KABUL CITY TRNSPORTAION SYSTEM ANALYSIS AND THE SHORT-TERM AND LONG-TERM TRANSPORTATION PLANNING & POLICY

By

AHADI, Mohammad Wali

THESIS

Submitted to

KDI School of Public Policy and Management

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For the Degree of

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Committee in charge:

Professor Kim, Jeong-Ho, Supervisor _____

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Approval as of May, 2020

Dedicated to:
My parents and my elder brother whose support, love and affection kept me steadfast and enabled me to attain targets and goals of academic life.

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Abbreviations

UPT	Urban Public Transport
KM	Kabul Municipality
MOTCA	Ministry of Transportation and Civil Aviation
MPW	Ministry of Public Works
JICA	Japan International Cooperation Agency
BRT	Bus Rapid Transit
LRT	Light Rail Transit
Dept.	Department
HR	Human Resources
Km^2	Square Kilometer

Abstract

The world has witnessed a great increase in motorization, urbanization, population growth and changes in population density over the past few decades. These changes have resulted in heavily congested roads. Congestion reduces efficiency of transportation systems and increases travel time, air pollution and fuel consumption. Kabul, the capital and business center of Afghanistan, is the most populated and congested city in Afghanistan. The increase in population and population density of the city has resulted in increased motorization, hence traffic congestions and air pollution. In this paper the main causes for congestions in Kabul City are studied and the solutions for congestion problems in Kabul City are suggested through case studies of Brazil and India.

From the regression of delay time as dependent and the number of vehicles as independent variable, it has been found that delay time has a positive relationship with number of vehicles (increase in the number of vehicles results in increase in congestion), which suggests that effort should be made to reduce the number of vehicles (specifically private cars) in the city.

From this study it has been found that one of the vital problems related to transportation in Kabul City is the absence of an independent organizing body to manage overall transportation network in Kabul city. As a solution for this problem a new organizing body is suggested that will be in charge of arranging, directing and overseeing the public transport system and will in future steps facilitate the integration of the public transportation system beside central dispatching, a common ticketing and other offices.

Chapter 1

Afghanistan

Afghanistan is a mountainous and landlocked country which is located in South-central Asia, with an area of 647230 sq. km (249,900 sq. mi) and ranked 42nd in the world according total area. The country shares borders with six countries, namely Pakistan (2,670km), Tajikistan (1,357km), Turkmenistan (804 km), Iran (921km), China (91km) and Uzbekistan (144km). Afghanistan is of great importance because of its strategic location at the crossroads of major trade routes.(*Kabul City master plan*, 2011)

The capital of the Islamic Republic of Afghanistan is Kabul. which is in the eastern part of the country and is the most populated city. Kabul city, having 3500 years of history, is of large importance because of its strategic location in Asia with connections from east to west and north to the south of Asia. Kabul city is the fifth fastest growing city and 75th largest city according to the size in the world with a population of 3.28 million in 2012.(World's fastest growing urban areas, n.d.)

It was 1773 when Kabul became the capital of Afghanistan under the sovereignty of Timur Shah, who was the son of Ahmad Shah Abdali. For the first time the urban movement started in 1950's in Kabul, during which the Kabul university was constructed along with Maiwand Hospital and Jaday-e- Maywand Road.

From the start of urbanization in Kabul, four master plans were articulated. The first was in 1962 up to the year 1987 which covered an area of 237.8 sq. km with a planned population of 0.8 million. The second was in 1970, planned up to the year 1995, with a covered area of 299.00 sq. km and population of 1.4 million. The third was in 1978, up to planned year of 2002, with the population of 2.0 million and covered area of 323.3 sq. km. The most recent one is prepared in

2008, which is planned for 4.2 million people in is still usable in governmental organization.

1.2 Statement of Problem

Integrated transportation planning for crowded cities as a step towards sustainable transport system can solve the complaints from current transport systems and provide the public economic, efficient, easily accessible, smooth, safe and environmentally friendly transport services. Kabul, the capital and trade center of Afghanistan, is the foremost populated and congested city in Afghanistan. The increase in population and population density of the city has resulted in increased motorization, hence traffic congestion and air pollution. This paper is trying to answer, what are the main causes for congestion in Kabul City and how to solve them.

1.3 Research Question

This research paper attempts to answer the following questions:

1. What are the main causes of congestion in the Kabul city?
2. How can these problems be solved?

1.4 Objective of the research

The purpose of this research is to study the transportation system of Kabul city and suggest some short term and long-term policies for having sustainable transport systems, a transport system which addresses the following five pillars: accessible to all, safe and secure, affordable, less harmful to the environment and an integrated and well-managed transport system, with the objective of minimizing the problems related to the current transport systems. At the end of this thesis paper, it is expected to develop an efficient institutional framework to solve the issue of lack of coordination among different governmental organizations and suggest some short- and long-term policies for having sustainable transport. Sustainable transport, as the future of transport, is the solution to the world's problems related to the transport and it is expected that at the end of

this research the demand of the public and the environment can be answered by providing public efficient transport policies and preserving the environment.

1.5 Research Method and Data Collection

The methodology applied is mainly by surveying data (from Kabul Municipality) and a review of literature published by Kabul Municipality, including recent master plans for Kabul City, Japan International Cooperation Agency (JICA) report, 2008-9 and the World Bank open data. The data from above mentioned sources are analyzed to find what are the main causes of congestion in Kabul. Thereafter, the cases of Brazil and India are studied to find the answer for the founded problems.

1.6 Structure of Thesis

The thesis presents an information background analysis related to Kabul city's transportation system, especially urban public transportation. In Chapter 1. Research questions, objectives of the thesis and research method are provided. In Chapter 2, a Literature review is conducted which includes the information about the past and current transportation systems in the city of Kabul, mainly from the master plan of 2008 for Kabul city, various papers (published and non-published) from Kabul Municipality, World Bank open data and Sasaki Urban framework. Chapter 3 is the analysis of the current situation of Kabul City and Chapter 4 answer the thesis question of what are the main causes of congestion in Kabul City and suggests solutions to the congestion problems of Kabul City.

Chapter 2

Literature Review

2.1 Location and access to Kabul city

Kabul which is found within the north east portion of Afghanistan is 1800 meters above sea level. The city can be accessed by air or land transport. Most of the trips made to/from Kabul are by land transport as the city is well connected to numerous other major cities by means of the national highway system and there's no railroad access. For air access, six domestic and 17 international flights to/from Kabul international airport exists. (Airports in Afghanistan, Central Intelligence Agency (CIA), United States: The World Fact book, n.d.)

