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Challenges of Traffic Development in Kabul City

vorgelegt von

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1. Introduction

Transport, especially the urban transportation system, is an interdisciplinary topic involving several fields of study such as economy, geography, architecture, politics, etc (KNOWLES 2008). Transportation infrastructures are powerful determinants of the economic and social wellbeing of all cities, towns and communities (GIFFORD 2003, p. 2). Thus, in this paper efforts are made to analyze the Kabul City transportation system (as a post-war city) by using the geographical theory, experiences and methodologies in order to formulate policy-oriented recommendations.

After two decades of war (1980-2002) which destroyed Kabul City, the city started to rebuild its transportation infrastructures from scratch. The city inhabitants are suffering from the lack of public transit and negative effects of crowded and costly transportation. Thus the need for scientific strategies and approaches to upgrade Kabul City transportation infrastructures is obviously seen.

It is widely believed that well-established transportation infrastructures upgrade the economy (KNOWLES et al. 2008), but without a developed economy it is not possible to have an improved transportation infrastructure. So, it seems to be a vicious circle or has analogy with the question of egg and hen but which one was created first?

So, while a well-organized transportation system supports a society and upgrades the economy, poor transportation infrastructures and management have negative effects on urban mobility and can hurt the economy (GIFFORD 2003). So, many cities try to improve their transportation infrastructures in order to bring benefits to the society and at the same time avoid the negative effects of transportation such as air pollution, accidents and traffic congestion. Developed metropolis cities used many approaches to provide efficient transportation facilities to their inhabitants. The improvement of technical transportation infrastructure such as tramways and roads, organizational transportation infrastructure such as public transportation including both fleet operation like bus and rail and individual transportation like taxi and private transportation are the lessons that the developing cities are on the way to follow. Besides, administrative transport infrastructure such as regulation and legislation is another major element that avoids negative effects of transportation and improves urban mobility. Approaches to improve transportation such as roads tolling and congestion pricing in London and Singapore are some of the examples. Construction of bus ways and lanes in Lima, Curitiba, Germany, UK and USA are the performances that

are followed by developing cities such as Indonesia, Hyderabad in India and in Kabul in 1979 in order to upgrade their transportation system, reduce congestion and prevent the negative effects of transportation.

Many strategies are developed for the purpose of studying urban transportation system, but the considerable differences between developed and developing cities make it quite difficult to launch a single approach. In the case of Kabul City as a developing city a strategy is used which focuses on city characteristic, population, existing transportation system and travel demand (HIL LING 1996, cited in PACIONE 2008, p. 585).

The structure of a city has an important role in transportation system. The new constructed cities are well designed with their transportation links either in raster model or radial. But ancient cities face challenges to fit the new transportation system with an ancient city structure where the city center has still strong effects with regard to its function. Moreover, multiple ethnic structures that are seen in many developing cities affect the transportation system indirectly.

The topography is another factor that structures the urban transportation system. For instance, the existence of natural phenomena such as mountains, rivers and hills affect the physical transportation infrastructure.

Along the historical development of Kabul City (before the arrival of Islam 700AC and after) the city is structured as a polar Islamic city which consists of ancient center and modern center with western style. The infrastructure was destroyed during the civil war (1991-1996) and sprawled about 69 percent after the war due to lack of land regulation and on account of influx of refugees. The city population increased rapidly by 4 million with 15 percent growth per year out of which 12 percent was migration (World Bank 2004). This phenomenon aggravated the city transportation system which was already in poor status.

In addition, Kabul City is located among the mountains at about 1800m above the sea level. The *Asmaye* and *Sher Darwaza* mountains divide the city into two parts. These parts are connected only by two main roads which are inefficient with regard to the city transportation demand that led to structuring the transportation routes in radial model. Also the multiple ethnic structure of the city has indirect effects on the city transportation

system. Each ethnic group settled in a specific area and created its own business district. All these issues are explained in chapter two which states the characteristics and function of the Kabul City and their effects on the transportation system.

In chapter three the organizational transportation infrastructure of Kabul City is analyzed. The purpose of transportation is to transform the geographical attributes of goods, passengers and information using processes of air transport, shipment, land transportation, pipelines and telecommunications (HANSON and GIULIANO 2004). The processes are categorized in different scales, such as global, regional or local. Regarding urban transportation as land transportation (focused on personal transportation) in local scale, transferring processes are performed by a set of different transportation modes (motorized and non-motorized) such as fleet operation and individual operation modes. These operations are organized in two categories: public transportation (public transit/mass transit) and private transportation (GATHER et al. 2008). Beside the two categories mentioned above a strong influence of an informal transportation system (paratranist) is visible in the city. Chapter three explains these categories in detail.

In addition, the technical transportation infrastructure is the basic physical structure needed for the operation of vehicles, or the services and facilities necessary for geographical mobility of goods, passengers and information. In general, technical transport infrastructure consists of ports, pipe lines, airports, urban transport infrastructure, and signage and traffic management systems (UNESCAP, 2006).

Chapter four describes the road network of Kabul City which is the only principle mode of physical infrastructure of transportation suffering from the unfair behavior of the users. Although it was planned in 1949 and revised in 1979, only 30 percent of the road network has been completed so far. Chapter four also explains the present road conditions and the road users. For instance, the roads in city center are used by all forms of transportation means as well as pedestrians, hawkers, mobile shops and stalls which seriously reduce the potential capacity of roads.

Chapter five illustrates the administrative infrastructure of Kabul City, the traffic management, the traffic police and their tasks, the educational system of the traffic police and the reconstruction of the traffic system.

Chapter six analyzes the Kabul City transportation system problems, forecasts demand and implies the strategies, approaches and geographical theory which can be used in order to improve the transportation infrastructures of Kabul City.

1.2 Conceptual Framework

There are multiple urban transportation strategies for third world countries. All of them try to identify the characteristics of the city as well as deficiencies of the existing transportation system and the people. For the context of my dissertation, the most appropriate strategy is the one developed by D. HIL LING (1996) (see PACIONE 2008, 585). It forms the basis of my theoretical approach (fig. 1.1). Relating to developing cities it focuses on city characteristic, population, existing transportation system, identifying deficiencies in characteristics of existing transportation system such as modes and services, estimates current and future demand, examines all possibilities for expanding capacity of the existing system and establishes scope and character of new systems likely to meet expected demand and be viable (HIL LING 1996, cited in PACIONE 2008, p. 585). According to my interpretation this strategy contains three phases: first, analyzing the current situation, second, establishing the scope of the new system, and third, carrying out an economic evaluation which is not part of this paper.

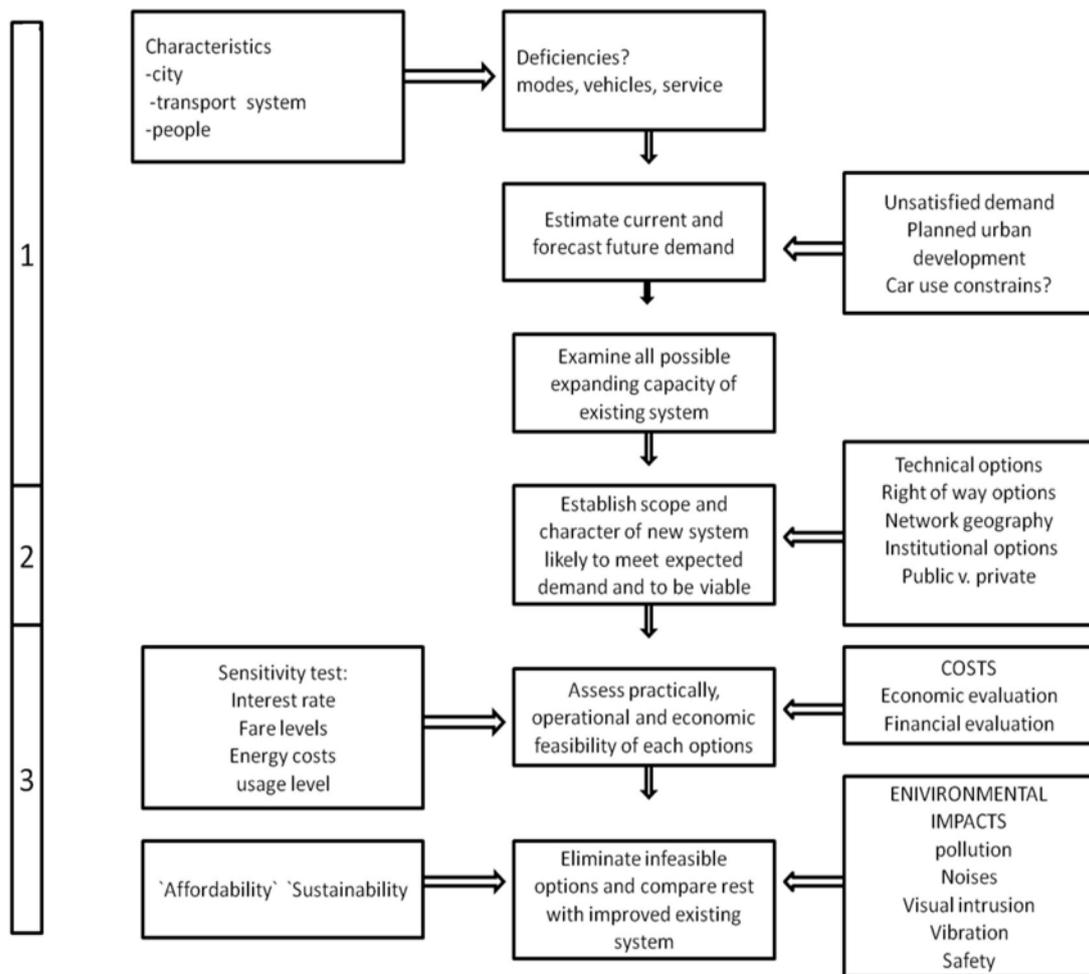


Fig. 1.1: A protocol for assessing transportation options (Source: D. Hilling 1996, cited in PACIONE 2008, p. 585).

1. 2. 1 Transportation System and Urban Structure

In general, two strategies can improve the transportation system and reduce the traffic congestion: the expansion and the improvement of the existing transportation infrastructures. In this paper efforts are made to focus more on the second case because it is suitable to the developing cities which are unable to pay the high capital cost of new construction. The improvement of existing transportation infrastructures which is called non-capital-investment emphasizes on exploitation of existing transport infrastructures and accessibility. This policy was launched in 1970 (PACIONE 2008).

In the process of improving the existing infrastructure it is necessary to improve the public transportation system. Researches in this field show that rail transportation is economical at very high passenger density, bus transit at medium density, and automobiles at low

density (SMALL 2006). Because of the close relationship between urban structure and public transportation some transportation strategies provide a general guidance to be applied in different urban structures. “Thomson (1977) identified four general urban transport strategies based on the degree of car-ownership to be accommodated [...] [fig. 1.2]” (PACIONE 2008).

1. **Full motorization.** This pattern can be observed in the raster-shaped cities such as Los Angeles. “The primary goal is to maintain high levels of car accessibility throughout the metropolitan area” (PACIONE 2008).
2. **Weak-center strategy.** This strategy can be applied to decentralized cities. The radial road network and inner city ring road is combined. Also the rail tracks are set up parallel to the radial roads, Boston being a good example.
3. **Strong center strategy.** This strategy is designed for the cities where the importance of the city centers must be maintained. The radial parallel (roads and railway) system with high-speed ring roads close to the city center is applicable for this model.
4. **Low-cost strategy.** This strategy is based on the improvement of the existing bus fleet network (with radial public transportation routes) in cities that cannot afford the expansion of the rail transit technical infrastructure.

