (2020, 7). Even the rich doesn't save.

Khan, A. H., Hasan, L., & Malik, A. (1992). Dependency Ratio, Foreign Capital inflow and the Rate of Saving in Pakistan. *The Pakistan Development Review, 31*(4), 843-856.

Khan, A. H., Hasan, L., & Malik, A. (1994). Determinants of National Saving Rate in Pakistan. *Economia Internazionale / International Economics, 47*(4), 365-382.

Khan, R. E., & Hye, Q. M. (2010). Financial Sector Reforms and Household Savings in Pakistan; an ARDL Approach. *African Journal of Business Management, 4*(16).

Krol, R. (2017). *Transportation, Mobility, and Economic Growth.* George Mason University, Mercatus Center .

Li, Y., & McDonald, M. (2002). Link Travel Time Estimation Using Single GPS Equipped Probe Vehicle. *The IEEE 5th international conference on intelligent transportation systems*, (pp. 932-937). Singapore.

Litman, T. (2003). *Transportation cost and benefit analysis: techniques, estimates and implications.* Canada: Victoria Transport Policy Institute.

Liu, S., & Hu, A. (2013). Household Saving in China: The Keynesian Hypothesis, Life-Cycle Hypothesis, and Precautionary Saving Theory. *The Developing Economies, 51,* 360-387.

Liu, Y., din, S. u., & Jiang, Y. (2021). Urban growth sustainability of Islamabad, Pakistan, over the last 3 decades: a perspective based on object-based backdating change detection. *GeoJournal*, 1-21.

MacKenzie, J. J., Dower, R. C., & Chen, D. D. (1992). *THE GOING RATE:What it Really Costs to Drive.* WORLD RESOURCES INSTITUTE.

Mahsud, & Khan, A. Z. (2010). Rethinking Doxiadis Ekistical Urbanism: Sustainability and Globalization as a dialectical framework for Design. *Positions: On Modern Architecture and Urbanism/Histories and Theories, 1*, 6-39.

Mansell, R. L. (1985, July). The Service Sector and Westorn Economics Growth. *Canadian Public Policy / Analyse de Politiques, 11*, 354-360.

Miranda, D., & Correia, S. (2007). Analysis of Sustainable Urban Mobility Using Spatial Statistics. *Operations Research and Sustainable Development*.

Modigliani, F. (1986). Life cycle , individual thrift, and the wealth of nations. *The American Economic Review* , 297-313.

Moeinaddini, M., Asadi, Z. S., & Shah, M. Z. (2015). An Urban Mobility Index for Evaluating and Reducing Private Motorized Trips. *Measurement*(63), 30-40.

Mori, U., Mendiburu, A., Álvarez, M., & Lozano, J. A. (2015). A review of travel time estimation and forecasting for advanced traveller information systems. *Transportmetrica A: Transport Science, 11*(2), 119-157.

Muggah, R., & Khanna, P. (2018, 9 05). *World Economic Forum on ASEAN.* Retrieved 12 2021, from World Economic Forum:

https://www.weforum.org/agenda/2018/09/these-asian-cities-are-best-equipped-for-the-future/

Munir, R. S., Maqbool, H., Sarwar, G., & Shaheen, S. (2011). Effect of Workers Remittances on Private Savings Behaviour in Pakistan. *Asian Economic and Financial Review, 1*(3), 95-103.

Nam, D. H., & Drew., D. R. (1996). Traffic Dynamics: Method for Estimating Freeway Travel Times in Real Time from Flow Measurements. *Journal of Transportation Engineering, 122*(3), 185-191.

Nawaz, M. A., Chaudhry, I. S., Shehzad, M. A., & Sheikh, M. R. (2021). An Analysis of Age Dependency Burden and Saving Rates in Pakistan. *Review of Applied Management and Social Science, 4*(2), 531-546.

Oh, J.-S., Jayakrishnan, R., & Recker, W. (2006). Section Travel Time Estimation from Point of Detection. *82nd annual meeting of the Transportation Research Board,* (pp. 1-13). Washington, DC: Virginia Polytechnic Institute and State University.

Palacharla, P. V., & Nelson., P. C. (1999). Application of Fuzzy Logic and Neural Networks for Dynamic Travel Time Estimation. *International Transactions in Operational Research, 6*(1), 145-160.

Patterson, M., & et.al. (2014). Use of the Urban Core Index to Analyze Residential Mobility: The Cae of Seniors in Canadian Metropoliton Regions. *Journal of Transport Geography*(41), 116-125.

Putra, R. A., & Arini, S. (2020). Measuring the Economics of a Pandemic: How People Mobility depict Economics? An Evidence of People's Mobility Data towards Economic Activities. *IMF*, 24.

Qasim, A. W., Khawaja, I., Haque, N. U., & Shahzad, Q. (2021). *Construction Permit For High-Rise From Capital Development Authority, Islamabad.* Islamabad: Pakistan Institute of Development Economics.

Qureshi, M. (1981). Household Saving in Pakistan: Some Findings from Time-Series Data. *The Pakistan Development Review, 20*(4), 375-397.

Rashmi, S. (2016). Drivers of Saving: A literature Review. *Indore Management Journal, 8*(1), 35-45.

Rodrigue, D. J.-P., & Notteboom, D. T. (2021). Transportation and Economic Development . In *The Geography of Transport.* The Spatial Organization of Transportation and Mobility.

Rodrigue, J.-P. (2020). *The Geography of Transport Systems.* Routledge.

Sajid, G. M., & Sarfraz, M. (2008). Saving and Economic Growth in Pakistan: An Issue of Causality. *Pakistan Economic and Social Revew, 46*(1), 17-36.

Santos, A., Methipara, J., Liss, S., & Reuscher, T. (2014). *Mobility Challenges for Households in Poverty, 2009 National Household Travel Survey*. FHWA, NHTS. Federal Highway Administration .

Schrank, D. L. (2001). The Keys to Estimating Mobility in Urban Areas. *ITE 2001 Annual Meeting and Exhibit* (p. 20). Chicago, Illinois, USA: Institute of Transportation Engineers.

Siddique, R., & Siddique, R. (1993). Household Saving Behaviour in Pakistan. *The Pakistan Develpment Review, 32*(4), 1-27.

Solow, R. M. (1956). A Contribution to the theory of Economic Growth. *The Quartely Journal of Economics, 70*(1), 65-94.

Southworth, M. (20015, December). Designing the Walkable City. *Journal of Urban Planning and Development, 131*(4), 246-257.

Travisi, C., Camagani, R., & Nijkamp. (2010). Impact of Urban Sprawl and Commuting: A Modelling Study of Italy. *Journal of Transportation Geography, 18*(3), 382-392.

Uber. (2018). *"Uber Movement: Travel Times Calculation Methodology.".* Retrieved from https://d3i4yxtzktqr9n.cloudfront.net/web-movement/static/pdfs/MovementTravelTimesMethodology-76002ded22.pdf.

Vidović, K., Mandžuka, S., & Brčić, D. (2017). Estimation of urban mobility using public mobile network. *2017 International Symposium ELMAR}* (pp. 21-24). IEEE Xplore.

Vidović, K., Šoštarić, M., Mandžuka, S., & Kos, G. (2020, January). Model for Estimating Urban Mobility Based on the Records of User Activities in Public Mobile Networks. *Sustainability, 12*(3), 838.

Wang, F., & Xu, Y. (2011). Estimating O-D travel time matrix by Google Maps API: Implementation, Advantages, And Implications. *Annals of GIS, 17*(4), 199-209.

Weiss, D. J., Nelson, A., Vargas-Ruiz, C. A., Gligoric, k. B., Gabrilovich, E., & Gethig, P. W. (2020). Global maps of travel time to healthcare facilities. *Nature Medicine, 26*(12), 1835-1838.

Wu, H. (2019). Comparing Google Maps and Uber Movement Travel Time Data. *Findings*.

Xia, F., Wang, J., Kong, X., & wang, Z. (2018). Exploring Human Mobility Patterns in Urban Scenarios: A Trajectory Data Perspective. *IEEE Communcations Magazine, 56*, 1-9.

Zhang, W. (2006). Freeway Travel Time Estimation Based on Spot Speed Measurements. *PhD diss.*

Zhu, T., Kong, X., & Lv, W. (2009). Large-Scale Travel Time Prediction for Urban Arterial Roads Based on Kalman Filter. *Proceeedings of the IEEE international conference on computational intelligence and software engineering*, (pp. 1-5).