Source: Kabul Master Plan (2008)

Fig. 2.1 International Air Routes to/from

2.2 Background

After a modern Afghan government was built up in December, 2001 recreation and improvement begun over the complete nation. Billions of dollars were spent to modify and create the framework, improve security, stimulate the economy, and also to back basic divisions such as

wellbeing, and instruction. Amidst this period, thousands of kilometers of streets were built in provincial and urban ranges bonding urban and rural areas. Millions of individuals from farther country regions moved to Kabul and other expansive cities. Despite the noteworthy improvements in urban transport frameworks, a few basic challenges stayed. Substandard urban planning, an abandonment in designing a plan, lacking seepage frameworks, destitute quality of development, lacking maintenance and a need of a viable resource administration framework are a few of the major challenges. There are gaps between supply and demand in numerous perspectives of urban transport administrations given by public and private sections. Other serious challenges incorporate the absence of a proficient public transport system, and the need of a legitimate roads, organizing and supporting the foundation as well as the need for a compelling activity administration framework. This has brought about a lack of portability, destitute availability, genuine clog and blockage, high traffic accident rates, and extreme natural contamination in most cities of Afghanistan.

Moreover, due to the insufficient public transport, individuals tend to switch to utilizing their individual cars more regularly, causing high levels of traffic blockage and natural pollution. Most ventures, especially while driving, are tiring and upsetting and there is an increased probability of car accidents. In spite of building recently cleared roads, small exertions have been made to move the traffic stream forward and oversee the public transport. This causes Afghans living in urban ranges to endure every day jam and high travel times. Around 66% of the travel time of Kabul citizens is squandered in traffic jam. A fundamental estimation appears that at slightest, one of every two male grown-ups in Kabul City works as or employs a traveler car and has a way of life built around utilizing a car. Be that as it may, the total impacts of persistently expanding traffic levels in Kabul City and other huge cities of Afghanistan are presently causing

financial, natural, and social issues. Activity development is intemperate which complements numerous of these issues and the prospects of this are causing significant concerns among both the experts and the people. Moreover, high levels of traffic blockage and thus higher transport costs weaken prospects for higher financial development.

Already, females had a battle to be able to drive due to critical dangers counting security dangers and harassment. Indeed, nowadays viciousness against females in Afghanistan is high in spite of the later advancements. A few individuals accept that ladies will be subject to extra savagery when they drive, particularly alone. In spite of those challenges, as of late few female drivers have begun to learn driving and drive cars on the boulevards of the Kabul city. Female travel behavior is distinctive than that of males in a few ways. Females are inclined toward traveling during the evenings either by public transport or renting a taxi but public transport is the overwhelming implication of transport for females in Afghanistan amid the day. There are isolated spaces for ladies in public transport busses.

2.3 Population Development and Extension of Kabul city

It was in the 18th century when Kabul become the capital of Afghanistan, in that time the population of Kabul was only 10,000. After Afghanistan got independence in 1919, the population was around 90,000 and in 1925, the city area increased to 450 hectares. According to the Master Plan of Kabul city (2008), the population of Kabul city has increased to 4.2 million in 2008 with a growth of 10% from 1999-2008; it is predicted to increase to 6.2 million in 2025. Meanwhile, the city area in this period expanded by 4.1 times from 250 sq.km to 1,022.700 sq.km. The below table gives a summary of population development and the development of the region of Kabul city over distinctive periods.(Jalal, 2015)

Table 2.1: Population ad area development of Kabul City

Year	Population	Pop. Growth (%)	City area (sq.km)	City development
~1700	10,000	--	--	Became the capital of Afghanistan (1775)
~1878	70,000	--	180	Developed as a bazaar city
~1916	65,000	--	400	Leather and textile industries developed
~1925	90,000	3.7	450	Independence (1919)
~1940	120,000	1.9	500	Housing construction (1930~)
~1962	380,000	5.4	6,840	Main infra. Built; became the largest city in Afghanistan
~1992	1,500,000	4.7	16,830	Communist period (1979~1992): Stable urbanization by capturing public lands. Invasion by USSR; Provincial Council established
~1999	1,780,000	2.3	~25,000	Mujahedin period (1992~1997): Strong urbanization by capturing public lands. Taliban period (1997~2001): Population flowed out from the central part of the city, while expanded in suburbs around the city center.
~2005	2,721,000	4.0	1,022,700	Karzai period (2001~): Rapid urbanization resumed in the city.

Source:(*Kabul City master plan*, 2011)

Table2.2: Assessed Population by Type of Built-up Region in Kabul City (2008).

Category	Population	%
Planned	1,101,117	26.1
Unplanned	3,080,265	73.0
Old City	38,874	0.9
Total	4,220,256	100.0

Source: (*Kabul City master plan*, 2011)

Table2.3: Population of Kabul by District in 2008.

District	District Area (sq.km)	Residential Area (sq.km)	Population	District Density (person/sq.km)	Residential Area Density by (person/sq.km)	Estimated population for 2025 at 2.34% growth rate
1	4.83	1.24	35,402	7329.607	28550	52697.51579
2	6.84	2.57	83,295	12177.63	32410.51	123988.4633
3	9.11	4.14	139,742	15339.41	33754.11	208012.4358
4	11.72	5.98	204,049	17410.32	34121.91	303736.3821
5	28.45	8.94	283,489	9964.464	31710.18	421986.4994
6	49.18	9.57	285,255	5800.224	29807.21	424615.2722
7	33.34	14.78	416,675	12497.75	28191.81	620240.0257
8	48.25	11.24	331,554	6871.585	29497.69	493533.4769
9	24.33	6.16	188,569	7750.473	30611.85	280693.6855
10	13.03	8.85	270,157	20733.46	30526.21	402141.2003
11	17.42	8.29	287,853	16524.28	34722.92	428482.5154
12	34.9	12.21	298,847	8562.951	24475.59	444847.5934
13	47.19	16.6	467,440	9905.488	28159.04	695806.0782
14	119.02	5.24	147,910	1242.732	28227.1	220170.8819
15	32.53	6.26	200,465	6162.465	32023.16	298401.4322
16	25.07	7.13	206,701	8244.954	28990.32	307684.0068
17	56.02	7.8	248,926	4443.52	31913.59	370537.874
18	33.88	1.21	33,958	1002.302	28064.46	50548.05494
19	141.43	0.11	3,906	27.6179	35509.09	5814.261812

20	142.94	1.52	31,836	222.7228	20944.74	47389.35971
21	6,395	22	6,040	1	279	8990.819596
22	7,925	258	48,187	6	187	71728.58011
Total	102,270	14,264	4,220,256	41	296	6282046.415

Source: (*Kabul City master plan*, 2011)

2.3 Urbanization in the Kabul city

The world has seen an extraordinary increase in urbanization, populace development, motorization and changes in population density over the past few decades. These changes have resulted in heavily congested roads. Congestion decreases the effectiveness of transportation systems and increments travel time, air contamination and fuel utilization. Most city transport systems suffer from these problems and are highly unsustainable. The current traffic system in most of the cities in the world were planned primarily with the aim of smooth and efficient traffic services, but the rapid urbanization and motorization not only disturbed the said purpose, but also caused even greater problems. The idea of sustainable traffic came to existence after the serious impacts, in the form of congestion, air pollution, global warming etc. that the conventional traffic systems experienced globally.