Besides, the rail transit needs a lot of subsidies, which are rarely granted in developing cities. In only a few cities such as Santiago, Seoul and Hong Kong the rail transit is cost effective due to the density of the population. In Hong Kong, for example, “50000 people live within 10 minutes of each stop, [...]” (GAKENHEIMER 1999, p. 683). Also “In cities where a minority owns a private car, substantial public expenditure on new road or rail system cannot be justified, socially or economically. Traffic problems require low-cost approach that maximize the use of existing infrastructure through improve management” (PACIONE 2008, p. 276-277). On the other hand the public want the city development and highway construction. “It would be a mistake to conclude that the public rejects urban highways and favors more public transit [especially in developing countries]” (GIFFORD 2003, p. 6). Thus the developing cities could focus both on the expansion (new construction) and the improvement of the existing transportation infrastructures through the transportation management.

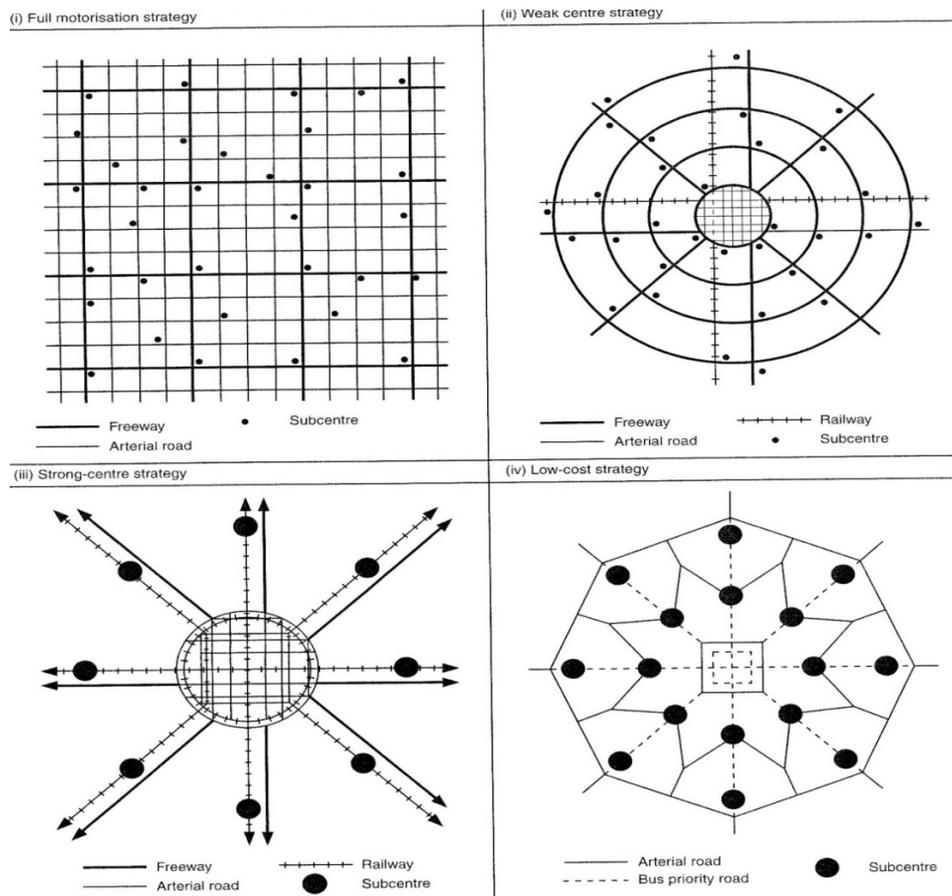


Fig. 1.2: Models of the relationship between transportation system and urban structure (Source: Thomson 1977, cited in Pacione 2008, p. 276).

1. 2. 2 Transportation Management Elements

As mentioned above the upgrading urban transportation management increases the capacity of the urban infrastructure which results in providing efficient services for the public and increases the mobility which is an important element of the economic growth. In other words, poor transportation infrastructures and management can hurt the economy (GIFFORD 2003).

In the field of transportation and mobility management two kinds of actions are defined: hard actions and soft actions. Both actions function in an integrated system which in general focuses on the city planning. Hard actions mostly focus on transportation management, practical and legislative terms. Physical performances of hard actions are the constructions of transport infrastructure such as roads and parking areas but also foot paths and electronic data transmission infrastructure. The legislative performances include law

and regulations, duty and taxes. The hard actions also offer different modes of transportation such as tramway, metro and buses. The public is informed about these modes by the elements of the mobility managements in order to alleviate the traffic congestion and create an effective transportation system.

Soft actions mostly focus on mobility management that consists of organizational matters, information, coordination and communication. Many cities in the world have traffic (transport) management centers (TMC) which provide fast, intelligent and coordinated responses such as traffic management teams, clean-up of hazardous materials, detour traffic, alert motorists via changeable message signs and traffic reports to the media, closing of highways in case of fire, floods or earthquake damages according to the information gathered by electronic sensors, video cameras and patrol officers¹. Also mobility management offers a Tele-work system (E-learning/work) which decreases the transportation demand (fig. 1.3).

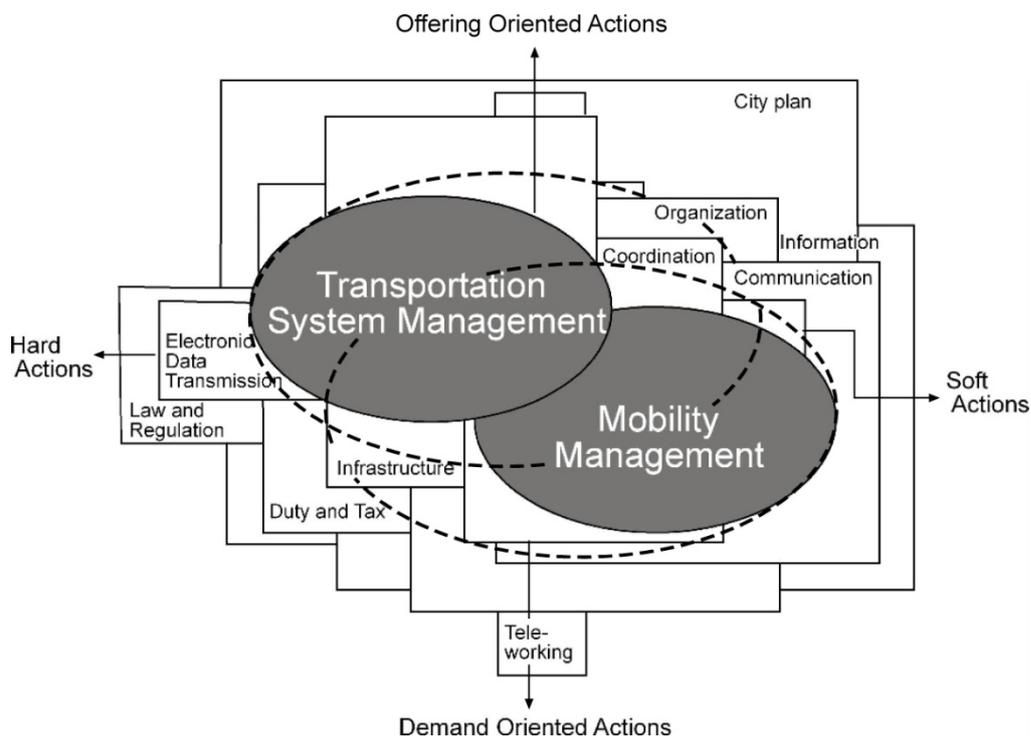


Fig. 1.3: Transportation management and mobility management elements (Source: GATHER, KAGERMEIER and LANZENDORF 2008, p. 214).

¹ <http://www.fhwa.dot.gov/tfhr/safety/tms.htm> 20.07.2010

The transportation system management and mobility management are much more integrated than on the figure mentioned by GATHER, KAGERMEIER and LANZENDORF (fig. 1.3). For instance parts of the hard actions (electronic tables on highways and navigation system) which regulate and manage mobility are included in soft actions. The broken lines in figure 1.3 show the integration of urban transportation infrastructures. According to the transportation management urban transportation infrastructures are divided into three parts: organizational, technical and administrative infrastructure. The organizational part includes public and private transportation system, technical part includes the physical infrastructure and the administrative part includes the regulation and legislations. More details are depicted in figure 1.4.

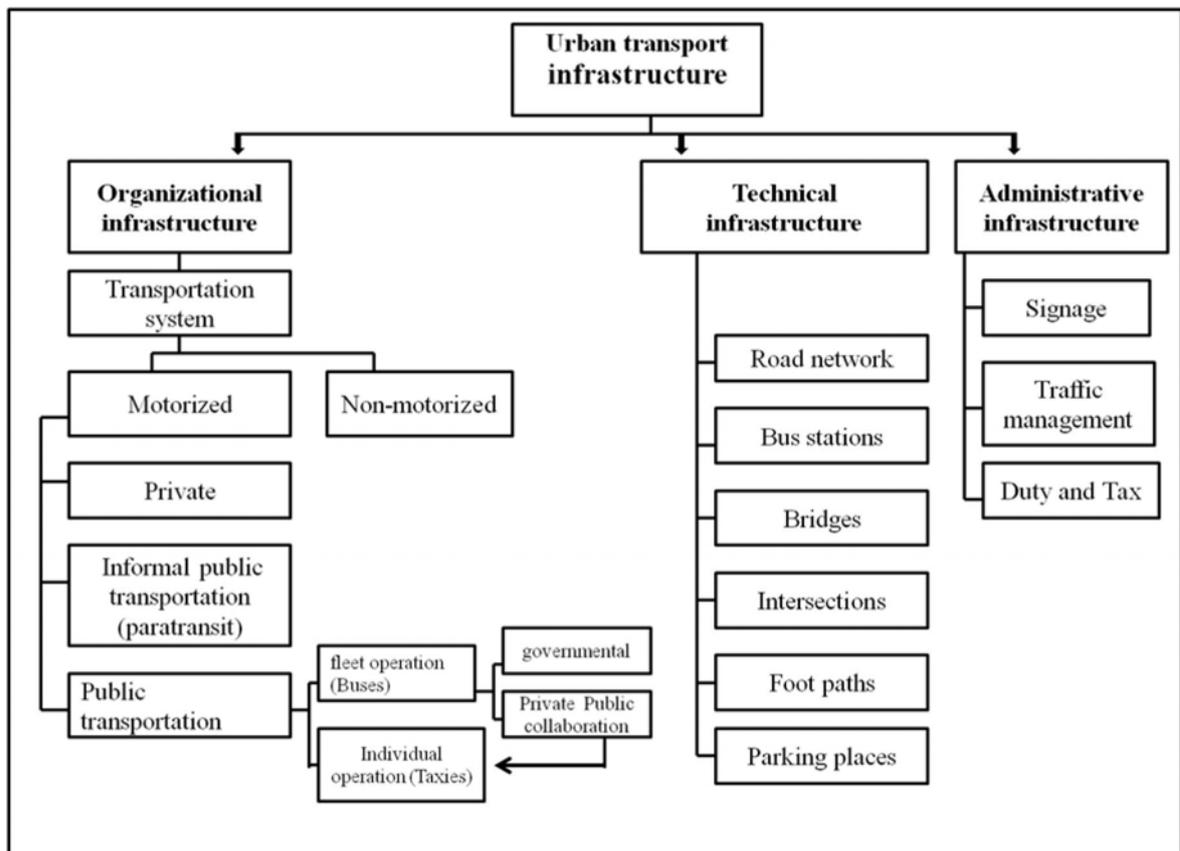


Fig. 1.4: urban transportation infrastructures (Source: own draft NOORI 2009).