Appendix A

All 44 ITA proposed routes

S. No	Route No	Route Area
1.	101	Pirwadhai to Faisal Masjid via Pindora, Faizabad, Zero Point, Aabpara, Super Market & Super Jinnah
2.	102	Pirwadhai to Pak Sectt via Fruit Mandi,Police Lines, G10/1, Bela Road, G10Markaz, Karachi Company, G8 Markaz, PIMS, Fazal-e-Haq Road, Blue Area, Super Market and Pak Secretariat
3.	103	Double Road I/8 (Faizabad) to E/9 via I/8, H/8 T&T Colony PIMS, F/8 Markaz, F/9 and E/9
4.	104	Tarnol To Pak Sectt Via G-10/1, G-10-2, G-10/3, G-9/3, PIMS, G-7 Markaz, Lal Quarter, Poly Clinic, Super Market And Pak Secretariat.
5.	104-A	Tarnol to Pak Secretariat via Islamabad Chowk, G-11/1, G11/4, G-10 Markaz, G-9 Markaz, PIMS, Blue Area, Poly Clinic, Parliament Chowk, Pak. Secretariat.
6.	105	G-15 to Pak. Secretariat via G/15-G-11/4 District Court G-10 Markaz G-10/2-3, G-9 Markaz, T&T Chowk, G-7/2, Service Road, G-7 Markaz, Lal Quarter, Poly Clinic, Melody, Aabpara, Foreign Office, Secretariat.
7.	105-A	G-15 to Pak. Secretariat via G-15-G-10 Markaz, G-9 Markaz, T&T Chowk, G-7/2, Service Road, G-7 Markaz, Lal quarter, Poly Clinic, Melody, Aabpara, Foreign Office, Secretariat
8.	106	Margalla Town To E/11 Via Dhokary Chowk, Aapara, Zero Point, G-8, F/8, F/9 And E/11
9.	107	Pirwadhai to Bari Imam via Police Line G-10/1,2,3 G-9/2, Karachi Company ,PARC, Noori, G-7, Lal Quarter, Poly Clinic, Embassy Road, Radio Pakistan and Bari Imam
10.	108	Golra to Pak Secretariat via F/10, G-9/2, F/8-1, Marjan School, Fazal-E-Haq Road, G-7, Melody, Policlinic, Super Market, And Secretariat
11.	109	Pak Secretariat via Melody, G-7, PIMS, G-8, G-9, G10 Markaz and G-10/1
12.	110	Khataar to Pirwadhai More via BoBari, Bhara Kau, Malpur, Rawal Dam Chowk, Faizabad, Pindora, CDA Colony, Pirwadhai More.
13.	111	Rewat to F-8 Markaz, via Islamabad Highway, Khanna, Faizabad, Al-Shifa international, Open University, PIMS, F8 Markaz.
14.	112	Korang Town to Pak Secretariat via Khana, Zero Point, Aapara, Lal Quarter, Poly Clinic, Melody, Aabpara, Foreign Office, Secretariat
15.	113	Pirwadhai to Secretariat via I-9, I/8, Open University, Zero

		point, G-7 Markaz, Lal Quarter, Poly Clinic, Super Market and Pak Secretariat.
16.	113-A	Pirwadhai to Secretariat via I-9, H-9, G-9 Markaz, G-8 Markaz, PIMS, Blue Area, Super Market, Secretariat.
17.	114	F/10 to Faizabad via G-10 Markaz, G-9 Markaz, PIMS, Zero Point and Faizabad
18.	115	Pirwadhai to G-11/1, via I-10,1-9, H-9, G-9 Markaz, G-10 Markaz, Golra Chowk, G-11/3, G-11/1.
19.	116	G-10/1 to Haj Complex via G-9, G-8, Noori, G-7, Aabpara, Zero Point, Faizabad, Murree Road, Saddar, Peshawar Road and Haj Complex
20.	117	Pirwadhai to Saidpur, via I-10, 1-9, H-9, Peshawar More, F8 Service Road, Shaheen Chowk, Margalla Road, Saidpur.
21.	118	PIMS to Shaheen Colony via F/8 Markaz, F/8-2 and Shaheen Colony
22.	119	I/10 to Pak Secretariat via I/8, H/9, Peshawar More, G/8 Markaz, Noori, G-7 Markaz, Lal Quarter, Poly Clinic, Super Market And Pak Secretariat
23.	120	Hajj Complex to Bari Imam via Golra, F-11 Markaz, F-10 Markaz Karachi Company, PIMS, G-7 Markaz, Aabpara, Foreign Office, Bari Imam.
24.	121	Hajj Complex to Faisal Masjid via Kohinoor Mills, Carriage Factory, Pirwadhai more, I-10, 1-9, H-9, G-9 Markaz, F-8 Markaz, Faisal Chowk, Faisal Masjid.
25.	122	Chirah to Pak. Secretariat via Alipur Farash, Taramri Chowk, Chak Shahzad, Rawal Dam, Aabpara, Melody, Super market, Secretariat.
26.	122-A	Khanna to Pak. Secretariat via Tarlai, Taramri Chowk, Chak Shahzad, Rawal dam, Aabpara, Melody, Super Market, Secretariat.
27.	123	Aabpara to Ramli Reliance via Police Mission, Malpur Quaid-e-Azam University
28.	124	Arri Syedan to Faisal Masjid via Sihala, Islamabad Highway, Khanna, Faizabad, Zero Point, PIMS, F-8 Markaz, Zafar Chowk, Faisal Masjid.
29.	125	Aapara to Quaid-e-Azam university via Bari imam
30.	126	Aabpara to Chak Shahzad via Rawal dam
31.	127	Chattar to f-8 Markaz, via Bhara Kau, Malpur, Aabpara, zero point, PIMS, f-8 Markaz.
32.	127-A	Bhera Pull to G-11 via Bhara Kahu Malpur Aabpara Melody Kalsoom plaza Khyber plaza, Complex, Itwar Bazar, NHA, PMDC, High Court New Katcheri
33.	128	Pir Shohawa to Pak Secretariat via Gogina, Tehlar, Super Market
34.	129	Bara Kau to Bobary via Shah Pur, Phulgran, Shakriala Milata
35.	130	Bara Kau to Shahdara via Sumbal Syedan, Mandla
36.	131	Faizabad to Kurry Sher via Rawal Dam, Chak Shahzad

37.	132	1/10 to Pak Secretariat via I/9,1/8, H/8, T&T Colony, PIMS, Blue Area, Super Market, Secretariat.
38.	133	Pirwadhai to CHONPRA via I/10-1-2, Police Line, G-11/-41, F-11/1-2 and Golra,S Borr Masjid St No. 12, Noor Plaza, Choprra Stop.
39.	134	Charah to Aabpara via Kirpa, Chak Shahzad
40.	135	Margalla Town to Faizabad
41.	136	PWD Colony to Pak Secretariat, via Khanna, Faizabad, Zero Point, PIMS,KHEBER PLAZA ,KALSOM PLAZA,POLY, SECRIRTATE.,
42.	137	Pirwadhai More to Secretariat via I-10, I-9, H-9, Karachi Company, PIMS, Blue Area, Secretariat.
43.	138	Ali Pur to G-15 Markaz via Tarlai, Khanna, Jinnah Town, Faizabad, Pindora, Pirwadhai More, Police Line, NUST, KASMIR HIGHWAY , TOOL PLAZA,22 NO CHUNGI,G-15 Markaz.
44.	139	Capt Naeem Tufail Shaheed Chowk to Golra via Chak Shahzad, Rawal Town, Margalla Town, Faizabad, I/9 Police Station, H/9, Peshawar More, Education Directorate, KARL Hospital, High Court, G-11/4-3 Service Road, F/11-1-2, Golra.
45.	140	Bari Imam to G-15 Near Motorway Chowk, via Q.A. University, Rawal Town, Margalla Town, Faizabad, Pindora, Pirwadhai More, NESCOM, Police Line, G-11 Chowk Kashmir High Way, NUST Chowk, Islamabad Chowk, Motorway Chowk