Sustainable transport refers to the transportation system which ensures safe and economically efficient transport service and has a minimum impact on the environment. The transportation system runs on three major components i.e. Vehicles, Infrastructure (road network, railways, etc.) and Energy. To have sustainable traffic, these three components have to be designed in a way to get the main purpose of transportation and also reduce the impact on the environment. Integrated transportation planning is one way of having a sustainable transport system. Planning the cities taking full account of people's lifestyle, their travel needs and also environmental issues

by integrating transportation and land use planning for better transportation systems with minimum disturbance to the environment. Also, following the pattern which allows the cities to have better landscaping, sufficient free space and greenery required for green and sustainable development. Kabul city has emerged as the multifunctional and multidimensional center of Afghanistan and this has resulted in crowed roads and polluted air in the city. In an attempt to reduce air pollution, which is mostly due to the running vehicles, the authorities have reduced the working days to five in a week, in contrast to other cities of the country which work six days a week. This is done with the aim to reduce the frequency of the high number of running vehicles, hence the gas emissions to the Kabul city atmosphere. The said effort can't solve the problem entirely therefore, there is a need to reevaluate transport policies and come up with a permanent solution. The urban public transport in Kabul city works in a very weak institutional framework. Therefore, the Kabul municipality, which is responsible for making and implementing the transport policies of the city, is looking for alternative policies and with the idea of sustainable transport, which promises efficient and environmental-friendly transport service. The authorities have shown great interest in it and encourage transport engineers to study the feasibility of sustainable transport and make it the future of all the transport projects in the coming years.

2.4 The effects of the transportation system on Economy of the country

Afghanistan is a landlocked nation with a great extent of precipitous territory without any accessible elective transport modes. This means that roads are the vital mode of transportation, and it has been challenging to get financial support and social administrations given the need for transportation offices. All these challenges are caused by lacking transport frameworks in terms of capacity or unwavering quality. The financial significance of transportation advancement, especially the railroad network for Afghanistan is related with moving forward the welfare of a

society through fitting social, political and financial conditions. Aside from extra foundation prerequisites, a number of challenging segment issues remains unresolved.

Great transport offices, associated expressways and railroad networks are the prime mode for transiting products from one nation to another. Afghanistan provides access to exchange along north-south and east-west Asian passages through Central Asia. The country has the potential to play an extraordinary part within the Central Asia Regional Economic Cooperation (CAREC) program, which reinforces speculations in the roads, vitality, and exchange. Road and rail join interface Afghanistan to the exterior world and can interface Asia's four diverse regions to each other. Typically, an incredible financial opportunity to invest in transport infrastructure for empowering outside speculators to contribute overwhelmingly within the mining and vitality division. Since seriously utilizing the infrastructure, the transport division is a vital component of the economy and a common device utilized for advancement. An associated and forward-moving transport infrastructure particularly a railroad network, can evacuate the geographical boundaries accessible for exchange and speculation.

The lion's share of Afghans' financial reliance is on farming items. Particularly in country ranges, on-time conveyance of such items to nearby and territorial markets are connected to the proficient transport framework. Inside, the nonattendance of other accessible transport framework modes, roads primarily interface Afghanistan's areas, cities, and towns. Investments in the transport segment increment the effect of the other divisions in Afghanistan, such as vitality and farming, by connecting markets, items, and individuals. The enhancement of a multimodal complementary relationship between road and rail infrastructure is crucial for supporting mine extraction businesses and utilizing the mineral riches of the nation to energize financial improvement. Great interstate transportation network makes a difference on the economy of the

nation by creating more opportunities for trade and work. In general, urban transportation in Afghanistan is car-dependent, and the road economy is influenced by the non-appearance of the public transport system, inappropriate activity administration and stopping offices. These ultimately cause jams and expanded traffic accidents. Critical numbers of human working hours are misplaced every day as a result of the time spent going through jam or injuries brought about by road accidents. These wasted hours result in diminished efficiency, and therefore financial misfortunes. A sustainable public transport framework like Light Rail Transit (LRT) and Bus Rapid Transit (BRT) are the leading solutions for the current urban transport circumstance in Afghanistan, especially in the Kabul city. These can be conservative and time-saving and blockages will be enormously diminished as an elective for car reliance.(*Islamic Republic of Afghanistan Afghanistan Green Urban Transport Policy 201 6 -202 6*, 2016)

Chapter 3

3.1 Analysis of Current situation of Kabul City.

The city of Kabul is one of the most occupied cities in the world. The city has an area of 1022.7 km2 and a population of more than 4 million inhabitants. The Regional Network made in 1978 by the Government permitted the city's greatest capacity of 0.7 million population and 50,000 vehicles. Since the long-lasting civil war, numerous individuals from distinctive parts of the nation concentrated within the capital city Kabul where it is generally calm. The sensational raise in activity within the city and the need of standard transport infrastructure to coordinate the current requirements complicate city activity. Based on the 2014-2015 central measurements, the number of vehicles within the city is estimated at 1,866,283 vehicles, which is more than a 35-fold increase from the initially accepted state. Urban Public transport in Kabul within the 1980s, prior to the flare-up of the civil war, met the needs of the population to a few degrees. At that time, Millie Bus

Company (Millie Bus is a government-run transport service, working across Afghanistan, and operations are overseen by the Ministry of Transportation and Civil Aviation) had 1600 buses and 150 trolleybuses accessible. Amid the long-lasting civil war, most buses and trolley buses of public transport were annihilated, the framework was gravely harmed, experienced staff misplaced their occupations, and since that point, they have not paid sufficient consideration to the urban public transport system and its reestablishment.

3.2 Existing issues of Kabul inhabitants regarding urban public transport (UPT)

- Bus Stops are full of travelers holding up for means of urban public transport within the morning and evening rush hours. Private little vehicles "minibuses," for the most part of the city, with a capacity of 7 to 11 individuals, are not sufficient to transport all of the travelers.
- Public Transport is very limited. The lack of accessible means of transport during the nighttime causes travelers to remain near their homes and not go out for long periods. Within the evening, particularly within the less open places, there is emptiness, individuals are surging home from fear of being stuck within the city.
- Stops in the city are not clearly stated, drivers stop wherever the passengers get in or get off.
- Private vehicles "minibuses" are overfilled and without air conditioning. To maximize benefits and maximize the capacity of the vehicle, three people must be in the front seats of the vehicle, which is made for two people (driver and co-driver). In the rear seat which is made for 3 individuals, must be 4 people. Passengers are awkward within the vehicle and are squeezed together. The circumstance is comparative to taxis, 3 individuals in front and 4 individuals within the rear. Sometimes they utilize a car trunk for half of the cost.