Physical (technical) Transportation Infrastructure Management -Existing Public Transportation

In many developing countries an effective public transportation plays a significant role in the urban development. Due to the high costs of rail infrastructure cities such as mentioned in fig. 1.2 (low cost strategy) prefer to upgrade the existing bus fleet network. These efforts mostly concentrate on the construction of bus ways, bus lanes², adequate and well organized bus stops and terminals, priority of buses at traffic lights and bus route rationalization.

The construction of bus lanes and bus ways which is called Bus Rapid Transit (BRT) occurred in Lima in 1972 and developed in Curitiba in 1974 and later in the United Kingdom and the USA. In Bogota since the launching of BRT there was a 10 percent decrease in private vehicle users (WRIGHT 2005, p. 14). This alternative was implemented in Hyderabad, India in 2004 out of consideration for urban development and the reduction of the carbon emission (SACHDEVA et al. 2004). In Kabul City bus lanes were established on some roads (map 3.1) by the arrival of the trolley bus system in 1979. Those lanes were not physically segregated from the other lanes. But this system disappeared along with the destruction of the trolley bus system.

Bus ways and bus lanes can be designed in the middle, on one side or on both sides of the road (ÖRN 2005) (fig. 1.5). In countries where the right hand road system is in use, bus ways in the middle of the road are frequent, so as to facilitate the transit of the vehicles turning to the right (WRIGHT 2005). On the other hand, the construction of bus ways in the middle of the road is problematic, because the doors of the left hand driving buses are designed to the right of the bus and vice versa for the right hand driving buses. So special buses are needed with doors opening on the medial bus stop or bus stops on both sides of

² “Bus lanes are street surface reserved primarily for public transport vehicles on a permanent basis or on specific hourly schedule. Bus lanes are not physically segregated from other lanes. While the lane may be painted, demarcated, and sign-posted, changing lanes is still feasible. In some cases, bus lanes may be shared with high-occupancy vehicles, taxis, and/or non-motorized vehicles. Bus lanes may also be opened to private vehicles usage near turning points.

Bus ways are physically segregated lanes that are exclusively for the use of public transport vehicles. Entering to a bus way can only be undertaken at specific points. The bus way is segregated from other traffic by means of a wall, curbing, cones, or other well-defined structural feature. Non-transit vehicles are generally not permitted access to a bus way although emergency vehicles often also may utilize the lane. Bus way may be at surface level, elevated, or underground” (WRIGHT 2005, p. 5).

the way which result in extra land consumption (to build bus stops on both side of the bus way), in other words extra costs.

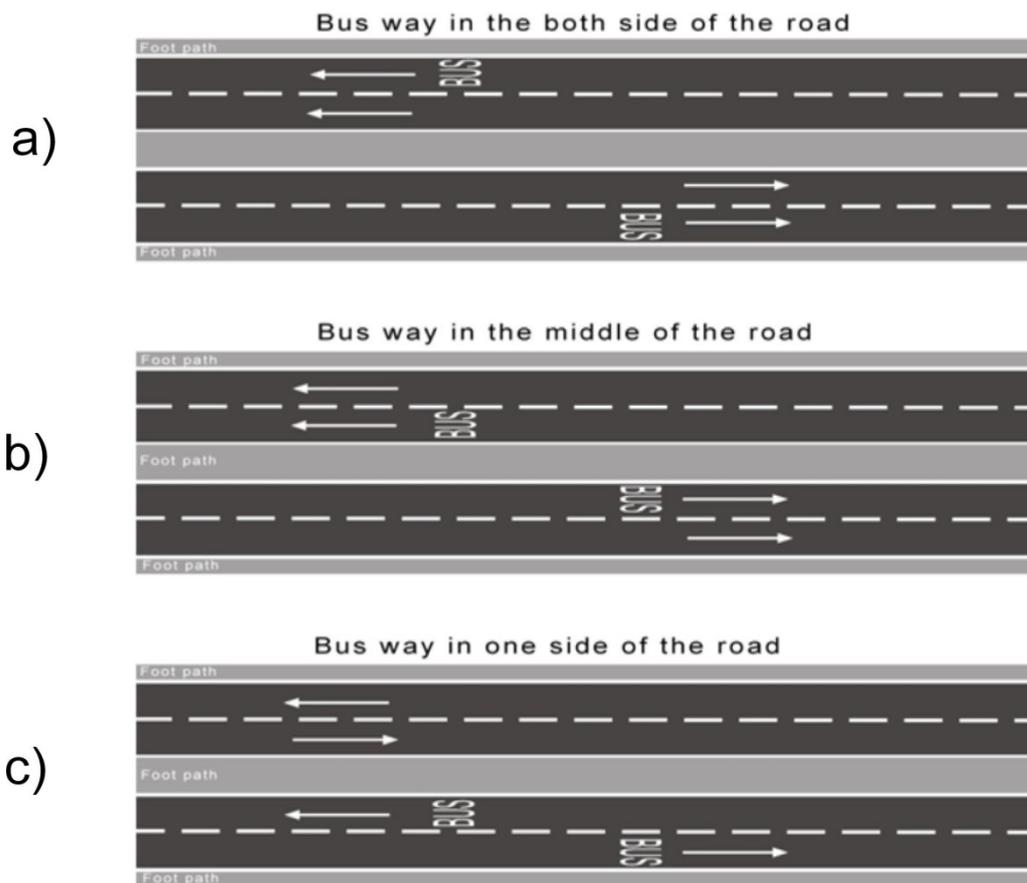


Fig. 1.5: Bus ways on sides, middle and one side of the road (Source: ÖRN 2005, p. 49, altered by author).

Improvement of bus stops is another alternative in order to upgrade the traffic flow. Besides, it provides safety for the passengers wait for the bus at the bus stop. The different types of bus stops are designed with regard to the variable states of the roads such as width and roads with side parking. The most useful bus stop design is the lay-by-bus stop which leaves a free way for the coming vehicles. But sometimes it prevents the bus to reintegrate into the traffic. The total length of lay-by-bus stops is 58m as shown in fig. 1.6, but it should be designed according to the length of the bus. Moreover, bus stops on the street are designed when there is not enough space on the road side. Bus border also called bus bulb is another type of bus stops which is designed where the road side parking is allowed (fig.

1.6). The last two types have some benefits such as preventing the bus from being put off while having to pull back into the traffic and preventing pedestrian crowding on foot paths.

All these patterns of bus stops are frequently used (STEIERWALD et al. 2005, P. 640-646). In most developed countries such as Germany the lay-by bus stops and bus border types are common. In Kabul City most of the bus stops are on the street, but only a few lay-by bus stops are to be seen on the road between Kabul Polytechnic and *Kota-e-Sangi*. These bus stops were designed for a trolley bus system so as to avoid delaying vehicles that must stop behind the trolley bus during its dwell time.

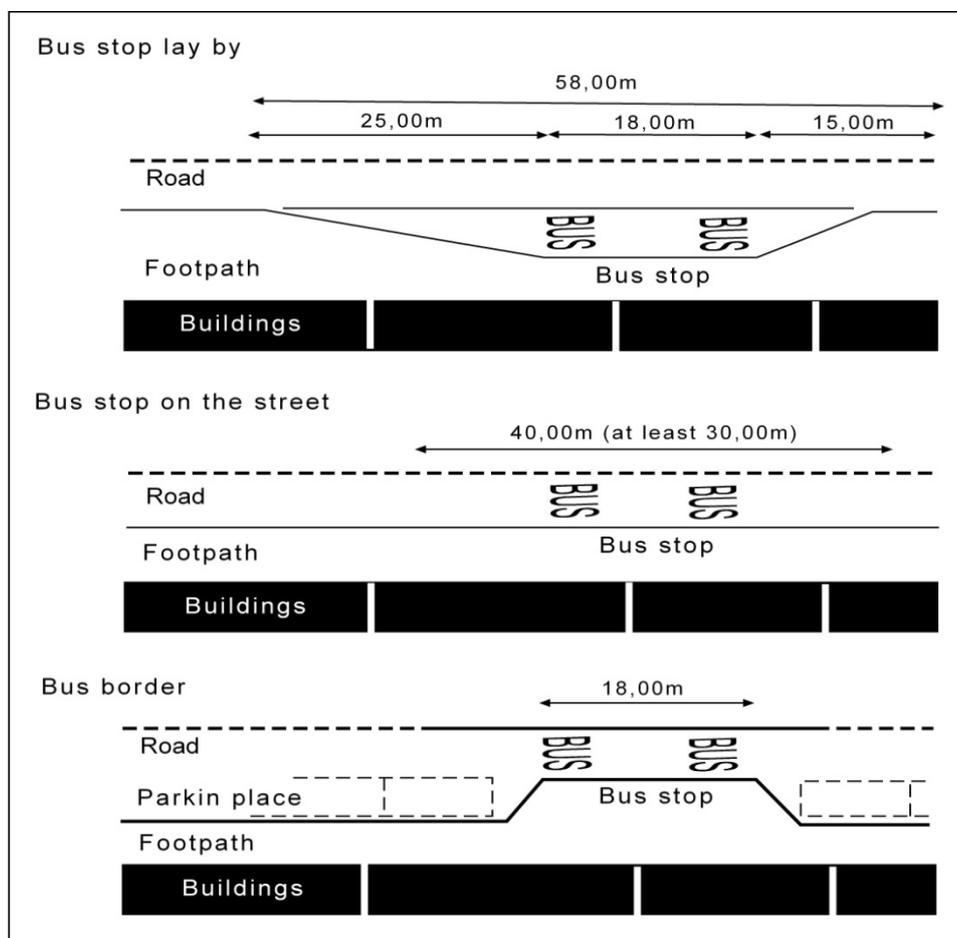


Fig. 1.6: Types of bus stops on roads that provide more than one traffic line in each direction (Source: STEIERWALD, KÜNNE and VOGT 2005, p. 646).

Bus stops on the street and bus border are not appropriate on the streets that are made up of one traffic line in each direction (especially in residential areas where the roads are

narrower), because the dwell time of a bus at the bus stop will impede the traffic flow. To solve this problem some other bus stops are designed (fig. 1.7). For instance to avoid accidents roads alternate with divisional traffic islands in combination with bus stops. But the coming vehicles must stop behind the bus during its stationary time at a bus stop. The second type of bus stop staggers the road (machine track). In this case, a free way is left for other road users. Bus stops on both sides of roads separated by medial traffic islands are the third form of bus stops to be seen on narrow streets. This form also leaves a free way for the coming vehicles. The bus border form of a bus stop in a narrow street is designed where the bus only operates only in one direction. This fourth type of bus stop does not impede the traffic flow and leaves a free space for the traffic (STEIERWALD, KÜNNE and VOGT 2005, P. 640-646).