Appendix B

Opensource code for geocoding addresses in coordinates (Lat/Lng)

```
functiongetGeocodingRegion(){returnPropertiesService.getDocumentPro
perties().getProperty('GEOCODING_REGION') || 'us';}

/*function setGeocodingRegion(region)
{PropertiesService.getDocumentProperties().setProperty('GEOCODING_R
EGION', region);updateMenu();}

function promptForGeocodingRegion() {var ui =
SpreadsheetApp.getUi();var result = ui.prompt('Set the Geocoding
Country Code (currently: ' + getGeocodingRegion() + ')','Enter the
2-letter country code (ccTLD) that you would like ' +'the Google
geocoder to search first for results.'+'For example: Use \'uk\' for
the United Kingdom, \'us\' for the United States, etc.'+'For more
country codes, see: https://en.wikipedia.org/wiki/Country_code_top-
level_domain',ui.ButtonSet.OK_CANCEL);// Process the user's
response.if (result.getSelectedButton() == ui.Button.OK)
{setGeocodingRegion(result.getResponseText());}}

*/function addressToPosition() {var sheet =
SpreadsheetApp.getActiveSheet();var cells =
sheet.getActiveRange();// Must have selected 3 columns (Address,
Lat, Lng).// Must have selected at least 1 row.if
(cells.getNumColumns() != 3) {Logger.log("Must select at least 3
columns: Address, Lat, Lng columns.");return;}

var addressColumn = 1;var addressRow;var latColumn = addressColumn
+ 1;var lngColumn = addressColumn + 2;var
geocoder=Maps.newGeocoder().setRegion(getGeocodingRegion());var
location;for (addressRow = 1; addressRow <= cells.getNumRows();
++addressRow) {var address = cells.getCell(addressRow,
addressColumn).getValue();// Geocode the address and plug the lat,
lng pair into the // 2nd and 3rd elements of the current range
row.location = geocoder.geocode(address);// Only change cells if
geocoder seems to have gotten a // valid response.if
(location.status == 'OK') {lat =
location["results"][0]["geometry"]["location"]["lat"];lng =
location["results"][0]["geometry"]["location"]["lng"];cells.getCell
(addressRow, latColumn).setValue(lat);cells.getCell(addressRow,
lngColumn).setValue(lng);}}};

function positionToAddress() {var sheet =
SpreadsheetApp.getActiveSheet();var cells =
sheet.getActiveRange();// Must have selected 3 columns (Address,
Lat, Lng).// Must have selected at least 1 row.if
(cells.getNumColumns() != 3) {Logger.log("Must select at least 3
columns: Address, Lat, Lng columns.");return;}var addressColumn =
1;var addressRow;var latColumn = addressColumn + 1;var lngColumn =
addressColumn + 2;var geocoder =
Maps.newGeocoder().setRegion(getGeocodingRegion());var location;for
(addressRow = 1; addressRow <= cells.getNumRows(); ++addressRow)
{var lat = cells.getCell(addressRow, latColumn).getValue();var lng
= cells.getCell(addressRow, lngColumn).getValue();// Geocode the
lat, lng pair to an address.location = geocoder.reverseGeocode(lat,
lng);// Only change cells if geocoder seems to have gotten a //
valid response.Logger.log(location.status);if (location.status ==
```

```
'OK') {var address =
location["results"][0]["formatted_address"];cells.getCell(addressRo
w, addressColumn).setValue(address);}}};
```

```
function generateMenu() {// var setGeocodingRegionMenuItem = 'Set
Geocoding Region (Currently: ' + getGeocodingRegion() + ')';// {//
name: setGeocodingRegionMenuItem,//   functionName:
"promptForGeocodingRegion"// },var entries = [{name: "Geocode
Selected Cells (Address to   Lat, Long)",functionName:
"addressToPosition"},{name: "Geocode Selected Cells (Address from
Lat, Long)",functionName: "positionToAddress"}];return entries;}
```

```
function updateMenu()
{SpreadsheetApp.getActiveSpreadsheet().updateMenu('Geocode',
generateMenu())}/**
```

```
 * Adds a custom menu to the active spreadsheet, containing a
single menu item * for invoking the readRows() function specified
above.* The onOpen() function, when defined, is automatically
invoked whenever the * spreadsheet is opened.** For more
information on using the Spreadsheet API, see*
https://developers.google.com/apps-script/service_spreadsheet*/
```

```
functiononOpen(){SpreadsheetApp.getActiveSpreadsheet().addMenu('Geo
code',generateMenu());//SpreadsheetApp.getActiveSpreadsheet().addMe
nu('Region',generateRegionMenu());//SpreadsheetApp.getUi()//.create
Menu();};
```

Appendix C

Zone No.	**UC No.**	**UC Name/ Centroid Coordinates**	**Areas Included**
1	1	Said Pur **(33.7299945, 73.07489293)**	Village Saidpur, Gokina Khurd, Talhar Gokina
2	2	Noorpur Shahan **(33.71996287, 73.09331159)**	Kachi Abadi, Muslim Colony, Ratahotar
3	3	Mal pur **(33.74477766, 73.1296075)**	Jabbi, Shadra, Village Subhan, Bharakahu, Mera, Jhung Bagyal, Qau Colony, Mandala Malpur
4	4	Kot Hathiyal North **(33.74021153, 73.17970922)**	Bhara Kahu, Nayi Abadi, Muhallah Alnoor, Muhallah Ban, Muhallah Malkan,Dhok syedan
5	5	Kot Hathiyal South **(33.71955096, 73.1748887)**	Barakahu, Behra Syedan, Muhallah Ghousia, Madina Town, Dhok Jilani, Muhallah Malikabad
6	6	Phulgran **(33.73695393, 73.20841375)**	Village Phul Garan, Dhok Kuch, Abbasiabad, Dhok Badhan, Muhallah Kangar, Mahallah Ranjpuran, Village Shah pur, Village Post Office Bobry, Village Karlot Chattar, Mohra Rajpoota, Shah pur, Muhallah Ban, Muhallah Sumbul, Bani gala road P.O Seri Chowk
7	7	Pind Begwal **(33.70927972, 73.2458146)**	Bai nala, Mair Bigguwal, Village Atthal, Village Maira Biggwal, Village P.O. Pind Bigwal, Dhok Sajjal, Dhok Nanda Sihali, Village Jandala, imli Dam Road
8	8	Tumair **(33.68309043, 73.26988709)**	Village & P.O.pihont, Village Chakhtan, Village Darkalam, Village & P.O. Tumair, Village & P.O. Kanjnah
9	9	Charah **(33.64703509, 73.2304112)**	Dhok Maira, Harnow tanda Pani, Dhok Las, Village Kiani, Faideral Town thanda pani, Dhok Haveli Harnou,Village Chirrah,Mora Chirrah
10	10	Kirpa **(33.62080067, 73.2308974)**	Ladhiot Syedan, P.O.Pind Malikan, Dhok Ban, P.O.Bhimbar Tarar, Mahallah Haveli Rajgan, Mehfooz abad,Village Chaniol, Muhallah Chaudrian, Village Ara,Gora Mast, Dhok Jogian Harnu, Village Chauntra Sogran
11	11	Mughal **(33.57805971, 73.21738556)**	Hardoghar, Kangota gujjran Sihala, HonDamial, Nara syedan, Chuchkal Chakiyan, Chak Kamdar, Police College Sihala
12	12	Rawat **(33.51386444, 73.1799451)**	Bhangrial Kalan, Banni Saran, Mohra Nagial, Sawan Camp
13	13	Nayi Abadi Humak	Sawan humak, Kaniyal, Gora Syedan, Niazian, Fatima Villas]

		(33.53634249, 73.1361781)	
14	14	Sihala **(33.55653516, 73.17955433)**	Sihala Khurd, Maira Dakhli, Bhandar Sihala, Jarki Sihala, Rawat, Gagri Sihala, Jhundla, Kangota Syedan, Gura Mistriyan
15	15	Lohi Bhair **(33.56467604, 73.131098)**	P.O. Korang Town, Sawan Garden, Pakistan Town, NFP, PWD Town, Korang, Pakistan Town
16	16	Darwala **(33.60100881, 73.17904994)**	P.O. Sihala, Dhaliala, Panwal, P.O. Pakistan Town, Village Chucha Sheikhiyan, P.O. Lohi Bhair, Village Kanghar, Sher Ghamial,Dhok Kavgar, Kathrial, Chucha, Dhok Kashimiriya,P.O. Korang Town
17	17	Koral **(33.60301476, 73.13027553)**	Tarlai Khurd, Gangal, P.O. Chaklala, Shareefabad, Gohra Sardar, P.O. Tarlai, Office Enclave
18	18	Khana Dak **(33.62081743, 73.10399996)**	Dhok Jabba, Pindorian, Bilal Town, Barma Town, Madina Town, Muhallah Wahid Abad, Cristian Colony
19	19	Tarlai Kalan **(33.62600919, 73.13383832)**	Lehtar Road, Irfanabad tramri, Chappar Meer Khanal, Sahana, Madina Town Tarlai, New Irfanabad
20	20	Ali Pur **(33.62647868, 73.17247486)**	Khadrapar, Village & P.O. Alipur,Farash
21	21	Sohan **(33.64094346, 73.08287365)**	Village & P.O. Sohan, Chak Shehzad, Pindorian, Khana Dak, New Shakrial, Nayi Abadi, Malor, New Shakrial, New Akbar Town
22	22	Chak Shahzad **(33.64249167, 73.13230614)**	Mouza Suhana, Chatha Bakhtawar, P.V. Scheme, Village Gaba Taili, Mouza Mojuan Ali Pur, Shehzad Town,Pindorian
23	23	Kuri **(33.66926972, 73.1806431)**	Muhallah Eid Gah, Village Rihara, Malot, Nih, Muhallah Mughlan, Village Mohra Noor, Jagiot, Dhok Pacci Masjid, Mohallah Jameh Masjid, Nogazi, PIA Chowk Kachi Abadi Chak Shehzad
24	24	Shahra-e-Rawal **(33.66383311, 73.08691236)**	Rawal Dam Colony, Sumbal Korakh, Puna Faqeeran, Village Mohrian
25	25	Sector F6 **(33.72017628, 73.05561167)**	F-6/4, F-6/1, F-6/3, Farooqi Market, Madni Masjid, F-6/2, Dhobi Gat
26	26	Sector G6/1 **(33.69875727, 73.06429105)**	-
27	27	Sector G6 **(33.71050248, 73.07643701)**	Sector G-6/2, Sector G-6/3, Sector G-6/4
28	28	Sector F7,F8,F9 **(33.70113704, 73.02310677)**	French Colony, Markaz, Nazimuddin road