- Public transportation vehicles, particularly private little minibuses, are not expecting the carriage of stationary people on the wheelchair and moms with baby-carriage, which means these two cannot travel by urban public transportation.
- Private minibuses frequently alter the route on their own due to traffic jams, road closures, and more. They frequently don't reach the ultimate stop, particularly within the evening. Drivers of those public transport cars particularly in winter, cold and damp climate, where streets and walkways are covered with mud, or ice and snow, when there's an expanded demand for public transportation, demand more fare than normal.
- Higher fare expenses complicate life particularly for the lower class of individuals who ought to travel to work and switch from one transport vehicle to another. The center and particularly the higher class of people utilize individual cars for travel. The enormous utilization of personal cars contributes to declining road traffic circumstances, which isn't built to resist the current traffic intensity.
- The competent authorities don't give any data campaign which advises the public how to utilize public transport and guarantee their security. Travelers go up against the Millie Bus Company, an UPT supplier with constrained capacities, with speedy destruction of UPT vehicles. The harms caused by travelers speak to sharp cuts, disgusting engravings, etc.
- The vital problem in Kabul city is unplanned areas. It is assessed that roughly 3.1 million individuals live in informal settlements out of the full population of 4.2 million within the city. Given the fact that the informal settlement zones are undoubtedly bigger than the full range of formal settlements the municipality could give. (Challenges of Traffic Development in Kabul City, Dipl. Geograph Walid Ahmad Noori, GieBen, n.d.)

3.3 Current condition of roads and Transportation system in Kabul

3.3.1 General urban transport needs

Investment within the road segment of Afghanistan has been festered, and the development of modern transport foundation and their upkeep have been generally dismissed. Thus, most transportation infrastructure has been cleared out or deteriorated. Since 2002, investments by the Government, foreign aids and private reserves have begun to come in and the territorial and national highways, counting the national ring street interfacing Afghan cities and districts, were built. The national ring street, which was among the early restored roads, facilitates Afghanistan to interface with its neighbors, shaping the largest road netwrok within the nation to bolster the national economy. As a result, the recovery works for the inter-regional and national interstates interfacing Kabul and provinces have been generally completed.

3.3.2 Responsible Organizations for Transport Sector in Kabul City

One of the transportation related problems in Kabul city is that there is no single organization who is responsible for all transportation sector, but instead there are three organizations each having responsibility for their own part of the transportation system.

1) The Kabul Municipality is in charge of arranging, planning, usage, and upkeep of urban transport facilities counting avenues, transport terminals and others, inside its territory.
2) The Ministry of Public Works (MPW) is in charge of arranging, planning, execution, and maintenance of transport infrastructures counting streets and railroads. Most transport projects undertaken by MPW is supported by foreign countries.
3) The Ministry of Transport and Civil Aviation (MOTCA) is in charge of making transport approaches conjointly regulating public transport services for trucks, buses, aircraft and others.

One other effective organization in transportation is Millie Bus enterprise. In the Kabul zone, Millie Bus enterprises are operating buses within the city and encompassing ranges. These enterprises are possessed and financed by the government. According to direct interview of Millie Bus authorities, currently there are 1,046 buses in this organizations among which most of them are in very bad technical condition, due to lack of maintenance. Only 350 are repairable and 110 are currently in operation in eight routes.(*Kabul Urban Public Transport System Analysis and Proposal*, 2017)

3.3.3 Current situation of existing roads

It is assessed that Afghanistan encompasses a road network of around 135,000 km counting provincial roads. More than 85% of them are in awful condition, having non-passable fragments by engine vehicles. The territorial, national and common road systems, recognized for improvement, incorporate 46,338 km. This is not counting the country roads which are under the duty of Ministry of Rural Rehabilitation and Development (MRRD).(*Kabul City master plan*, 2011)

3.3.3.1 Road Network

- **Organizational road classification:** roads are classified into five types by the managerial organization responsible for them. Ministry of Public Work (MPW) is responsible for Regional Highway, National Highway and Provincial Roads. Kabul Municipality (KM) is responsible for City Roads within Kabul City. Managing and maintaining of Rural roads is the responsibility of Ministry of Rural Rehabilitation and Development (MRRD).
- **Road Classification according their Function:** Counting those that fall within the group of territorial and national interstates characterized above, currently roads in Kabul City are existing roads in Kabul City are divided into the below 5 groups.

  Main Arterial Roads

Three territorial highways and one national highway emanating from the city center frame the most outline of the city road network as well. The carriageways are comprised of no less than two paths and paved with asphalt-concrete.

Minor Arterial Roads

minor arterial roads enrich the four main arteries to inter-connect districts in the city. The carriageways are comprised of no less than two paths and paved with asphalt-concrete.

Secondary Road

Secondary roads interface societies with the artery roads. The minimum width of secondary roads is two-lane (one lane of 3.5 meters) and most of them are paved with asphalt.

Community Roads

The minimum width for Community roads is two-lanes and form town blocks. Numerous community roads are not paved and have no side drains.

Other Roads

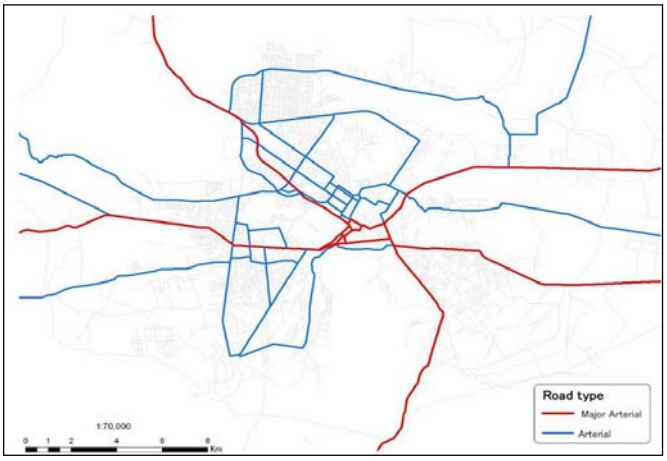
These are the roads which form the town blocks in unplanned area. Mostly they have the width of one lane and difficult to distinguish from private roads.

The table below provides information about road length and its density in each district of Kabul. The general road density changes broadly between areas. The least is less than 5.0km/km2. Among those areas where planned/formal urban regions are prevailing, Districts 6, 9, 12 and 15 have moderately high density, taken after by Districts 8 and 16. The density of formal roads except "other roads" also changes broadly. The road density is exceptionally high in Areas 3, 4, 5, 10, 11 and 15, where medium-rise flats are prevailing. In common, it is small in outer range districts, excluding District 18, which is considered as a semi-urban zone and formed prior.(Development, *Draft Kabul City Master Plan-Chapter one and two*. (June), 1–46 2011)

Table3.1: Road length and its density in each district of Kabul.