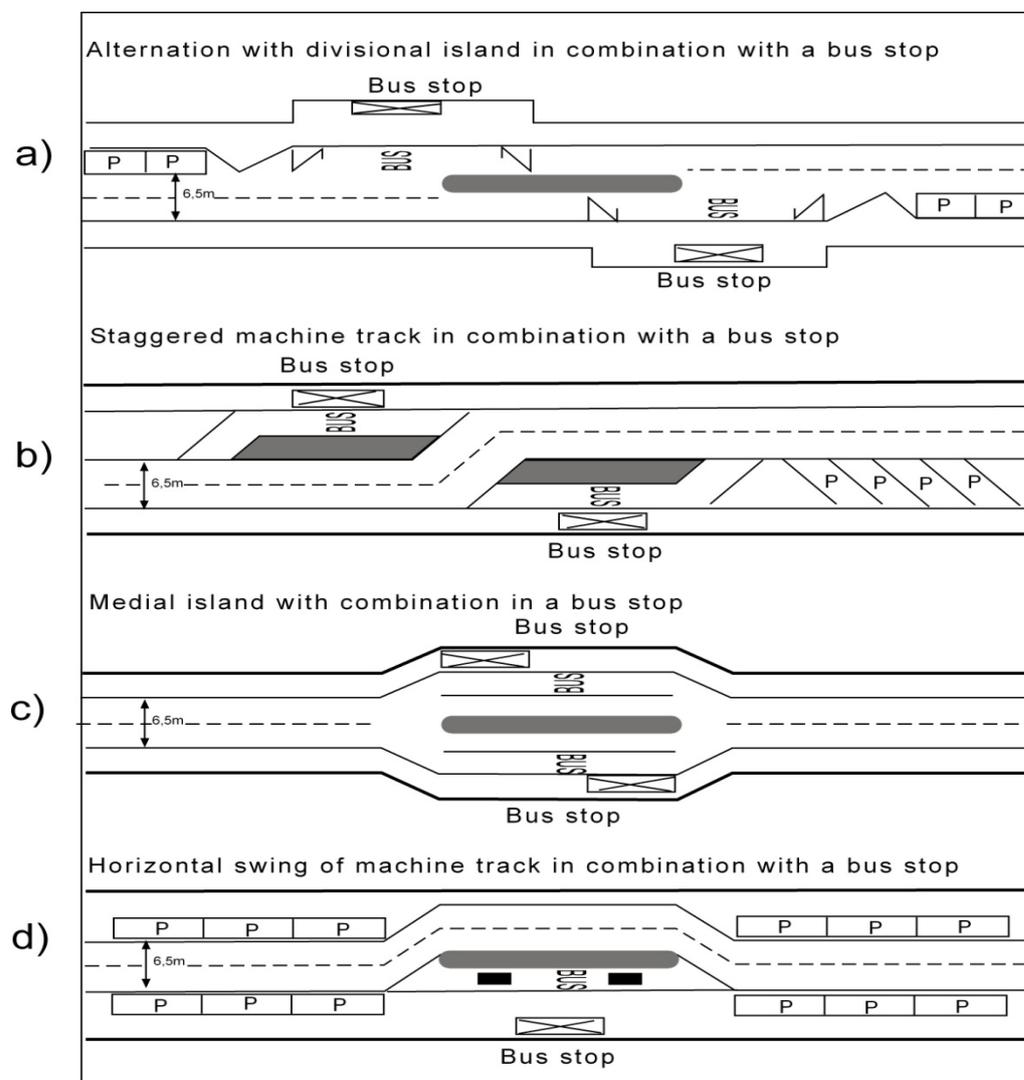


Fig. 1.7: types of bus stops on roads that provide one traffic line in each direction (Source: STEIERWALD, KÜNNE and VOGT 2005, P. 640, altered by the author).

Increasing the capacity of the transportation modes is another option which meets the rising demand. The use of big capacity buses instead of small capacity buses reduces the number of vehicles on the road which results in reduction of congestion. This approach is mainly connected with the idea of the new expansion of the transportation infrastructure.

Administrative Transportation Infrastructure Management-Existing Public Transportation

“Even in highly congested cities, urban road efficiency can be improved through better system management [(technology)] (GWILLIAM 2002). The priority of buses at intersections is another option for the improvement of the existing fleet operation infrastructure. Controlling the priority of buses by installing electronic sensors at traffic signal is widespread all over the world. However, this is a part of new construction and is also related to the administrative transport infrastructure. The use of “Selected Vehicle Detection” (SVD) is common especially in developed countries. This is a method that allows buses to pass the traffic light in priority. “The I BUS system [which is a project of use of Global Positioning Satellite (GPS) bus location system in the purpose of SVD] utilizes GPS technology and other-bus system such as odometer output and door sensors to communicate with the bus’ on-board computer. [...] When a virtual detection point is reached as programmed in to iBIS plus software, a signal is sent to the transceiver in the signal controller requesting bus priority, and to a central location for performance monitoring” (MAYOR OF LONDON 2006, p. 3).

Since the installation of electronic sensors (GPS technology) at 3200 junctions and 8000 buses, bus delays were reduced by one third in London(D’SOUZA and HOUNSEL 2009) from 1999 until 2006 (MAYOR OF LONDON 2006). In Los Angeles 654 intersections and 283 buses are equipped with electronic sensors that reduce the travel time by 6-8 percent. In Prague 65 junctions and 352 buses are equipped with electronic sensors that reduce the travel time by 2 percent. Bus priority is a part of BRT which upgrades the existing transportation infrastructure by using technology without any expansion in technical transportation infrastructure.

Moreover public fleet operation can be improved by traffic regulation. For instance a bus should have priority when it reintegrates the traffic after its dwell time at a bus stop.

Organizational Transportation Infrastructure Management

The improvement of BRT depends also on soft transportation management (organizational infrastructure improvement) and not only on physical infrastructure. In general the transportation system is categorized into three parts: public (governmental) transportation system, private sector and mixed public private collaboration. In many developing cities because of the large public (governmental) transport subsidies the city transit is mostly left to private sectors (WRIGHT 2005). In many developing cities paratransit³ is the mainstay of the city transportation system. The existence of 2000 “mamas” in Nairobi, 15000 “carros por puesto” in Caracas and 40000 jeepneys in Manila shows the strong role played by the paratransit in the city transit. For instance about 60 percent of peak-hour trips are ensured by paratransit in Manila and 50 percent in Indonesia (JOEWONO and KABUTA 2007). Indonesia regulated the paratransit which operates on fixed routes but not on fixed stops and schedules.

Also in Turkey “Dolmus” paratransit is organized along a predetermined route but has no determined stops and schedules and is integrated within the city public transit⁴. Moreover in developed cities such as New York City 3.000 to 5.000 private minibuses provide services for the public. “In both the devolving and developed worlds, paratransit best operates in a supporting and supplemental, rather than substituting, role” (CERVERO 1998, p. 15-16). Due to the advantages of the paratransit such as high accessibility and mobility because of its unimpeded lane movement and low maintenance cost some cities like Mount Pelion region in Greece desire to supply paratransit and integrate it to the city transit (MASTROGIANNIDOU et al.2006). But the inefficient services of the private

³ "The smallest carriers often go by the name of paratransit, represent the spectrum of vans, jitneys, shuttles, minibuses, and minibuses that fall between the private automobile and conventional bus in terms of capacities and service feature. Often owned and operated by private companies and individuals, paratransit services" (CERVERO 1998, p. 15, available online: http://books.google.de/books?id=bLs3H_IWr3wC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false). In the case of Kabul City transit system, paratransits is an informal urban transportation system (not registered at the Private Transportation Sector and have no permission to operate for the public) which consists of intermediate transportation modes (minibuses), private cars and auto rickshaws.

⁴ <http://www.kemer-tr.info/Transport-Dolmus.htm> 28. 09. 2010

operators result in the creation of an informal transit (paratransit) which operates individually and generates lot of traffic problems. That is why the public transit should integrate the private individual paratransit within the public transport (fig. 1.8) and also define their routes like main routes for the buses and feeder routes for the intermediate public transportation (IPT).

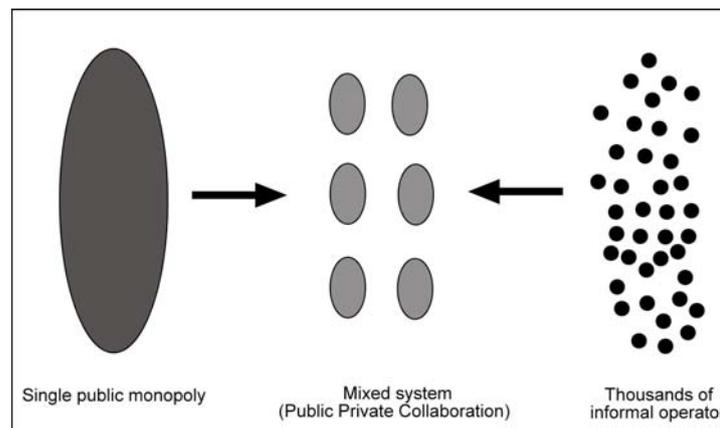


Fig. 1.8: Integration Process of Individual Paratransit into the Public Transit (Source: WRIGHT 2005, p. 32).

The creation of feeder lines (feeder service) is also an organizational option which supports reduce of congestion. The system organizes the IPT to transfer the passengers to the bus terminals (high capacity vehicles). This system is used in Curitiba (in Brazil) where five radial bus way (direct lines) emanate (57 km) from the city nucleus with 340 km feeder line service (WRIGHT 2005). The system reduces the number of vehicles (IPT) on direct routes where the big capacity vehicles operate (fig. 1.9). Moreover the single origin honeycomb model which has been designed based on CHRISTALLER scheme is the best type of network. In this treelike model there is a single origin with multiple terminals (HAGGETT 1979, p. 443). In fig. 1.9 the feeder line and feeder trunk line of WRIGHT's scheme is combined with single origin model. In the figure each of the honeycomb structure is the catchment area of a feeder trunk line that is connected by a direct line to the city center.

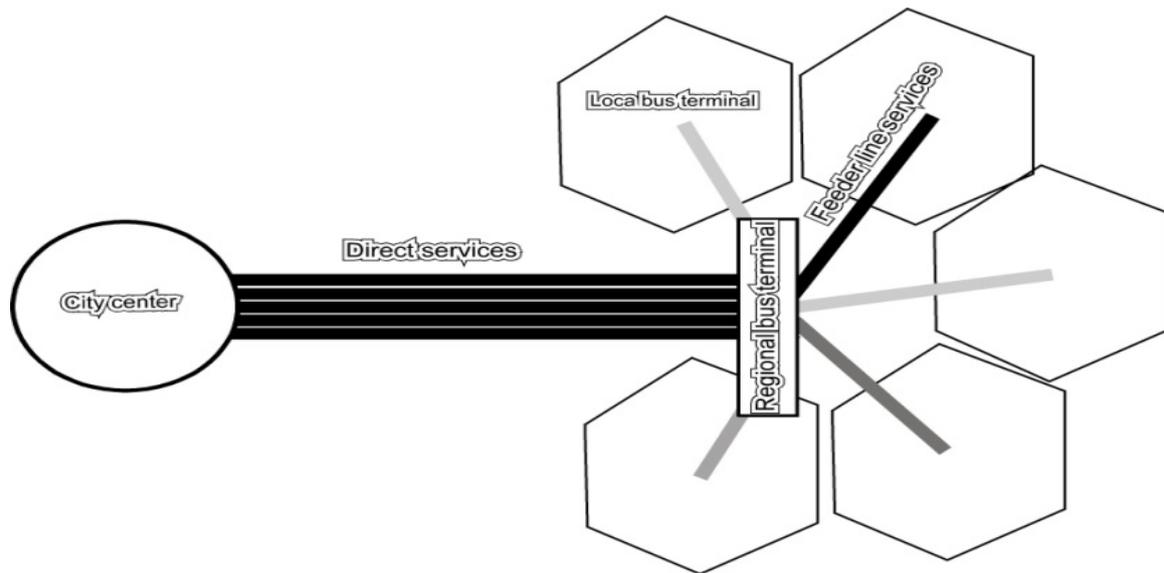


Fig. 1.9: Combination of Single origin model and Feeder and Direct line scheme
(Sources: HAGGETT 1979, p. 443 and Wright 2005, p. 19, altered by author).