29	29	Sector F10,11 **(33.68280556, 72.98602544)**	Waraich Plaza, Tariq Height Appartments
30	30	Sector G7/3-G7/4 **(33.69889798, 73.05415536)**	Press Colony
31	31	Sector G7/1-G7/2 **(33.69453597, 73.04581586)**	Faisal Colony, Shah Abdul lateef Road
32	32	Sector G8/3-G8/4 **(33.68977813, 73.03806656)**	PTCL Staff Colony, Pims Hospital, Pims Colony, Radio Colony, Makin Colony, Postal Colony, Bismillah Plaza, TnT Colony
33	33	Sector G8/1-G8/2 **(33.68608182, 73.02797415)**	PARC Colony, Jai Salai Colony
34	34	Sector G9 **(33.67452368, 73.01863644)**	Sector G-9/1, Sector G-9/3, Sector G-9/4
35	35	Sector G9/2 **(33.67968393, 73.00649898)**	-
36	36	Sector G10/3-G10/4 **(33.66790715, 73.00645448)**	Sector G-10/3, Sector G-10/4
37	37	Sector G10/1-G10/2 **(33.67009564, 72.9935893)**	Sector G-10/1, Sector G-10/2
38	38	Sector G11 **(33.66017484, 72.98222532)**	Sector G-11/1, Sector G-11/2, Sector G-11/3, Sector G-11/4
39	39	Maira Sumbal Jaffar **(33.65601398, 72.95667354)**	Village Maira Jaffar, P.O. Golra Sharif, Badia Rusmat Khan, Maira Akku, Dhareek Mohri, Effaq Town
40	40	I8,H8 **(33.67331549, 73.06795235)**	Sector I-8/2, I8/4, I8/1, I8/3, AIOU Colony
41	41	I9-H9 **(33.66400109, 73.04992385)**	Sector I9/4, I9/1
42	42	Sector I10/1 **(33.64043686, 73.01384972)**	Partly, CDA Colony
43	43	Sector I10 **(33.63470941, 73.02057862)**	Partly, Sector H-10
44	44	Bokra **(33.6566406923572, 73.0151408)**	P.O Haji Complex, Muhallah INT Centre, Nayi Abadi Bokra, PHA Flat, Soria Harboza, Mouza Sorain, Bokra P.O Peer Wadhai, Iqbal Town H-13

45	45	Jhangi Saydan **(33.6161281, 72.9330587)**	Pishawar Road Jhangi Syedan, Suleman Town, P.O Tarnol, Muhallah Sultan Nagar, Dhok Boota Khan, Sadat Colony, Dhok Malyar, CMT Golra Road, Dhok Qureshiyan, Pind Paracha
46	46	Badhana Kalan **(33.55895356, 72.83551117)**	Village Noon
47	47	Tarnol **(33.68888567, 72.87937715)**	Pind Parian, Muhallah Chaudrian, Golra Sharif, Muhallah Sadiq Abad
48	48	Sarai Kharbooza **(33.66682423, 72.8395486)**	Dhok Paracha Tarnol, Dhok Raja Mehboob, Sanjani
49	49	Shah Allah Ditta **(33.68433413, 72.92966549)**	Pind Siri Siral, Tarnol, Pind Sangrial Golra, Bakar Fateh Bakhsh, Bakar Akku
50	50	Golra Sharif **(33.70325025, 72.97952657)**	Maira Bheri Karnol, Bakar Akku, Kalanjar, SectorE-11
51	12-A	Khana Dak **(33.54709079,73.10374362)**	-

Appendix D

All 51 Queries executed to extract data from Google through Google Map API

1.https://maps.googleapis.com/maps/api/distancematrix/xml?departure
_time=now&destinations=33.7199629,73.0933116%7C33.7447777,73.129607
5%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.20
84138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,
73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.513
8644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C3
3.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%
7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749
%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.18
06431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,
73.0642911&origins=33.7299945,73.0748929&key=Your API Key

https://maps.googleapis.com/maps/api/distancematrix/xml?departure_t
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33.6828056,72.9860254%7C33.698898,73.0541554%7C33.694536,73.0458159
%7C33.6897781,73.0380666%7C33.6860818,73.0279742%7C33.6745237,73.01
86364%7C33.6796839,73.006499%7C33.6679072,73.0064545%7C33.6700956,7
2.9935893%7C33.6601748,72.9822253%7C33.656014,72.9566735%7C33.67331
55,73.0679524%7C33.6640011,73.0499239%7C33.6404369,73.0138497%7C33.
6347094,73.0205786%7C33.6566407,73.0151408%7C33.6161281,72.9330587%
7C33.5589536,72.8355112%7C33.6888857,72.8793772%7C33.6668242,72.839
5486%7C33.6843341,72.9296655%7C33.7032503,72.9795266%7C33.5470908,7
3.1037436&origins=33.7299945,73.0748929&key=Your API Key

2.https://maps.googleapis.com/maps/api/distancematrix/xml?departure
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5%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.20
84138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,
73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.513
8644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C3
3.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%
7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749
%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.18
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73.0642911&origins=33.7199629,73.0933116&key=Your API Key

https://maps.googleapis.com/maps/api/distancematrix/xml?departure_t
ime=now&destinations=33.7105025,73.076437%7C33.701137,73.0231068%7C
33.6828056,72.9860254%7C33.698898,73.0541554%7C33.694536,73.0458159
%7C33.6897781,73.0380666%7C33.6860818,73.0279742%7C33.6745237,73.01
86364%7C33.6796839,73.006499%7C33.6679072,73.0064545%7C33.6700956,7
2.9935893%7C33.6601748,72.9822253%7C33.656014,72.9566735%7C33.67331
55,73.0679524%7C33.6640011,73.0499239%7C33.6404369,73.0138497%7C33.
6347094,73.0205786%7C33.6566407,73.0151408%7C33.6161281,72.9330587%
7C33.5589536,72.8355112%7C33.6888857,72.8793772%7C33.6668242,72.839
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3.1037436&origins=33.7199629,73.0933116&key=Your API Key

3.https://maps.googleapis.com/maps/api/distancematrix/xml?departure
_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.093311
6%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.20
84138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,
73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.513
8644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C3

3.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.7447777,73.1296075&key=Your API Key

https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7105025,73.076437%7C33.701137,73.0231068%7C33.6828056,72.9860254%7C33.698898,73.0541554%7C33.694536,73.0458159%7C33.6897781,73.0380666%7C33.6860818,73.0279742%7C33.6745237,73.0186364%7C33.6796839,73.006499%7C33.6679072,73.0064545%7C33.6700956,72.9935893%7C33.6601748,72.9822253%7C33.656014,72.9566735%7C33.6733155,73.0679524%7C33.6640011,73.0499239%7C33.6404369,73.0138497%7C33.6347094,73.0205786%7C33.6566407,73.0151408%7C33.6161281,72.9330587%7C33.5589536,72.8355112%7C33.6888857,72.8793772%7C33.6668242,72.8395486%7C33.6843341,72.9296655%7C33.7032503,72.9795266%7C33.5470908,73.1037436&origins=33.7447777,73.1296075&key=Your API Key

4.https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.7402115,73.1797092&key=Your API Key

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5.https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.719551,73.1748887&key=Your API Key

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86364%7C33.6796839,73.006499%7C33.6679072,73.0064545%7C33.6700956,72.9935893%7C33.6601748,72.9822253%7C33.656014,72.9566735%7C33.6733155,73.0679524%7C33.6640011,73.0499239%7C33.6404369,73.0138497%7C33.6347094,73.0205786%7C33.6566407,73.0151408%7C33.6161281,72.9330587%7C33.5589536,72.8355112%7C33.6888857,72.8793772%7C33.6668242,72.8395486%7C33.6843341,72.9296655%7C33.7032503,72.9795266%7C33.5470908,73.1037436&origins=33.719551,73.1748887&key=Your API Key