Dist. No.	Road class					Total	Density1 (Km/Km2)	Density2 (Km/Km2)
	Main arterial	Arterial	Secondary	Community	Other			
1	0.3	3.2	3.3	2.0	67.6	76.3	16.2	2.2
2	6.9	1.8	3.6	17.4	55.1	84.8	12.5	3.3
3	5.6	1.1	9.2	39.9	61.9	117.7	12.1	1.7
4	6.9	12.3	7.0	52.3	125.1	203.6	17.6	3.0
5	18.3	0.7	1.2	97.1	231.5	348.8	12.0	1.0
6	0	19.6	10.1	49.5	322.6	401.8	8.2	0.5
7	0	15.7	5.7	27.4	343.8	392.6	12.1	0.3
8	7.5	11.6	10.4	59.8	400.4	489.7	10.1	0.9
9	10.1	7.2	3.4	23.2	195.7	239.6	9.8	1.1
10	0	14.7	7.3	78.6	121.2	221.8	17.1	1.2
11	1.4	10	2.6	57.9	226.2	298.1	17.1	1.7
12	0.0	19.3	4.8	36.2	285.1	345.4	9.9	0.8
13	0.0	7.5	19.4	58.2	442.7	527.8	11.3	0.6
14	3	24.5	3.0	55.0	239.8	325.3	2.6	0.2
15	0	25.5	5.3	128.3	89.8	248.9	7.8	0.8
16	0.4	13.4	4.2	9.8	228.1	255.9	10.2	0.8
17	9.6	0.0	8.1	12.2	245.8	275.6	4.9	0.3
18	0	14.1	18.0	54.0	38.8	124.9	3.7	0.4
19	15.5	0.0	24.1	36.2	220.1	295.8	2.1	0.3
20	17.8	0.0	7.9	81.9	148.8	256.4	1.8	0.2
21	10.9	0.0	7.0	35.8	3.4	57.1	0.9	0.03
22	0	8.8	17.6	52.8	189.4	268.6	3.4	0.00
Total	114.1	211.0	183.2	1,065.4	4,282.8	5,856.5	5.7	1.5

Source: Kabul Metropolitan Area Urban Development Master Plan, JICA, 2009
Note: Density 1: Total Road Network Density
Density 2: Core Road Network Density (except "Other Road")



Source: Kabul Metropolitan Area Urban Development Master Plan, JICA, 2009

Figure3.1: Existing Arterial Road Network in Kabul

Table3.2: Road length of Arterial Road Network

Major Arterial	137.4 km
Arterial	193.3 km
Total	330.7 km

Source: Kabul Metropolitan Area Urban Development Master Plan, JICA, 2009

3.3.3.2 Current Condition of Road Surface

In spite of the fact that numerous roads have been built in recent years, and numerous segments of existing roads have been remade and strengthened, numerous issues remain. The roads have been repaired and reinforced unprofessionally; after a moderately brief period since the commissioning, numerous redesigned roads required advance remaking. The drainage system in most of the roads is totally truant; in some cases, road drainage system isn't working, causing major issues, primarily in winter when water is held in splits and underground layers cause huge harm to roads. On roads and nearby, there are misplaced safety highlights (barriers, railings), directionally traffic lanes, pedestrian pathways, traffic signs and most vitally, traffic lights. On lost crossroad control systems, maximum transport speed is balanced (controlled) by road condition, vehicle condition, and traffic density. No other consideration is paid to the secondary roads. The width of numerous roads does not coordinate the traffic density on the road. There are lost sidewalks along the roads, and compared to pedestrian density, the division of the walkway from road paths for the person on foot is missing. There are lost cycle ways in an appropriate area to contribute to traffic control. The width of the roads does not coordinate transport density. Furthermore, the width of the roads is influenced by vendors along the streets that offer products on little moving carts on the ground, and merchants who show their products on the street in front of the shop. Private carriers offering public transportation services remain on the road in an attempt to induce travelers, particularly at the first and last stops. The absence of stopping spaces within the city causes the driver to stop at

the edge of roads. One example is when shopping in the city. The nonappearance of public transport terminals powers private transport companies to stop their vehicles on the edge of the roads. Below tables provide the information about current situation a level of service (LOS) of two main intersections in Kabul City. The data was collected at peak hour.

Table 3.3: Current Condition of Karte Parwan Intersection

Karte Parwan Intersection													
No.	**Indicators**	**EB**			**WB**			**NB**			**SB**		
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Volume (vph)	457	1960	0	120	2978	100	0	0	0	195	0	351
2	Control Delay/Veh (s/v)	2550	345		924	38.8						68.1	74.5
4	Total Delay/Veh (s/v)	2550	345		924	38.8						68.1	74.5
5	v/c Ratio	6.53	5.93dl		2.89	0.99						0.91	0.93
6	LOS	F	F		F	D					C	E	E
7	Approach Delay (s)	553.1			71.9						71.2		
8	Approach LOS	F			E						2		
9	Control Type	Pretimed Signalized											
10	Cycle Length (sec)	120											
11	Capacity (vph)	69.98469			41.52249								377.4194
12	Intersection v/c Ratio	12.60											
13	Intersection Signal Delay (s)	260.6											
14	Intersection LOS	F											

Source: Traffic Coordination Directorate of Kabul Municipality (2019)

Table 3.4: Current Condition of Panjsad Family Intersection

Panjsad family Intersection													
No.	**Indicators**	**EB**			**WB**			**NB**			**SB**		
		EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
1	Volume (vph)	172	386	147	136	984	55	197	243	270	318	107	230
2	Control Delay/Veh (s/v)		176.8			374			418			723	
3	Queue Delay/Veh (s/v)	-	-	-	-	-	-	-	-	-	-	-	-
4	Total Delay/Veh (s/v)		176.8			374			418			723	
5	v/c Ratio		1.52			1.78			1.87			2.55	
6	LOS		F			F			F			F	
7	Approach Delay (s)		176.8			374			418			723	
8	Approach LOS	F			F			F			F		

9	Control Type	Pretimed Signalized											
10	Cycle Length (sec)	45											
11	Capacity (vph)		253.9474			552.809			129.9465			41.96078	
12	Intersection v/c Ratio	3.32											
13	Intersection Signal Delay (s)	411											
14	Intersection LOS	F											

Source: Traffic Coordination Directorate of Kabul Municipality (2019)

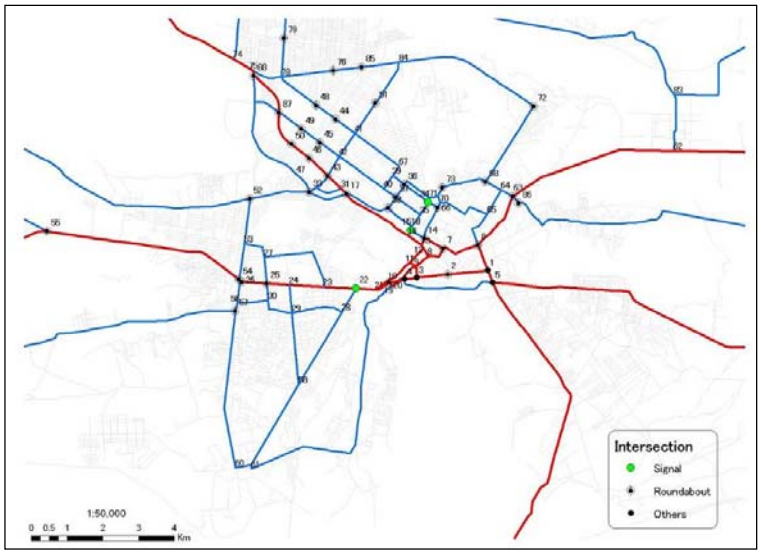
Intersections

There are very few intersections with signals in Kabul City. Too many intersections and a lack of signals are some of the main reasons for congestion in Kabul City. The following table provides the congestion information and its reasons, surveyed by Traffic Safety Team of Kabul Municipality (2018) at peak hour, for four main intersections in Kabul City, and the attached figure shows the locations of intersections in Kabul City.