1. 2. 3 Private Transportation Improvement (administrative management)

Some approaches have been thought of in order to reduce the large costs caused by traffic congestion. These include road pricing, high duty and tax, as well as the control and regulation of parking places.

Road pricing has been set up in order to induce people to use cheaper transportation means (public transport), reduce congestion of roads and travel time at various times of the day when the traffic is light. The system has been implemented for example in Singapore, Bergen, Trondheim, Durham, London, Stockholm, Bologna and Roma (NAGEL et al. 2008). This system has three forms: congestion pricing, road pricing and value pricing. In the first form the price increases when the traffic volume gets higher (fig. 1.10), as it is the case in Singapore since 1975.

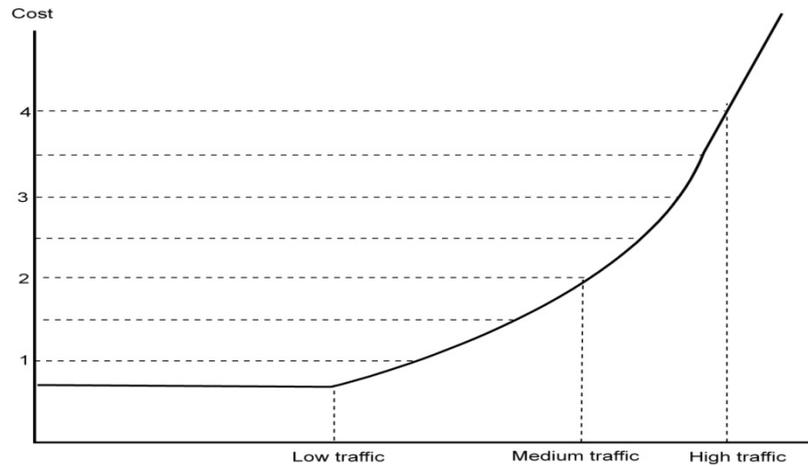


Fig. 1.10: Principle of Congestion Pricing (Source: LI 2002, fig. 1, altered by author).

The road pricing system has been applied at a large scale in London central area since 2003 (PEIRSON and VICKERMAN 2008). Each vehicle entering the city center must pay a five Pound road pricing charge.

In the USA another form of road pricing is adopted which is called “value pricing”. This system applies only to express lanes which are adjacent to unpriced roads. The one who wants to use the express way have to pay the cost. This system is regulated by the video recording of the license plate (SMALL 2006).

The higher duty charge of the vehicles is also a way to decrease the number of private car trips. “The examples of Hong Kong and of Singapore (where purchase taxes amount to some 300% of the price of the vehicle) are present examples” (GAKENHEIMER 1999, p. 683). In Singapore since the 1990ies two methods have been implemented in order to reduce the number of cars. The first is a quota system, by which only a limited number of imported cars are allowed into the country. The second system consists in limiting the number of cars in peak-hours during the weekday (OLSZEWSKI and TURNER 1993).

1. 2. 4 Non motorized Improvement

“Bicycle, as well as other forms of non-motorized transport can bring significant benefits” (GUITINK, 1996, p. 1). Because of the negative effects of the traffic congestion both in developed and developing countries, new attention has been paid to non-motorized vehicles. The use of bicycles in developing countries (Asian cities) is first related to the economic situation, bicycle being very cheap means of transportation (TIWARI 2005). For instance “data from Malaysia and India suggest that bicycle ownership raises to 40 percent when household income level reach about 10 times the cost of a bicycle” (GUITINK 1996, p. 5). In Madras City center, one third of the coming vehicles (into the city center) are bicycles. 50 to 90 percent of the passengers use bicycles in Chinese cities. But in developed countries use of bicycle is popular for different reasons: health, reduction of traffic and as a non polluting transportation means, as well as its cheap cost. In the Netherlands about 30 percent of daily trips are done by bicycles. Most of the European countries encourage people to use bicycles and providing facilities and make it accessible to everyone. For example the German Rail company (DB) distributed 2000 bicycles in Berlin under the electronic bicycle renting system which is called “Call a Bike”. This system also exists in other German cities like Hamburg and Munich. Each bicycle has an electronic device and a password which the user receives by calling the bicycle renting center and giving her/his credit card number (Stiftung Warentest, test.de 2002)⁵. The integration of non-motorized routes with motorized traffic (technical infrastructure improvement) as well as bicycle priority policy (administrative improvement) favor non-motorized transportation and thus reduce traffic congestion (GUITINK 1996).

1. 2. 5 Land Use Management (decentralization) and Work Schedule Changes

Land controlling is another strategy which reduces traffic congestion. “The cities of the developing world have motorized faster, leaving urban structure further out of adjustment [...]” (GAKENHEIMER1999, p. 680). The expansion of the store area of a city increases

⁵ <http://www.test.de/themen/freizeit-reise/meldung/DB-Fahrradverleih-Rad-per-Telefon-1063365-2063365/01.10.2010>

the traffic congestion. For instance Miraflores out of Lima and Providencia out of Santiago are occupied by multi store buildings with a massive congestion (GAKENNHEIMER 1999). Also in Kabul City the decentralization policy, launched in 2004, which relegate the victual markets into the periphery centers, away from the CBD.

The schedule changes policy has been adopted in many countries in order to decrease the traffic congestion. This policy is also used in Tehran since 2009 (BBC 2009)⁶ but because of the lack of information the result is not clear yet.

Efforts are made to focus on some of the approaches mentioned above which can apply to the case of Kabul City. Figure 1.11 illustrates the general scheme of improvement of transportation system and reducing traffic congestion.

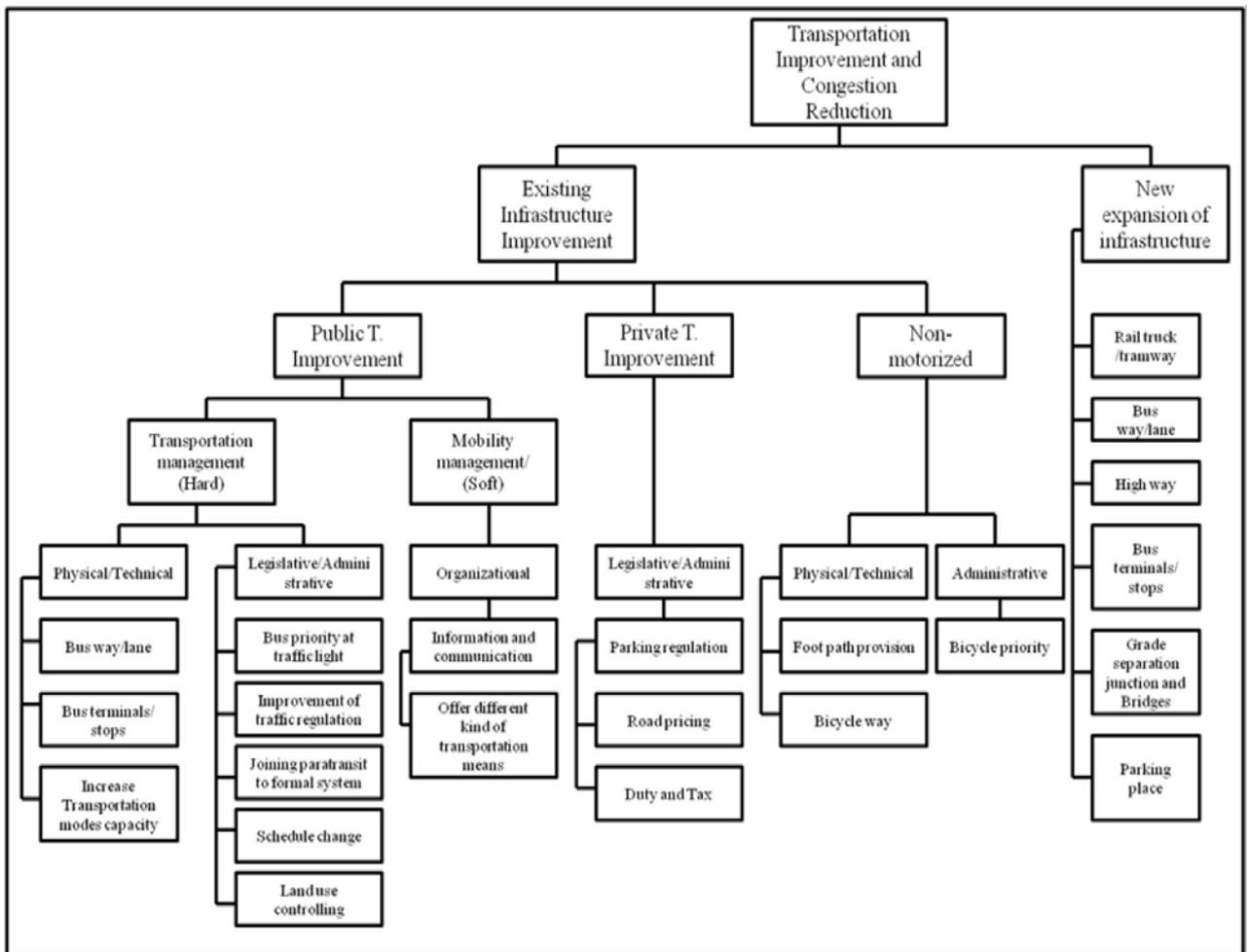


Fig. 1.11: General guide line of transportation improvement and congestion reduction
(Source: own draft NOORI 2010).

⁶ http://www.bbc.co.uk/persian/iran/2009/11/091109_ag_fb_work_hours.shtml 10.11.2009

1.3 Hypotheses on Traffic Collapse in Kabul City

The rapid growth of urban population and the number of cars creates a lot of problems such as traffic congestion whose economic costs can count billions of dollars (PICEONE 2008). Also “the translation of the aims of the sustainable development vision into urban transport sector at the local level is one of the most challenging aspects of urban transport strategy formulation [...] (DIMITRIOU 2006, p. 19).

After 2002 international donors tried to upgrade the Kabul City transportation system. About one thousands buses were donated to the Kabul Millie Bus company by Japan, India, Iran, Pakistan and Italy in order to improve the collapsed governmental public transportation system. 400 of the donated buses have been dedicated to provide transportation services for the Kabul City inhabitants (about 5 million in 2010). But only 280 of them operate. The operations of informal transportation the so-called Paratransit with their small capacity is increasing. Private car ownerships increase also (60 cars per 1000 people). Compared to the infrastructure plan one can see that 30 percent of the planned roads are paved that impedes the traffic circulation to a certain extend. Beside this, the existence of right hand driving automobiles which are not fit to the Afghanistan traffic legislations, the existence of stalls, hawkers and mobile shops as well as the use of roads as parking places are other challenges facing the city traffic situation. This situation creates lots of problems such as impeded traffic circulation, traffic congestion, air pollution, accidents and costly transportation which is not affordable for the Kabul inhabitants with lower income (less than 100 US Dollar per month).