6.https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.7369539,73.2084138&key=Your API Key

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7.https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.7092797,73.2458146&key=Your API Key

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8.https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.093311

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11. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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12. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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13. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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14. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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15. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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16. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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18. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.6208174,73.104&key=Your API Key

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19. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117%7C33.6987573,73.0642911&origins=33.6260092,73.1338383&key=Your API Key

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20. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1

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25. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.6987573,73.0642911&origins=33.7201763,73.0556117&key=Your API Key

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26. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6987573,73.0642911&key=Your API Key

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27. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.133838

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28. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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29. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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30. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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31. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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32. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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33. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6860818,73.0279742&key=Your API Key
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34. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6745237,73.0186364&key=Your API Key
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35. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6796839,73.006499&key=Your API Key

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36. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6679072,73.0064545&key=Your API Key

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37. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6700956,72.9935893&key=Your API Key

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38. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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39. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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40. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6733155,73.0679524&key=Your API Key

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41. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6640011,73.0499239&key=Your API Key

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42. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6404369,73.0138497&key=Your API Key

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43. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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ime=now&destinations=33.6987573,73.0642911%7C33.7105025,73.07643%7C
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%7C33.694536,73.0458159%7C33.6897781,73.0380666%7C33.6860818,73.027
9742%7C33.6745237,73.0186364%7C33.6796839,73.006499%7C33.6679072,73
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4,72.9566735%7C33.6733155,73.0679524%7C33.6640011,73.0499239%7C33.6
404369,73.0138497%7C33.6566407,73.0151408%7C33.6161281,72.9330587%7
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.1037436&origins=33.6347094,73.0205786&key=Your API Key

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748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904
,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.57
80597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C
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3%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1
323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763
,73.0556117&origins=33.6566407,73.0151408&key=Your API Key

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%7C33.694536,73.0458159%7C33.6897781,73.0380666%7C33.6860818,73.027
9742%7C33.6745237,73.0186364%7C33.6796839,73.006499%7C33.6679072,73
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45. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904
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33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499
%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.133838
3%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1
323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763
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ime=now&destinations=33.6987573,73.0642911%7C33.7105025,73.07643%7C
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%7C33.694536,73.0458159%7C33.6897781,73.0380666%7C33.6860818,73.027
9742%7C33.6745237,73.0186364%7C33.6796839,73.006499%7C33.6679072,73
.0064545%7C33.6700956,72.9935893%7C33.6601748,72.9822253%7C33.65601
4,72.9566735%7C33.6733155,73.0679524%7C33.6640011,73.0499239%7C33.6
404369,73.0138497%7C33.6347094,73.0205786%7C33.6566407,73.0151408%7
C33.5589536,72.8355112%7C33.6888857,72.8793772%7C33.6668242,72.8395
486%7C33.6843341,72.9296655%7C33.7032503,72.9795266%7C33.5470908,73
.1037436&origins=33.6161281,72.9330587&key=Your API Key

46. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
e_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.09331
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748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904
,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.57
80597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C
33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499
%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.133838
3%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1
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ime=now&destinations=33.6987573,73.0642911%7C33.7105025,73.07643%7C
33.701137,73.0231068%7C33.6828056,72.9860254%7C33.698898,73.0541554
%7C33.694536,73.0458159%7C33.6897781,73.0380666%7C33.6860818,73.027
9742%7C33.6745237,73.0186364%7C33.6796839,73.006499%7C33.6679072,73
.0064545%7C33.6700956,72.9935893%7C33.6601748,72.9822253%7C33.65601
4,72.9566735%7C33.6733155,73.0679524%7C33.6640011,73.0499239%7C33.6
404369,73.0138497%7C33.6347094,73.0205786%7C33.6566407,73.0151408%7
C33.6161281,72.9330587%7C33.6888857,72.8793772%7C33.6668242,72.8395
486%7C33.6843341,72.9296655%7C33.7032503,72.9795266%7C33.5470908,73
.1037436&origins=33.5589536,72.8355112&key=Your API Key

47. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
e_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.09331
16%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1
748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904
,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.57
80597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C
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%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.133838
3%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1
323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763
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48. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6668242,72.8395486&key=Your API Key

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49. https://maps.googleapis.com/maps/api/distancematrix/xml?departure_time=now&destinations=33.7299945,73.0748929%7C33.7199629,73.0933116%7C33.7447777,73.1296075%7C33.7402115,73.1797092%7C33.719551,73.1748887%7C33.7369539,73.2084138%7C33.7092797,73.2458146%7C33.6830904,73.2698871%7C33.6470351,73.2304112%7C33.6208007,73.2308974%7C33.5780597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499%7C33.6030148,73.1302755%7C33.6208174,73.104%7C33.6260092,73.1338383%7C33.6264787,73.1724749%7C33.6409435,73.0828737%7C33.6424917,73.1323061%7C33.6692697,73.1806431%7C33.6638331,73.0869124%7C33.7201763,73.0556117&origins=33.6843341,72.9296655&key=Your API Key

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50. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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51. https://maps.googleapis.com/maps/api/distancematrix/xml?departur
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80597,73.2173856%7C33.5138644,73.1799451%7C33.5363425,73.1361781%7C
33.5565352,73.1795543%7C33.564676,73.131098%7C33.6010088,73.1790499
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,73.0556117&origins=33.5470908,73.1037436&key=Your API Key
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ime=now&destinations=33.6987573,73.0642911%7C33.7105025,73.07643%7C
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Appendix E