Table3.5: Delay time in four main intersections in Kabul City

Location	Width of road (m)	GPS Points		Queue length (m)	Number of vehicles (V/H)	Delay time (h/v)	reasons
		E	N				
Malak Asghar intersection	18	515,988.522	3,820,142.659	552.5	3556	15’31”	Illegal parking, blockage of road in front of Foreign Ministry
Pashtonestan Intersection	9	516,475.847	3,819,870.440	900	1820	11’9”	Illegal Parking
Sar-e-Zerzameen up to T section of Serina Hotel	18	516,213.372	3,819,812.821	151.32	2024	33.5”	Illegal loading and unloading
T-section of Serena Hotel up to Pashtonestan intersection	13.1	516,460.727	3,819,773.387	334	2146	2’ 08”	Illegal parking

Source: Traffic Safety Team (Kabul Municipality)



Source: Kabul Metropolitan Area Urban Development Master Plan, JICA, 2009

Figur3.2: Locations of Intersections in Kabul City.

3.3.4 Public Transport

The public transport provided within the city has several different modes. The necessities for the operation of these administrations are not well directed. Enforcement of regulations is, for the most part, destitute. Different sorts of vehicles are utilized for public transportation services, counting standard size buses, minibuses, minivans, shared taxis, and motor-rickshaws. These are by in large and exceptionally terrible conditions since they comprise of ancient fleets and poor maintenance.

- **Buses**

The bus system in Kabul is operated by state and private bus companies individually. The bus routes mostly start from the city center and extend towards suburbs. The city bus service consists of 54 routes based on 10 terminals throughout the city. The total length of these bus services is 473 km, making the average service length at around 8.8 km for each route. The density of serviced length is 1.6km/km2, close to the average density of arterial roads in the city. (*Kabul City master plan*, 2011)

- **Millie buses**

The Millie Bus enterprise is a public body, similar to those observed in many countries. The enterprise is financially supported by the Government which is responsible to provide cheap transportation services for low income citizens (a bus having capacity of 50 passengers). The enterprise has been functioning as a transport service provider for the past 40 years in Afghanistan under various regimes. After the establishment of the republic, it has been headed for corporatization. (Habibzai, Habibzai, Sun, & Infrastructure, 2011)

- **Private buses**

There is no statistical data available for the number of private buses operating in Kabul. The registered number of privately-owned buses was 44,924 in Kabul out of the total registered buses of 48,513 in the entire country. Assuming that 20 to 30% of fleet operation are in and around the city area, the number of privately-owned buses would be 10,000 to 15,000.(*Kabul City master plan*, 2011)

- **Taxis**

Around 4,800 taxi cars are working in Kabul with private proprietorship agreeing to the official information given by the Ministry of Transport and Civil Aviation (MOTCA). Be that as it may, the genuine number of such taxi cars working in and around Kabul is said to be as high as 30,000. The number of registered taxis at the national level was 62,373 in 2006-07 as per the Afghan Statistical Yearbook 2007 (detailed as the countrywide vehicle enlistment information of (MOTCA). The country-wide registered number of such taxis has been reported as 29,131 in 2002. Hence, a considerable increment is taking put with 16-20% per annum.(*Kabul City master plan*, 2011)

Analyzing and interpreting the Current situation

From analyzing the above data and site surveys and observations it is concluded that the major transportation challenges in Kabul City are:

- No reliable Public Transport system
- Uncontrolled Development
- Unplanned Area and Urban Sprawl
- Lack of coordination and cooperation among related organizations
- Lack of intersection Control Devices
- Weak Transport law enforcement
- Illegal maneuvers
- Presence of Street vendors

Figure 3.3: Current condition of Roads in Kabul city.

Source: Kabul Municipality

Chapter 4

4.1 What is the main reason of congestion in Kabul city?

Table3.5: Number of vehicles & delay time

Number of vehicles	Delay time (seconds)
3556	3587
1820	1829
2024	33.5
2146	2154
3218	1150
1465	946.5
388	90.5
3000	237.5
386	205
984	475
243	316
107	608
120	37.9
412	37.9
1225	282.6
302	282.6
1096	27.4
809	11.4
263	44.8
1960	345
2978	38.8
351	74.5

Source: Traffic Coordination Directorate of KM (2019)

Above data was collected by Traffic Coordination Directorate survey team (2019) at peak hour in main intersections of Kabul City. By running a simple regression analysis on above data, it is found that there is a positive relationship between number of vehicles and delay time.

Regression Statistics	
Multiple R	0.564759647
R Square	0.318953458
Adjusted R Square	0.284901131
Standard Error	754.098417
Observations	22
coefficient	
intercept	-8.923053724
No. of Cars	0.450948157

From above regression we can conclude that the delay time is increased with increase in number of vehicles, in other words the more

the number of cars the more will be congestion in the city.

4.2 Solutions to the Current Major Transportation Challenges in Kabul City

4.2.1 Short term Solutions

As it has been found that the main reason of congestion in Kabul City is the increasing number of vehicles, so effort should be made to decrease the number of vehicles in the city. To decrease the number of vehicles (especially private cars) a city should improve their public transport. From the studying of various transportation systems in the world the following solutions are suggested for the transportation challenges of Kabul City.

- **Congestion Charges:** this approach is the utilization of cost mechanism to create user cognizant of the costs that they force upon one another while blocking the road which make them more cautious of their effect on the environment. Congestion charges vary by time of the day, in this way empowering the redistribution of the demand in space or in time.
- **Traffic Management System**: applying the policies and soft measures to the traffic problems as a short-term solution. It will improve the current capacity and maximize the usage of the existing road facilities and it is of low cost compare to other solutions.