The research questions are:

- What problems does the city transportation face?
- Where do the challenges come from?
- How to improve the urban transportation system in Kabul City?
- How to reduce the traffic congestion in the city?
- How to increase the capacity of public transportation?
- How to control the increasing number of car ownerships?
- How to regulate the informal transportation system.

Demands for future planning issues are as follows:

Improve existing transportation infrastructure and care for new infrastructure. Upgrade public transportation infrastructure by means such as the construction of bus ways and lanes, the improvement of bus terminals and stops and transportation mode capacity (big capacity buses). Besides, upgrading of public transportation through administrative affairs such as bus priority at traffic lights. Moreover, encourage people to use the public transportation via information and communication. Upgrading public transportation will reduce use of informal transportation as well as private car trips. Without an improved public transportation system (fleet operation) other attempts such as car ownerships restriction and traffic regulation do not work effectively. Figure 1.11 illustrates the transportation improvement and congestion reduction process. Many scientists in the field of traffic and transportation emphasize on improving existing transportation system in developing cities (PACIONE 2008) and necessary new constructions (GIFFORD 2003). The new construction should more focus out of the city center because of the higher land price. According to these concepts the existing transportation situation of Kabul City need both existing infrastructure improvement and new constructions especially in fulfilling the city road network master plan.

1.4 Methodology and data collection

The research methodology in this paper includes literature review on urban transportation development in developing cities, maps (historical and updated), field, interviews (qualitative and quantitative) and fact findings through questionnaire distribution.

Because of the lack of literature on Kabul City's transportation system most of the data and information have been accumulated through interviews (qualitative and quantitative) and field research. For instance for the field work which was carried out in 2007 to identify the peak-hours seven stations were selected on the roads leading to the city center as a most congested place. This field work was carried out by the help of the students of Kabul University, Faculty of Geosciences. Moreover, in order to get access to the data about modal split, travel demand and monthly per capita the questionnaire (in Dari) was distributed in the city center as the most major active place in Kabul City in 2009.

Unfortunately in some cases the security problem and cultural behavior of the inhabitants created difficulties to complete the questionnaire. There were altogether 2,000 questionnaires but only half of them have been completed. The reasons were, firstly, that it was difficult to make an interview with women, secondly the security situation, thirdly the lack of time and personnel. But fortunately I was able to gather about 1178 completed questionnaires by the help of the students of Geography, Kabul University. As I spend several years teaching at the Department of Geography I held a one day workshop about Urban Transportation and Urban Geography for the students. then the students were asked if they could help me fulfilling the questionnaires. Fortunately 20 students (male) enrolled. That was the time before presidential election (2010) and because of the terrorist attacks many students did not want to go into the crowded places (central bazaar) where the questionnaires were supposed to done. So about half of the questionnaires were not completed.

To get the exact data about the vehicles in Kabul City I frequently visited the General Traffic Office of Afghanistan, Kabul Traffic Office, Ministry of Transportation and Afghanistan Central Statistical Office (in 2007, 2008 and 2009). Also, to get the information about technical transportation infrastructure I paid several visits to the Kabul municipality which is responsible for city road construction and maintenance. The interviews which were done with experts listed as follows:

Abdulwahed Zia Ghaznawi, Vice dean of the Department of Revenue, Millie Bus company
Ghulam Farooq, Director of the Department of Planning, Ministry of Transportation
Ghulam Rabani, Director of the Department of Transportation, Ministry of Labor and Social Affairs

Nehmatullah Hashemi, Director of the Department of Transportation, Central Statistics Office

Faiz Mohamad, Director of the Department of Road Construction, Kabul Municipality

Sardar Mohamad, Head of the Department of Planning, Kabul Traffic Office

Mohamad Barat, Head of the Department of Traffic, Police Academy

Mohamad Fahim, Director of the Department of Education, General Traffic Office of Afghanistan

Mohamad Zarif Taniwal, Head of the Department of Geography, Kabul University

As for the number of population of the city there exist variable figures, but efforts were made to rely on World Bank database. To identify the city characteristics historical maps of Kabul City were used which was available at the Institute of Geography of the University of Giessen. Furthermore, maps produced by Afghanistan Information Management Services (AIMS) and Afghanistan Geodesy and Cartography Head Office (AGCHO) are also used.

2 Kabul City Structure and Population

2.1 Kabul's urban Development-A historical perspective

“The original birth place of Kabul City was *Khord Kabul* (34° 23` N and 69° 23`E) which has a small distance to the east of present Kabul City. [...] *Khord Kabul* was also called *Shah Kabul* because the first emperor of Kushanid empire established the capital of his empire there” (AREZ and DITTMANN 2005, p. 1). *Kabul Shahan* (the last emperor of Kushanid Empire) established the nucleus of the present city as a fortress on *Bala Hisar* hill because of its strategic location and surrounded it by a city wall against Islamic invaders. This part was later converted to a political and trading center.

According to history, Kabul City came under the “Arabs” in the 7th century (AREZ and DITTMANN 2005) and was occupied. As a result Kabul lost its significance and remained a secondary centre for several hundreds of years especially during the *Sultan Muhammad Ghaznawi* period when the royal attention focused on Ghazni City (SADID 1976a).

When *Babur Shah* (Mogul) in 1502 came to power, he selected Kabul as a capital for his government and within 20 years, due to his interests in Kabul, he not only reconstructed the city but also attempted to make Kabul a beautiful and pleasant place to live in. *Babur* built up the provincial roads that connected Jalalabad City to Kandahar. He built a mosque in the city center *Masjed-e-Bala chawk* (AREZ and DITTMANN 2005, p. 8) which was later surrounded by many shops, light industries and residential houses constructed of mud, stone and beams. The city expanded in his era from its ancient boundaries and developed with the construction of many entertainment places and gardens such as *Bagh-e-Babur*, *Bagh-e-Shahr-e-Arah*, and *Bagh-e-Mahtaab* on the outskirts of the ancient city. After *Babur Shah* his successors also paid specific attention to Kabul City. But as *Nadir Afshar* (Persian) took power in this land in the 17th century, the city was destroyed by the influx of his soldiers. But the city still functioned as an administrative center (RAHMATI 1985).

As *Ahmad Khan Abdali* (Pashtun) became king of Afghanistan he transferred the capital from Kabul to Kandahar in 1781. Eventually, he desired to transfer the capital back to Kabul. During his reign, *Ahmad Shah* ordered to build a wall around Kabul City. “*Sardar Jan Khan* implemented this order” (RAHMATI 1985, p. 173). The wall that was then

erected had six sections with highly protected gates. *Ahmad Shah's* son *Temor Shah* implemented his father's plan and decided to return the capital of Afghanistan back to Kabul in 1801. After this move Kabul city began to develop and extend.

As shown in fig. 2.1 the nucleus of an ancient Islamic city is a mosque surrounded by bazaars and residential areas with small sub centers. Also the city is protected by a defensive wall with gates and a castle which functioned as a citadel. These characteristic can be seen in Kabul City as well. The existence of *Bala Hisar* castle on the edge of the city, construction of mosque (*Masjed-e-Bala Chawk*) in *Babur Shah* empire in the city center, construction of *Bazaar-e-Char Chata* by *Ali Mardan* in 17th century (KNOBLOCH 2002, p. 161, cited in ISSA 2006, p. 28) surrounded by residential quarters and construction of the city wall in *Ahmad Shah* era structured the city along the established functional patterns of Islamic cities at that time (SADID 1976 a). Rather than the minority of Christians indicated in fig. 2.1, Sikhs and Hindus minorities are presented in Kabul City.

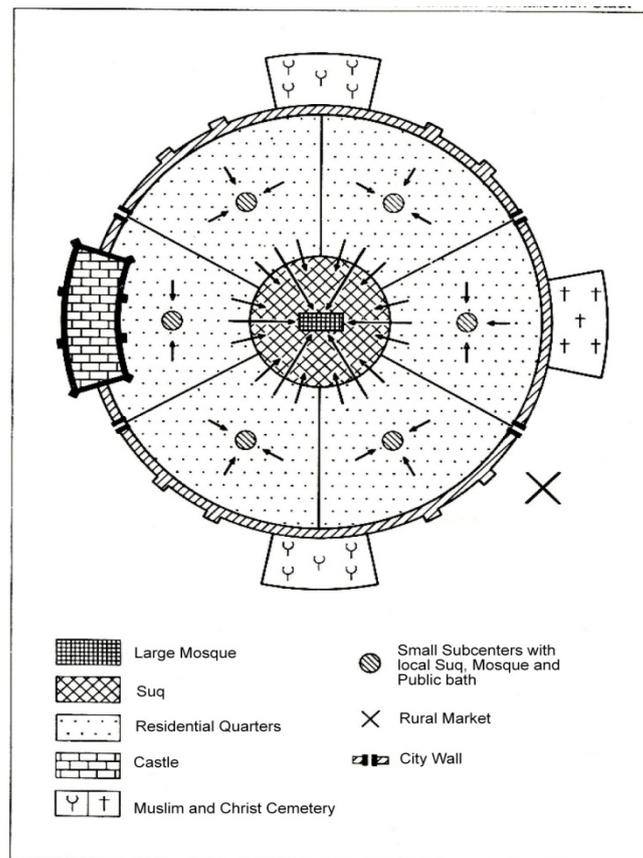


Fig. 2.1: Ideal scheme of functional Structure of an oriental Islamic city. (Source: DETTMANN 1969, p. 65).

Under *Temor Shah* a new plan and a new map of Kabul were designed, a new royal palace on *Balaa Hisar* and many small residential areas were built and called after the national heroes. The city's affairs were regulated and managed by an effective administration, divided into several sections such as the construction, supervision and security sections. The basis of the municipality was established at that time (RAHMATI 1985).