Travel Time Matrix

Zone ID	UC 1	UC 2	UC 3	UC 4	UC 5	UC 6	UC 7	UC 8	UC 9	UC 10	UC 11	UC 12	UC 13	UC 14	UC 15	UC 16	UC 17	UC 18	UC 19	UC 20	UC 21	UC 22	UC 23	UC 24	UC 25	UC 26	UC 27	UC 28	UC 29	UC 30	UC 31	UC 32	UC 33	UC 34	UC 35	UC 36	UC 37	UC 38	UC 39	UC 40	UC 41	UC 42	UC 43	UC 44	UC 45	UC 46	UC 47	UC 48	UC 49	UC 50	UC 12A
UC 1	~	7	19	21	27	37	47	51	42	43	46	48	51	39	40	36	29	25	35	34	23	32	35	16	8	12	8	19	23	14	13	15	16	19	18	21	21	29	31	16	18	29	28	24	43	46	47	50	39	23	48
UC 2	8	~	13	16	22	31	40	46	36	40	44	45	51	37	38	34	28	23	33	32	21	26	30	13	10	11	7	18	19	13	12	14	16	19	17	20	19	28	29	15	17	29	26	24	42	45	46	48	38	23	40
UC 3	24	17	~	10	16	26	38	48	41	45	48	49	52	40	42	38	32	27	37	36	25	31	35	18	27	22	21	32	32	23	24	25	26	28	29	27	30	36	37	23	25	35	34	30	50	52	63	56	54	38	50
UC 4	28	20	14	~	15	16	29	38	45	49	53	53	56	45	47	43	36	32	43	41	30	35	39	22	31	26	25	37	37	27	28	30	31	33	33	31	34	41	41	27	29	40	38	35	54	57	65	60	57	41	49
UC 5	26	18	17	11	~	15	27	36	39	43	51	53	54	45	45	41	34	30	37	39	28	29	32	20	29	24	23	35	35	25	26	28	29	30	31	29	32	39	39	25	27	38	36	33	52	55	63	58	55	39	47
UC 6	35	27	26	13	15	~	12	22	37	48	64	60	64	52	54	50	43	39	48	51	37	40	30	30	38	34	35	27	26	13	15	12	22	37	48	64	60	64	52	54	50	43	39	48	51	37	40	30	30	38	34
UC 7	48	40	39	25	27	13	~	9	25	36	52	67	72	58	67	49	55	49	46	45	47	38	27	38	50	46	45	57	56	47	48	50	51	52	53	51	54	60	61	42	49	59	58	54	74	76	85	80	77	60	64
UC 8	57	49	48	35	36	22	9	~	16	28	44	59	64	49	59	41	47	43	40	37	53	41	31	45	56	52	56	63	63	53	55	56	58	59	60	58	61	67	68	49	55	66	65	61	81	83	91	87	83	67	70
UC 9	49	40	44	49	41	38	26	17	~	17	32	46	52	37	47	29	35	32	30	26	42	30	24	34	46	42	46	52	53	43	44	46	47	49	50	47	50	56	57	39	45	56	54	51	70	73	81	76	72	56	58
UC 10	43	42	45	48	44	51	38	29	20	~	19	33	39	24	34	16	22	28	33	18	37	33	28	32	40	36	40	47	47	37	39	40	42	43	44	42	45	52	52	33	40	50	49	45	65	67	75	71	67	51	45
UC 11	46	44	48	51	53	68	55	47	32	19	~	28	33	19	28	18	24	30	38	20	39	39	45	34	43	39	43	49	50	40	41	43	44	46	47	44	47	53	54	36	43	53	51	48	67	70	78	74	69	53	39
UC 12	46	44	48	51	53	66	69	61	46	34	27	~	18	14	25	34	24	30	38	32	39	39	57	34	43	39	43	50	50	40	41	43	44	46	47	44	47	54	54	36	42	53	51	48	62	70	78	73	69	53	16
UC 13	50	48	52	55	57	70	73	65	50	38	31	17	~	18	20	38	28	34	42	36	43	43	61	38	47	43	47	53	54	44	45	47	48	50	51	48	51	58	58	40	46	57	46	52	53	74	82	68	73	57	11
UC 14	38	36	40	43	45	60	61	53	38	26	19	14	19	~	17	26	17	22	30	24	31	31	49	26	35	31	35	41	42	32	34	35	36	38	41	36	40	46	46	28	35	45	43	40	59	62	70	66	61	45	25
UC 15	36	38	41	41	43	56	59	55	47	31	27	24	18	17	~	27	18	24	32	25	29	29	51	24	33	29	36	43	43	33	35	36	37	38	42	38	41	47	44	29	36	47	45	41	59	60	73	64	64	48	14
UC 16	37	36	39	42	45	57	54	45	30	18	20	34	40	25	28	~	16	21	29	11	31	31	43	26	34	30	34	41	41	31	33	34	35	37	38	36	39	45	46	27	34	44	43	39	60	61	69	65	60	44	40
UC 17	25	23	27	30	32	47	48	44	34	22	24	25	30	17	18	14	~	10	17	12	18	18	36	13	22	18	22	28	29	19	21	22	23	25	26	23	27	33	33	15	22	32	30	27	46	49	57	53	48	32	32
UC 18	26	24	28	31	33	48	49	45	35	32	35	35	41	27	29	25	12	~	22	23	20	19	37	14	23	19	23	30	30	20	22	23	24	26	29	24	28	34	34	16	23	33	31	28	47	50	60	54	51	33	37
UC 19	33	31	35	38	37	52	47	38	29	33	37	38	43	29	31	27	20	16	~	18	26	14	30	21	30	26	30	37	37	27	28	30	31	32	35	31	35	41	41	23	30	40	38	35	54	57	65	62	56	40	45
UC 20	35	33	37	40	40	53	46	37	28	18	20	35	40	26	26	11	14	19	17	~	28	25	29	23	32	28	32	39	39	29	31	32	33	35	38	33	37	43	43	25	32	42	40	37	56	59	67	63	58	42	42
UC 21	22	20	24	27	29	44	45	50	40	42	45	39	33	37	37	35	22	18	29	33	~	28	34	10	20	15	20	26	27	16	17	18	22	21	24	21	24	31	31	12	14	25	22	25	44	46	55	50	46	30	26
UC 22	32	29	32	37	29	44	40	38	29	33	38	41	46	30	34	28	22	15	15	26	25	~	29	20	29	25	29	35	36	26	27	29	30	32	33	30	34	40	40	22	29	39	37	34	54	56	64	60	55	39	46
UC 23	41	33	37	42	34	31	29	32	23	27	44	58	63	49	58	41	40	33	30	29	35	29	~	28	39	35	38	46	46	36	38	40	41	42	43	41	44	51	51	32	39	49	48	46	64	66	74	70	66	49	54
UC 24	15	13	17	19	22	37	37	43	33	31	33	35	34	27	29	23	16	12	22	21	7	20	27	~	12	8	12	18	19	9	10	12	13	15	17	13	16	23	23	4	11	22	20	16	36	39	47	42	38	22	26
UC 25	7	10	21	24	30	39	46	51	42	39	41	41	45	33	35	31	24	20	30	29	19	28	36	11	~	7	8	17	19	10	11	13	14	17	16	16	18	26	26	11	14	24	23	20	39	41	44	45	35	19	38
UC 26	11	9	17	20	23	37	41	46	37	34	36	36	40	28	30	26	20	15	25	24	14	23	31	6	10	~	7	16	16	5	9	11	11	12	13	11	14	20	22	6	9	19	18	14	34	37	44	41	35	19	33
UC 27	7	6	16	19	23	37	44	49	39	39	41	41	45	33	35	31	25	20	30	29	19	28	33	11	9	7	~	18	22	10	13	15	16	18	18	16	19	25	27	11	16	24	23	19	40	42	47	46	39	23	38
UC 28	15	15	26	29	33	47	52	57	47	44	46	47	51	38	40	36	30	25	35	34	24	33	41	16	13	12	13	~	13	12	9	10	8	11	10	13	13	21	25	13	14	24	22	19	37	40	40	44	31	15	43
UC 29	22	22	33	36	39	55	58	63	54	51	53	53	59	45	47	43	37	32	42	41	33	40	48	23	21	20	21	15	~	19	17	15	13	13	9	12	9	14	20	21	22	20	21	18	33	35	35	39	24	11	50
UC 30	10	10	19	22	25	39	43	49	39	36	38	38	42	30	32	28	22	17	27	26	16	25	33	8	7	3	8	14	15	~	6	9	11	13	13	13	15	22	25	8	11	21	20	16	36	40	42	46	34	17	35
UC 31	13	13	20	23	27	41	46	51	41	38	40	41	45	35	34	30	24	19	29	28	19	28	35	11	11	8	12	14	15	4	~	5	8	11	12	11	15	20	24	8	8	19	18	14	37	39	42	43	33	17	38
UC 32	13	12	20	23	26	40	45	50	41	38	40	40	45	32	34	30	24	19	29	28	18	27	35	10	12	8	10	12	13	6	2	~	7	10	10	13	13	22	23	7	8	20	18	15	36	38	42	43	33	16	37
UC 33	15	15	22	25	29	43	48	53	43	40	42	43	46	34	36	32	26	21	31	30	21	30	37	13	13	10	13	9	11	11	6	4	~	5	8	9	11	18	21	12	12	18	17	13	34	36	40	40	31	15	39
UC 34	19	16	24	27	30	44	49	55	45	42	44	44	48	36	38	34	28	23	33	32	22	31	39	14	17	12	14	11	11	13	11	8	5	~	8	7	9	16	17	12	12	16	15	11	30	32	40	36	31	15	41
UC 35	19	18	26	29	32	46	51	56	47	44	46	46	50	38	40	36	30	25	35	34	24	33	41	16	17	13	16	11	7	15	12	10	8	6	~	5	7	14	17	14	15	16	14	11	30	32	36	36	27	11	43
UC 36	19	17	24	27	31	45	50	55	45	42	44	45	48	36	38	34	28	23	33	32	22	32	39	15	16	12	15	13	9	13	10	9	8	6	6	~	5	13	14	12	13	14	13	9	27	30	38	34	29	13	41
UC 37	20	20	28	31	34	48	53	58	49	46	48	48	52	40	42	38	32	27	37	36	27	35	43	18	18	15	18	12	6	16	14	12	10	8	6	5	~	11	17	16	17	17	16	13	30	32	37	36	28	12	45
UC 38	28	26	34	36	40	54	59	64	55	51	54	54	50	46	47	44	37	32	43	42	32	41	48	24	27	21	24	21	14	22	19	18	17	15	14	12	11	~	13	21	20	19	20	16	28	31	44	35	33	20	43
UC 39	29	27	34	37	41	55	60	65	55	52	54	53	48	46	51	44	38	33	44	42	32	42	49	25	26	22	25	23	20	23	20	19	19	16	17	13	16	10	~	22	21	19	20	17	26	29	40	33	29	24	40
UC 40	14	13	20	23	26	40	41	46	37	33	36	36	40	28	29	26	19	14	25	24	13	23	30	6	12	7	12	18	19	8	9	11	13	14	16	14	16	22	24	~	7	19	19	16	36	39	47	44	38	22	32
UC 41	18	15	23	26	30	44	47	52	42	40	42	43	43	35	36	33	26	21	32	30	17	30	36	13	16	11	13	17	18	13	8	10	13	16	15	12	15	25	24	7	~	12	12	14	36	40	46	45	37	22	36
UC 42	26	23	31	34	42	56	57	62	53	50	53	51	46	45	49	43	36	31	42	41	23	40	47	23	23	19	21	21	17	20	17	16	16	13	14	11	15	20	19	18	12	~	9	9	32	35	46	40	37	21	38
UC 43	27	27	33	36	39	54	54	59	50	47	50	47	41	43	45	40	33	28	39	38	20	37	44	20	25	22	25	22	18	24	20	18	17	14	15	13	16	22	21	18	12	8	~	11	27	36	47	42	39	22	35
UC 44	22	20	28	31	34	49	53	58	49	46	48	48	52	40	42	38	32	27	37	36	24	35	43	18	20	16	18	17	14	17	14	13	13	10	11	8	11	18	17	17	10	11	10	~	30	32	43	36	34	18	44
UC 45	42	40	48	50	54	66	73	78	69	65	68	59	53	60	57	58	49	47	57	56	47	55	62	38	40	35	38	37	33	37	33	33	32	29	30	26	29	30	22	35	34	32	32	30	~	32	53	35	50	37	46
UC 46	43	40	48	51	55	66	73	79	69	66	68	65	60	60	62	58	52	47	57	56	47	55	63	38	40	36	38	37	33	37	35	33	32	29	30	26	29	30	23	36	35	32	34	30	36	~	55	25	51	37	52
UC 47	46	47	58	61	64	77	83	88	78	75	77	78	80	69	71	67	61	56	67	65	58	65	72	48	43	43	45	38	34	44	43	40	38	40	36	39	39	46	42	47	47	50	48	45	54	57	~	42	23	30	72
UC 48	50	47	54	57	61	73	80	85	76	72	75	69	64	67	67	65	58	53	64	63	52	62	69	45	46	42	45	42	38	44	41	39	38	35	35	31	34	37	28	42	40	39	42	35	38	34	42	~	39	42	58
UC 49	37	38	49	52	56	67	74	79	70	66	69	69	73	61	63	59	52	47	58	57	46	56	63	39	34	34	36	29	25	35	32	31	29	31	27	30	30	34	30	37	37	41	39	36	50	53	23	38	~	22	65
UC 50	21	22	33	36	39	53	58	63	54	50	53	53	59	45	46	43	36	31	42	41	33	40	47	23	18	18	20	13	9	19	16	15	13	15	11	14	14	22	28	21	21	25	23	20	39	41	28	45	19	~	51
UC 12-A	45	43	47	49	52	65	67	64	54	42	35	15	10	21	15	36	24	29	37	34	30	39	57	33	42	38	42	48	50	39	40	41	44	44	47	44	47	53	42	35	36	42	37	46	45	55	77	58	68	52	~