Solving the Traffic Related Problems using Traffic Management system

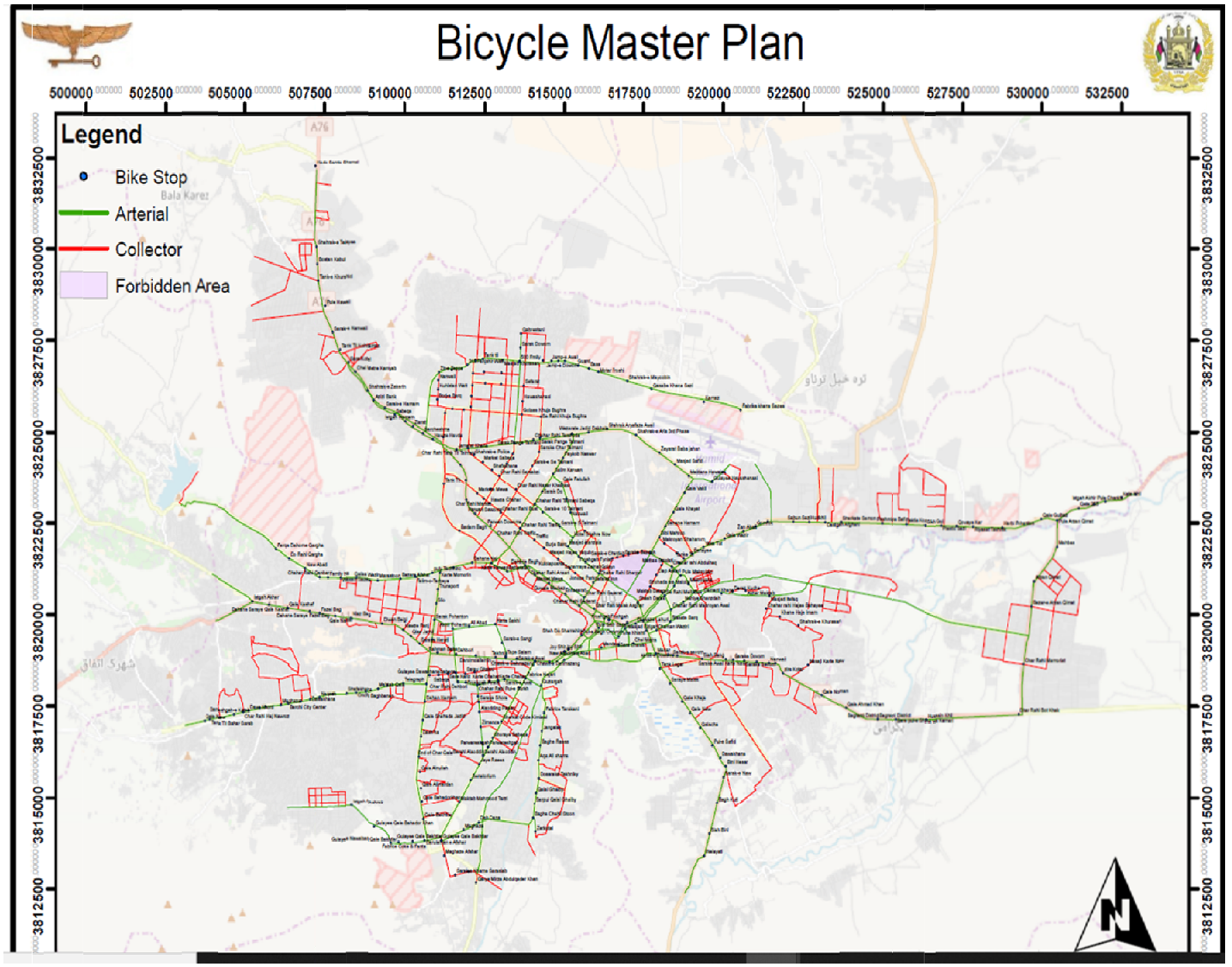
This can be accomplished by doing the following:

- signal control, install and control signals of the road
- removing the street vendors: it is the biggest problem, almost half of the road width is occupied by the vendors. So, first a specific are should be built for them and then enforce them to move to specified place.

- Intersection Improvement: from the site surveys and observations it is very clear that intersections are in a very bad situation in Kabul City. Installing the signs and signals and marking the road can improve the usage of intersections.
- Parking and Vehicle Stops Control: the locations of bus stops should be specified, illegal parking and illegal loading and unloading should strictly prohibited.
- Priority lanes for special buses and establishing the new regulations according to the needs.(*Islamic Republic of Afghanistan Afghanistan Green Urban Transport Policy 201 6 -202 6*, 2016)

Long term solutions

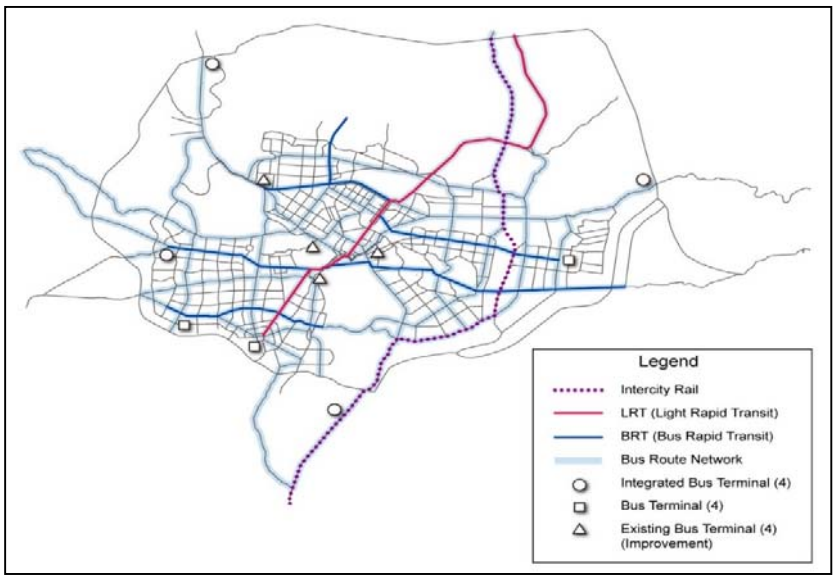
- **Transport Mobility Management:** this is communication and encouraging individual to change their mobility in a way which is favorable for both society and individual. Shifting from excessive use of cars to use of public transportation, cycling and walking. To encourage people for cycling a city should have a bicycle lane which ensures the users safety. Below figure is suggested route selection of bicycle lanes in Kabul City. The route selection was suggested by researcher in 2017 while working with Kabul Municipality.



Source: AHADI, Mohammad Wali, (Public and Planning Team, Kabul Municipality, 2018

Figure 4.1: Suggested routes of bicycle lane

- **Introducing Bus Rapid Transit:** As shown above, there is a positive relationship between the number of vehicles and congestion (delay time), which suggests that efforts should be made in reducing the number of cars in Kabul City. Due to a lack of a convenient and comfortable public transport individuals prefer to drive their own cars for commuting. One way to reduce the number of cars in Kabul City is to provide a public transport system which is safe, convenient, comfortable and environmentally friendly (sustainable transport) from case study of brazil and India it is concluded that Bus Rapid Transit system can be a solution to answer the demand for public transport in Kabul City. BRT can be a good option because this is cheap and construction time is lesser than Light Rail Transit (LRT). The following is the proposed BRT and LRT lane by Japan International Cooperation Agency (JICA) in 2009:



Source: (*Kabul City master plan*, 2011)

Figure4.2: Proposed BRT and LRT routes by JICA

Suggestion of a new Institutional Framework

To have a better transportation system in a city it is necessary that all transport related projects should be undertake by a single organization body which is responsible, to manage, implement and maintain all the transportation projects. As we discussed that there are three organizations responsible for transportation sector in Kabul City namely, Kabul Municipality (KM), The Ministry of Transport and Civil Aviation (MOTCA), The Ministry of Public Works (MPW) due to that lack of coordination among mentioned organizations, there is a need of an institution that can arrange, direct and oversee the public transport system and will, in future steps, facilitate the integration of the public transport system beside central dispatching, a common ticketing and other offices. The Urban Public Transportation framework ought to end up a coordinates transport framework, where associations are ensured and within the future, travelling on one fare document premise ought to be built up. The board of this organizing body should be consisting of the members of all current organization. The basis for the organizational chart seen below was first developed by researcher and Czech Republic team and improved upon by the researcher.