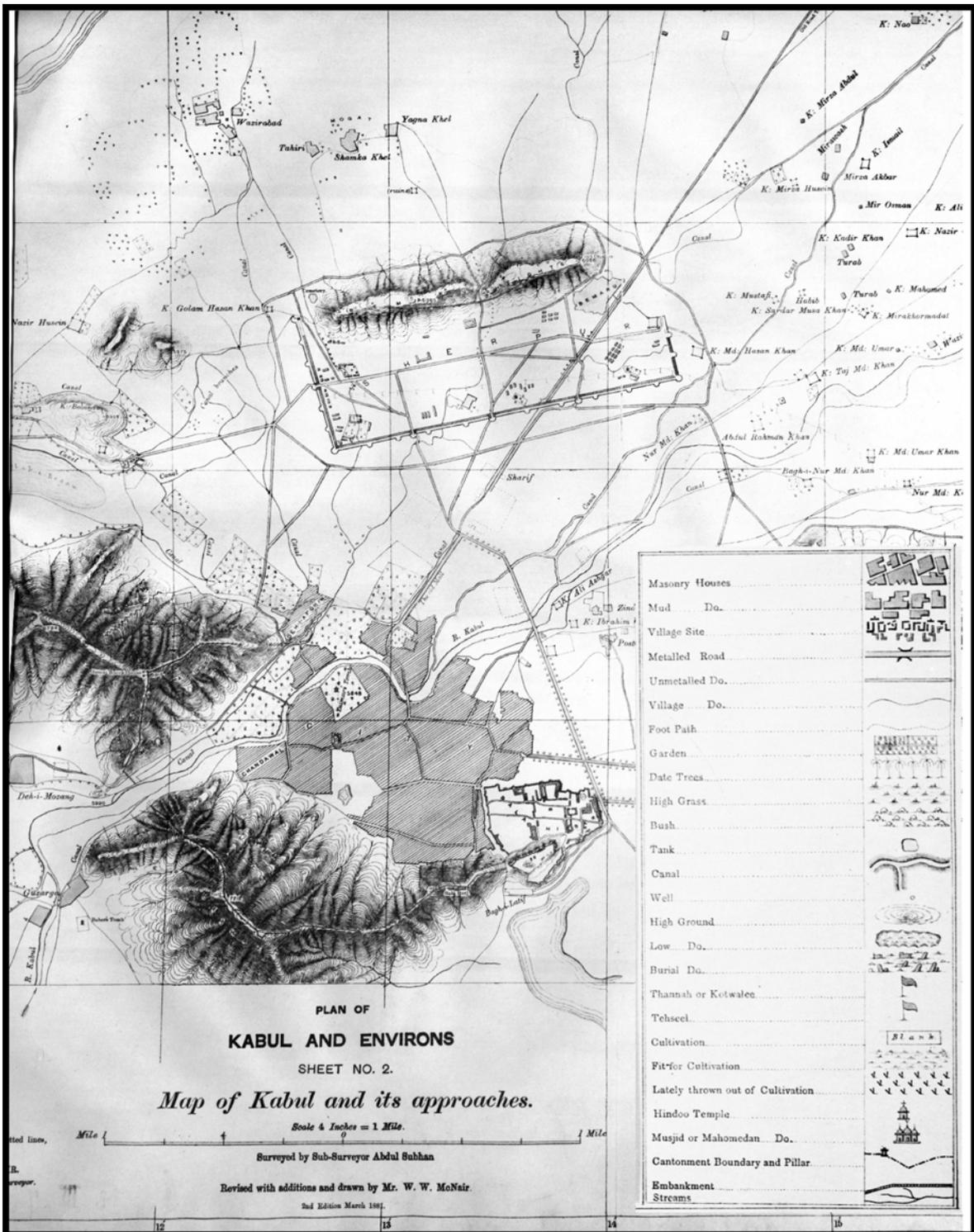
During the second period of his government *Amir Sher Ali Khan* paid attention to the revision, construction and reconstruction of Kabul city. *Sher Pur* (place of lions) a residential area for national heroes was built in his period (AREZ and DITTMANN 2008). Above all, he extended the city boundaries to the north side of Kabul River (map 2.1).

When the British military destroyed the *Bala Hisar* royal palace, king *Abdur Rahman Khan* moved from *Bala Hisar* to the northern side of Kabul river (between *Sher Pur* and *Bala Hisar*) and built another royal palace for his kingdom. Soon after his court settled a newly built area which is called *Shar-e-Naw* (new city) developed (DITTMANN 2006). Thus the boundaries of the city that had already expanded to the north developed and a new city (*Shar-e-Naw*) as a modern urban nucleus was planned with a modern style.

The idea of development and extension of the city to the northern side of the Kabul River was inspired by the city development plan of *Amir Sher Ali Khan* (1868). Also after him *Hibibulah Khan* tried to build a modern city on the south part of the Kabul City. Later on King *Amanulah Khan* ordered in 1919 to produce a master plan for the city development. For instance, *Jada-e-Maiwand* is one of the main roads that were built along standard norms.

Under King *Amanulah Khan* the foundation of a new city was laid out in the southern part of Kabul called *Darulaman*. The plan was to build palaces on hills, (*Tajbik* hill) that were positioned in the center of the Kabul city master plan and the nearby area was divided into 10 sections. Also, the offices of supervision and security had been established under *Temor Shah* became a well organized institution with effective regulations. For the first time the municipality of Kabul was created, and called "*Baladyah*" (municipality). Since 1931 the face of Kabul has been completely altered. Soon after, many houses, roads, parks and entertainment places such as cinema, museum and theater were built, new sections were added to the new Master Plan (1949) for Kabul City which was revised in 1978

(RAHMATI 1985). The new constructions turned Kabul into a modern city although it kept its ancient structure.



Map 2.1: Kabul City extension to the north in 1881. Source: INDIA OFFICE LIBRARY AND RECORDS 1881, Map E. x. 29 (A). Scale: 2 Inches = 0.5 Mile

The functional structure of Islamic cities was altered during the last century and turned to bipolar cities. The most important changes are the spatial expansion and the increase of subdivision of the newcomer forms of economic activities and urban life (EHLERS, 1993). Islamic cities developed on new nucleus in modern (western) style beside the ancient core where the mosque is in the center surrounded by bazaar, traditional industry and residential quarters (fig. 2.1).

The bipolar form of the city can be seen in economic and commercial activities not in constructional forms only. The new nucleus of an Islamic city functions as central business district (CBD) with modern infrastructure such as multi-storey buildings, banking, insurance and social infrastructures such as theaters, cinemas and modern supermarkets. The modern industrial area (light and heavy industries) appears near to the ancient city as well. Besides, the construction of apartments and upper-class residential area on the edges of the city, middle-class residential areas next to the CBD, lower-class residential quarters close to the industrial areas and old city, and the modern reparatory workshops in the expanded areas form the bipolar city (fig. 2.2). “The bipolar model of Islamic city considers (a) social economy, (b) structural form and (c) functional differentiation of the city. The arrow in (c) indicates the actual coexistence not only of the different population groups but also their economic activities, the space behavior patterns and the respective urban forms and function” EHLERS 1993, p. 36).

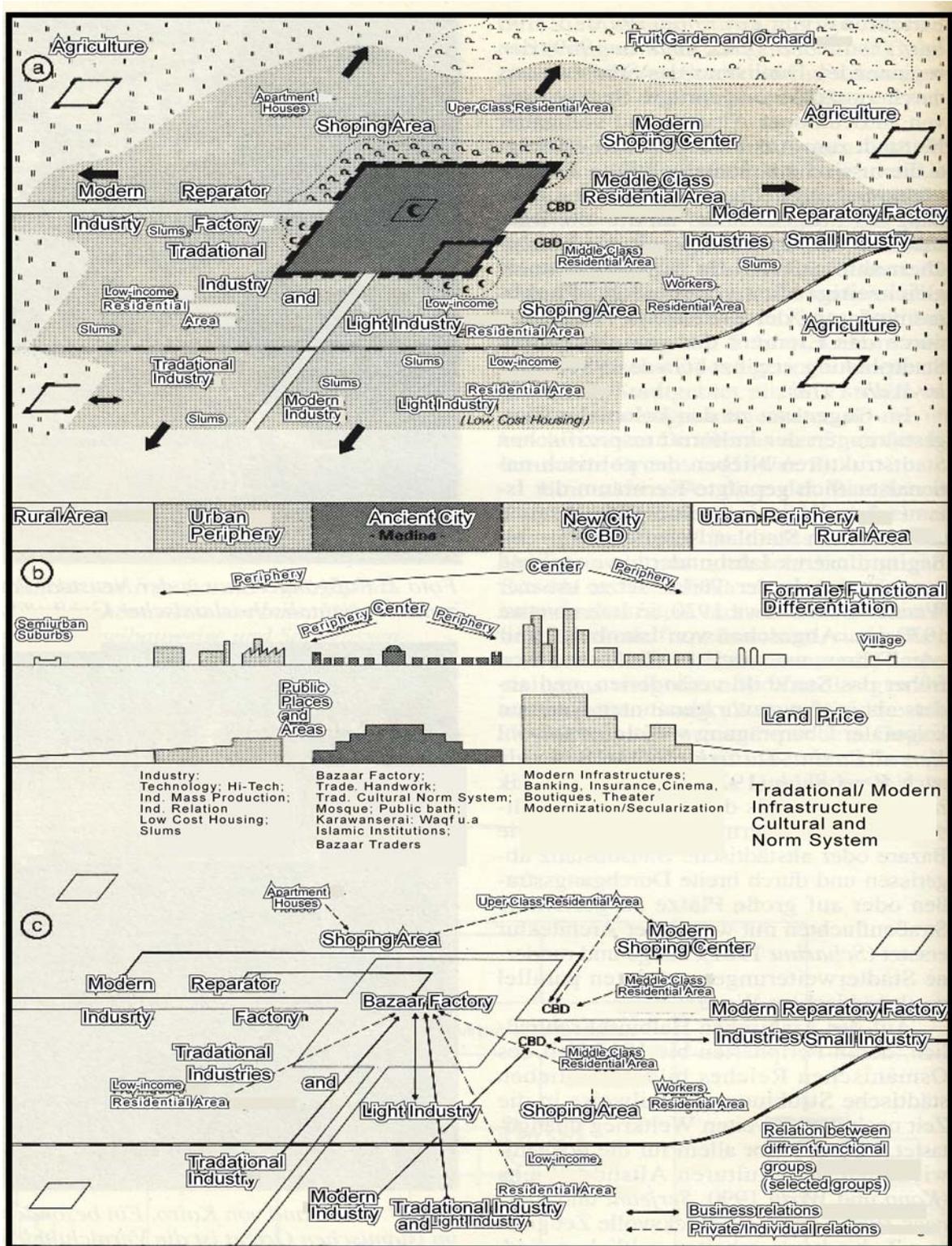


Fig. 2.2: Bipolar model of Islamic city according to function, form, growth tendency and regional relation (Source: Geographische Rundschau, Januar 1. 1993, die Stadt des Islamischen Orient E. Ehlers 1993, p. 36, altered and translated by author).

The bipolar model of Islamic cities can be comparable with the current functional structure of Kabul City, but with some differences. The new revised master plan (1978) that covered 33000 hectares extended the city on both sides of the *Asmaye* and *Ali Abad* mountains (photo 2.1). It was planned for 2 million people and valid until 2003. The city network was thoughtfully planned, so that roads were linked to each other at a right angle. Beside the *Shar-e-Naw*, the new nucleus of the modern city, many other new sections were added to the city. The newly added sections were *Sha Shaid*, *Said Noor Mohammad Shah Mina*, *Rahman Mina*, *Nader Shah Mina*, *Karta-e-Wali*, *Akbar Khan Mina*, *Shahabudin Maidan*, *Karta-e-Parwan*, *Khairkhana Mina*, *Khoshal Mina*, *Mirwais Maidan*, *Jamal Mina*, *Qargha* project and *Microraion*⁷ project (AREZ and DITTMANN 2005). These sections were to be built on a flat surface; proportion and symmetry of land use (empty areas such as parks, sport stadium, parking etc., and occupied areas where the buildings are constructed) were effectively taken into the master plan (table 2.1). The city developed to the west, north an east (AREZ 1976a) Also 1770 hectares of urban land was dedicated for industrial activities in eastern part of Kabul City (*Pul-e-Charkhi*) where a lot of modern manufactories (light industry) have been built.