Travel Time Matrix (Peak Hours)

Zone ID	UC 1	UC 2	UC 3	UC 4	UC 5	UC 6	UC 7	UC 8	UC 9	UC 10	UC 11	UC 12	UC 13	UC 14	UC 15	UC 16	UC 17	UC 18	UC 19	UC 20	UC 21	UC 22	UC 23	UC 24	UC 25	UC 26	UC 27	UC 28	UC 29	UC 30	UC 31	UC 32	UC 33	UC 34	UC 35	UC 36	UC 37	UC 38	UC 39	UC 40	UC 41	UC 42	UC 43	UC 44	UC 45	UC 46	UC 47	UC 48	UC 49	UC 50	UC 12A
UC 1	~	7	19	21	27	37	48	53	42	46	48	53	61	46	51	39	31	27	38	36	26	32	36	18	7	11	7	18	22	13	12	14	15	18	17	20	20	28	32	15	18	30	29	23	45	47	47	53	39	23	53
UC 2	8	~	14	18	24	36	46	56	46	50	53	59	65	51	56	43	37	32	42	41	29	32	35	19	10	11	6	22	23	13	13	15	16	19	21	25	23	32	36	17	18	35	36	26	50	51	54	59	45	27	57
UC 3	24	17	~	10	16	27	40	49	45	50	55	67	68	59	63	45	35	31	41	43	30	33	37	20	24	22	21	32	33	23	23	25	26	29	29	27	30	37	40	23	24	37	36	30	54	55	64	62	54	38	59
UC 4	30	23	15	~	16	17	29	38	53	59	65	74	76	65	70	55	43	39	49	53	38	41	45	28	32	28	27	38	39	29	30	32	33	35	36	33	37	43	47	29	31	44	43	37	61	63	70	71	60	44	67
UC 5	27	20	17	12	~	15	27	36	39	44	61	69	72	60	67	51	40	35	36	38	34	27	31	25	28	25	24	35	36	26	27	28	29	31	33	30	33	39	44	26	28	40	39	33	57	59	65	66	56	40	65
UC 6	41	33	30	16	15	~	13	23	37	48	66	83	87	75	79	65	54	50	48	50	48	40	31	39	43	38	41	33	30	16	15	13	23	37	48	66	82	86	74	79	64	54	50	48	50	48	40	31	38	43	38
UC 7	53	46	43	29	28	13	~	10	25	36	52	68	73	58	68	48	55	51	45	43	51	37	27	41	56	51	51	62	63	52	53	55	56	58	60	57	60	68	73	48	54	66	65	61	86	88	93	95	83	67	82
UC 8	62	55	52	37	37	23	10		16	28	43	59	65	48	60	40	45	45	41	36	56	41	30	51	59	54	58	67	66	55	57	58	60	62	63	60	64	71	76	51	60	70	69	64	89	92	95	98	85	69	72
UC 9	51	49	51	51	42	37	25	17	~	18	32	48	55	38	49	29	34	35	31	26	46	31	24	41	49	44	48	57	57	45	47	49	50	52	53	51	54	62	66	41	48	60	59	54	79	81	86	88	76	60	61
UC 10	42	43	45	48	46	50	38	29	20	~	19	35	41	26	37	16	21	27	34	18	37	35	27	31	39	35	39	49	48	36	38	40	41	44	45	42	45	51	56	32	39	51	50	46	70	72	77	80	68	52	49
UC 11	44	45	47	50	54	70	56	45	33	20	~	28	34	19	30	19	24	29	39	20	39	40	43	34	42	38	41	50	50	38	40	42	43	46	47	44	47	55	60	34	42	54	53	48	74	75	80	82	71	55	41
UC 12	44	45	47	51	55	72	70	64	47	36	27	~	18	14	25	33	24	30	39	31	40	40	60	34	42	38	41	50	51	39	40	43	44	46	47	45	48	55	62	35	42	55	54	48	69	77	81	85	71	55	16
UC 13	51	50	54	57	61	77	76	68	53	40	32	17	~	19	21	39	30	35	46	37	46	46	66	40	48	44	47	57	57	44	47	47	51	53	54	51	54	61	66	41	48	60	60	54	74	82	86	86	76	60	12
UC 14	38	38	41	45	48	63	64	55	39	28	19	14	19	~	19	27	17	23	33	25	34	34	53	27	36	31	35	45	45	32	35	35	39	41	42	39	43	49	54	28	35	48	47	42	69	70	74	78	64	48	27
UC 15	42	39	42	48	51	67	67	66	47	38	30	25	19	20	~	28	19	25	34	26	37	38	54	31	40	35	37	46	48	33	36	37	39	40	44	42	45	51	58	30	37	51	50	43	67	73	76	80	66	50	14
UC 16	36	35	39	42	46	62	54	44	30	18	20	36	43	27	37	~	15	21	31	12	31	32	42	25	34	30	33	43	43	30	33	35	36	39	40	37	41	46	54	26	33	47	46	41	67	71	72	79	62	47	49
UC 17	25	24	27	31	34	48	49	47	33	22	23	34	41	26	32	14	~	10	19	12	20	20	38	13	22	18	22	32	31	18	21	22	26	27	28	25	29	35	43	15	22	35	34	30	56	58	60	66	51	35	34
UC 18	25	25	28	32	34	49	50	49	39	32	33	44	50	35	41	24	11	~	23	22	20	21	40	14	23	19	22	31	32	19	22	24	25	28	29	26	30	36	42	15	23	36	35	29	55	57	61	65	50	36	44
UC 19	35	34	38	41	37	52	49	41	31	36	43	54	61	47	52	34	21	19	~	18	30	13	32	24	32	29	32	40	43	29	31	33	34	36	38	37	40	46	52	25	32	46	45	38	67	68	70	75	60	45	48
UC 20	34	33	37	41	40	54	46	38	29	19	20	36	43	27	35	11	13	19	17	~	30	25	30	24	31	28	31	39	42	28	30	31	35	38	38	36	40	46	52	24	32	45	44	38	67	68	70	76	60	45	44
UC 21	24	24	26	30	33	47	49	57	47	43	46	53	48	48	50	35	23	19	32	33	~	31	38	12	21	17	21	31	32	18	22	22	26	26	29	26	30	35	41	14	18	27	24	28	56	56	58	64	48	33	39
UC 22	35	35	37	39	30	44	39	41	32	36	48	56	62	51	52	38	25	19	15	26	30	~	29	24	33	29	32	42	41	29	32	34	35	38	38	35	39	45	53	25	33	46	44	40	66	68	70	76	60	45	52
UC 23	47	40	42	44	35	32	29	32	23	28	42	59	65	48	60	40	43	36	31	29	42	28	~	32	45	40	45	52	53	40	44	43	47	47	50	48	51	57	64	37	45	57	56	49	79	80	81	87	71	56	70
UC 24	14	13	17	21	24	38	40	47	37	38	40	49	48	41	45	30	18	13	23	28	10	24	28	~	12	8	11	20	22	8	12	14	15	17	19	16	19	25	31	5	11	26	25	20	46	48	48	55	38	23	40
UC 25	7	10	22	26	31	45	50	59	49	50	52	63	65	55	59	42	29	24	35	40	26	35	39	14	~	7	7	18	21	9	11	13	15	17	17	17	20	26	33	12	14	27	26	21	47	49	46	57	37	21	56
UC 26	15	15	26	33	32	46	54	59	49	45	47	56	55	47	50	38	31	27	36	36	24	36	42	17	13	~	12	13	12	11	9	9	8	10	10	13	12	20	26	13	13	24	23	19	39	42	39	48	30	14	46
UC 27	7	5	16	24	22	36	46	53	42	40	42	50	49	43	46	32	26	21	31	30	20	30	36	12	8	6	~	20	22	8	11	14	16	17	19	18	21	27	30	12	14	26	25	21	43	46	46	55	38	22	41
UC 28	15	15	26	33	32	46	54	59	49	45	47	56	55	47	50	38	31	27	36	36	24	36	42	17	13	12	13	~	12	11	9	9	8	10	10	13	12	20	26	13	13	24	23	19	39	42	39	48	30	14	46