The organization will be responsible for the following tasks.

- Public transport planning
- Ticketing and fare collection control
- Central dispatching
- Public transport system operational management and control
- Bus stops and other infrastructure management

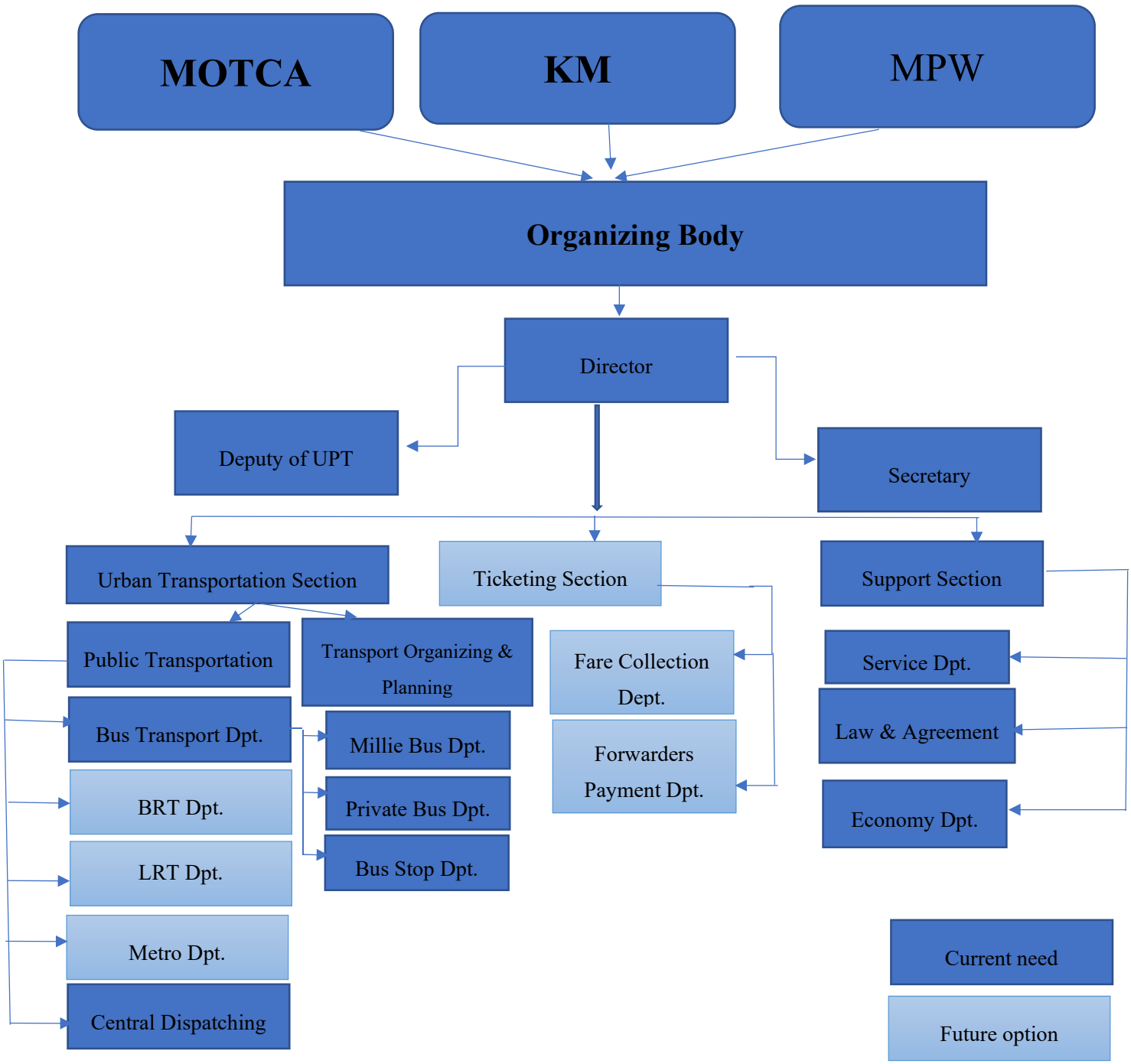


Figure4.3: Organizing Body organization Scheme

Description of the suggested Organizing Body

- Director: responsible for managing of overall organizing body.
- Deputy of the UPT: responsible for the efficiency of public transportation.
- Secretary**:** provide administrative support to the Director.
- Urban Transportation Section: managing all transportation sectors (public & Private).
- Public Transport Section: looking after all public transport projects.
- Transport Organizing & Planning Department: responsible for the planning (time schedules), organizing of UPT system and evaluation of data about the operation of public transport.
- Bus Transport Department: responsible for the executing and managing the agreements with bus companies according to the standards.
- BRT department: A suggested department for future which will have the responsibility of managing, implementing and controlling the BRT services.
- LRT Department: A suggested department for future which will have the responsibility of managing, implementing and controlling the LRT services.
- Metro Department: A suggested department for future which will have the responsibility of managing, implementing and controlling the metro bus services.
- Central dispatching: a technical team with the responsibility of supervising the operation of all public transport and have direct communication access to all drivers in operation.
- Bus Stop Department: accountable for keeping the bus stops in operation with sufficient information system for passengers.
- Ticketing Section: a suggested section for future, which will control the ticketing services.

- Fare Collection Department: a suggested section for future, accountable for the collecting and controlling of all fare.
- Forwarders Payment Department: a suggested section for future which will distribute the collected fare between forwarders.
- Support Section: providing support for overall organization and facilitate the operation and work of entire organizing body.
- Service Department: responsible for the supply of all consumables, heating water supply, Sanitation, security, vehicles, HR agenda, etc.
- Law and agreement department: dealing with agreements between organizing body and transport companies and provide support according to the law.
- Economy Department: Financing the economy issues and controlling the salaries of the employees.

Conclusion

Kabul, the capital and business center of Afghanistan, is the most populated and congested city in Afghanistan. The increase in population and population density of the city has resulted in increased motorization, hence traffic congestions and air pollution

From the regression of delay time, number of vehicles it has been found that delay time has a positive relationship with number of vehicles. This suggests that effort should be made to reduce the number of vehicles (especially private cars) in the city. To solve the congestion problems in Kabul city the short-term and long-term solutions are suggested.

From this study it has been found that one of the vital problems related to transportation in Kabul City is the absence of an independent organizing body to manage overall transportation networks in Kabul city. As a solution for this problem a new organizing body is suggested that will oversee arranging, directing and the overall public transport system. This body will also, in future steps, facilitate the integration of the public transport system beside central dispatching, a common ticketing and other offices.

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