UC 29	25	25	36	44	42	58	61	67	58	54	56	63	64	55	60	45	39	35	45	43	32	43	50	25	23	22	22	14	~	19	16	15	13	13	9	11	8	12	19	21	22	20	21	18	31	35	32	40	22	10	56
UC 30	10	10	19	27	26	39	43	48	39	35	38	45	45	37	42	28	22	17	27	26	16	26	32	8	8	3	7	15	16	~	5	7	11	13	14	13	16	22	26	8	10	22	20	17	38	42	43	47	34	18	37
UC 31	12	13	21	28	27	41	46	52	42	38	40	47	48	41	45	31	24	20	29	29	19	29	35	11	11	7	10	14	16	4	~	4	7	10	11	12	14	21	25	7	8	20	19	15	38	41	41	48	32	17	40
UC 32	13	12	21	28	27	41	45	50	41	38	40	48	48	41	46	31	24	20	29	29	18	29	35	11	12	7	10	12	13	6	2	~	7	10	10	13	12	21	24	7	8	20	19	14	36	39	41	45	31	16	40
UC 33	15	17	26	33	32	46	52	58	47	43	45	55	56	46	52	36	29	25	35	34	24	34	40	15	14	13	14	9	11	9	6	4	~	5	7	8	10	16	22	11	11	21	20	16	38	41	39	45	30	15	47
UC 34	19	17	27	34	33	47	52	58	48	44	46	56	56	46	50	36	30	25	35	34	24	35	40	16	17	13	15	11	10	13	10	8	5	~	7	7	8	14	17	13	13	16	14	11	29	33	39	38	30	15	46
UC 35	19	18	28	35	34	48	53	60	49	45	47	57	57	48	53	38	31	27	36	36	26	37	42	17	18	14	17	10	7	15	12	10	7	6	~	5	6	13	17	14	16	17	15	11	30	33	35	38	26	11	48
UC 36	20	17	27	34	33	47	51	58	48	44	46	55	56	46	50	36	30	25	35	34	24	35	40	16	17	13	15	12	9	14	11	9	8	5	6	~	5	11	14	13	14	15	13	9	26	30	37	35	28	13	47
UC 37	32	30	39	48	46	62	67	73	64	59	61	65	62	60	62	50	44	39	49	48	38	49	56	29	30	26	28	25	21	26	24	23	20	17	18	14	~	17	9	26	24	20	23	19	24	27	38	32	27	26	49
UC 38	28	26	36	44	43	59	62	68	58	55	56	64	66	56	60	46	39	35	45	44	33	44	50	25	27	22	24	20	12	22	20	19	15	14	13	11	9	~	12	22	21	18	20	16	27	30	41	36	31	19	56
UC 39	32	30	39	48	46	62	67	73	64	59	61	65	62	60	62	50	44	39	49	48	38	49	56	29	30	26	28	25	21	26	24	23	20	17	18	14	17	9	~	26	24	20	23	19	24	27	38	32	27	26	49
UC 40	15	13	21	29	26	40	41	46	37	33	36	43	44	36	40	26	20	15	24	24	14	25	30	6	12	7	11	18	20	8	9	10	13	15	17	15	17	24	27	~	7	19	18	18	40	43	49	48	39	23	36
UC 41	20	16	25	33	32	45	48	55	44	41	43	53	48	43	48	33	26	22	32	31	18	32	37	13	18	11	14	17	19	12	8	9	14	16	16	15	18	24	24	7	~	12	12	15	37	39	48	45	39	23	40
UC 42	29	26	36	44	43	59	59	66	56	53	54	61	56	55	58	44	37	32	42	42	23	42	47	23	26	21	24	22	18	22	19	18	16	13	15	12	15	19	18	18	11	~	8	10	31	34	47	40	38	23	45
UC 43	30	27	35	43	40	56	56	63	53	49	51	52	47	49	47	41	34	30	40	39	21	39	45	20	28	21	24	24	20	23	19	20	19	15	17	14	18	21	21	17	12	7	~	12	28	37	49	43	40	25	36
UC 44	25	22	32	39	38	55	57	64	54	49	53	61	57	53	57	42	35	31	41	40	25	40	46	21	22	17	20	18	14	18	16	14	13	10	11	9	12	17	17	17	10	10	9	~	29	32	43	37	34	18	46
UC 45	49	46	58	65	65	85	84	91	81	77	79	75	70	78	72	69	62	58	68	67	55	68	74	46	46	38	40	38	34	40	37	35	33	30	31	27	29	27	20	38	38	33	35	33	~	30	53	34	46	38	61
UC 46	46	44	55	61	62	82	81	88	78	73	75	82	77	76	80	65	59	54	64	63	52	64	70	43	44	37	40	38	35	39	37	35	33	30	31	27	29	28	21	37	38	34	38	34	34	~	54	25	49	38	69
UC 47	46	47	60	66	67	86	87	95	85	80	81	89	94	82	86	62	66	61	71	70	60	71	77	49	44	44	45	36	32	43	41	38	36	38	36	39	38	44	39	45	46	53	52	46	55	57	~	43	23	30	86
UC 48	54	51	61	68	68	87	87	95	85	79	82	86	81	81	83	71	65	60	71	69	60	71	77	51	51	47	49	47	43	48	46	44	41	38	40	36	38	36	30	47	47	43	45	43	38	33	42	~	39	47	69
UC 49	37	38	49	58	57	78	78	85	76	71	72	81	83	73	78	63	57	51	62	61	50	62	68	40	35	35	35	27	23	34	31	29	27	29	26	30	28	34	30	35	36	42	41	37	50	53	23	39	~	22	75
UC 50	22	22	33	41	39	54	62	69	59	54	56	65	64	57	62	45	40	34	44	43	32	45	50	25	20	20	20	12	9	20	17	14	12	14	12	15	14	21	25	20	21	27	26	22	43	45	28	54	18	~	56
UC 12-A	49	48	51	59	58	79	72	69	55	42	35	15	10	22	15	39	27	32	41	37	33	41	62	36	46	41	45	53	54	42	43	43	49	47	51	48	51	58	53	38	39	45	39	47	56	67	86	73	77	60	~

Interview Guide

Name:

Designation:

Questions:

1. What do you think about the mobility ecosystem in the city of Islamabad? Is it adequate?
    a. If yes, how?
    b. If no, why?
2. Provision of mobility infrastructure in context of the city MP, was there given any importance to public transport/mass transit?
    a. If yes, how?
    b. If no, why?
3. Is it government responsibility to provide public transportation to the general public or private bodies?
    a. If its government responsibility, then how much should the government invest?
4. What are your views on the increasing travel time in the city?
5. What are your views on the increasing cost of mobility in the city?
6. What do you think are the main factor behind increasing travel time and cost of mobility in the city?
7. What is your take on the rapid expansion/ sprawl of the city?
8. Why are high rise buildings not encouraged in Islamabad?
9. Why is mixed used of land not encouraged in Islamabad?
10. What do you think is the solution for the abysmal state of mobility and role can different stakeholder play?