According to the constructional form between the bipolar model and Kabul City there are some differences that should be considered. The ancient city of Kabul developed in modern style (construction of Ministry of Telecommunication in 18 stories and Cinema Pamir Building in 14 stories) which is not similar to the bipolar model, but the ancient city of Kabul has still kept its old constructional and multiple-linguistic structure along the modernization process (AREZ 1973). So the land price in both old city and new city is almost the same (AREZ 1976b) (fig. 2.3). This dual structure altered the downtown to a CBD, but the new construction declined its rank in the functional value. The new construction has launched after 2002. Many buildings in western style as trading center and residential apartment have been built in the city especially in the modern urban nucleus *Shar-e-Naw* (DITTMANN 2007). These changes in the urban construction and economic activities oriented the city towards a bipolar city (fig. 2.3).

⁷ “Microdistrict, or microraion (Russian: микрорайон), is a residential compound—a primary structural element of the residential area construction in the Soviet Union and in some post-Soviet states. Residential districts in most of the cities and towns in Russia and the republics of the former Soviet Union were built in accordance with this concept. According to the Construction Rules and Regulations of the Soviet Union, a typical microdistrict covered the area of 10–60 hectares”

(<http://encyclopedia.thefreedictionary.com/Mikroraion> 28.8.2010).



Photo 2.1: Kabul City master plan (1978). Source: Kabul municipality (photo: NOORI 2008).

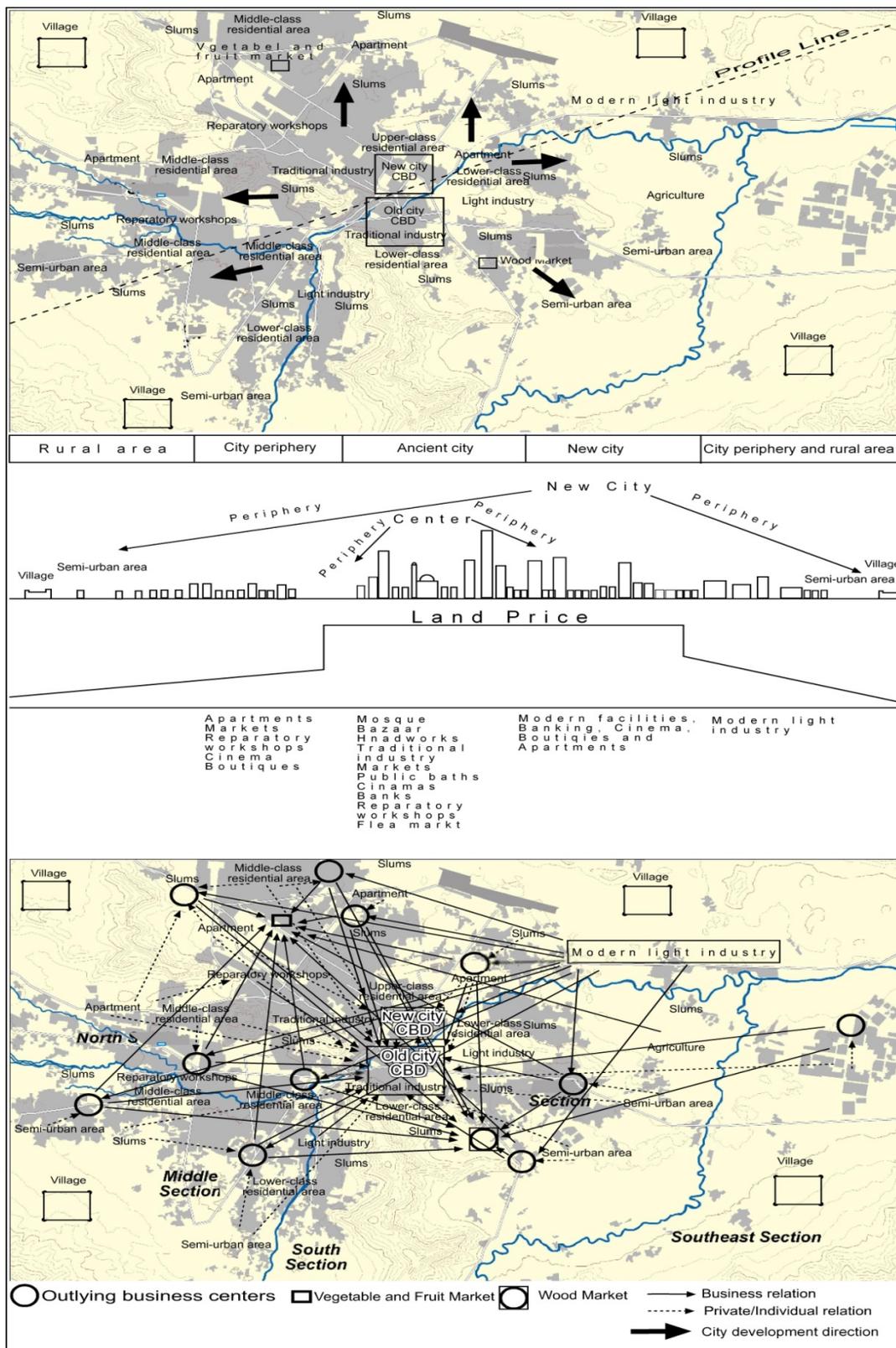


Fig. 2.3: Bipolar model of Kabul City according to function, form, growth tendency and regional relation (Source: own draft, NOORI 2010). Cartography: N. Vorbeck, Institute of Geography, University of Giessen, based on AIMS map.

Areas	Limits in hectares
Residential areas	16870
Industrial parks	1770
Parks and depots	2560
Cultural areas and circular roads	3100
Praivate and vocational beds	650
Swamp and river beds	7650
Cemeteries	400

Table 2.1: Kabul City land use classification (Source: AREZ and DITTMANN 2005, p. 65).

As mentioned above Kabul City is a multiple-linguistic city which make it similar to some other Islamic cities. For instance the city of Gilgit situated in a mountain area (Karakorum) of Northern Pakistan is a good example (DITTMANN 2004a). People from different ethnic groups settled in the city oriented to their home town. For instance people from Gilgit district in the center of the city, Ghizer in the west, Diamir in the south west and Baltistan in the east (fig. 2.4). The most important impression of Gilgit urban development are religious and ethno-linguistic factors (ISAR-UD-DIN 1998). This orientation is comparable to the settlement of variable ethno linguistic groups which come from different parts of Afghanistan and settled in Kabul City.

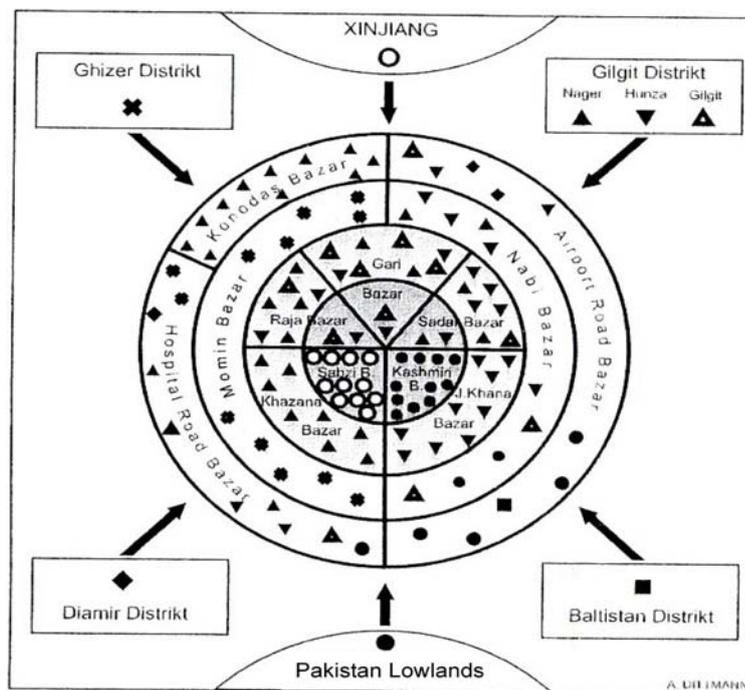
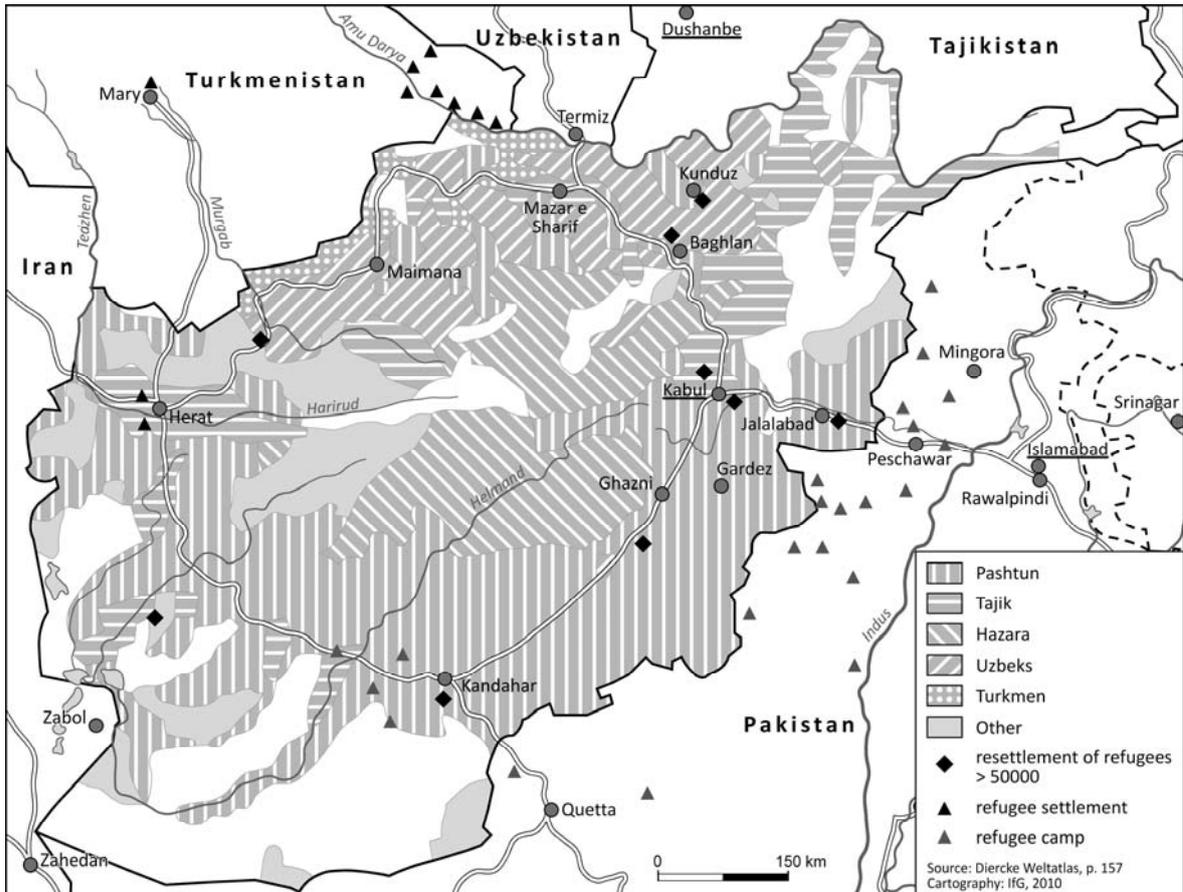


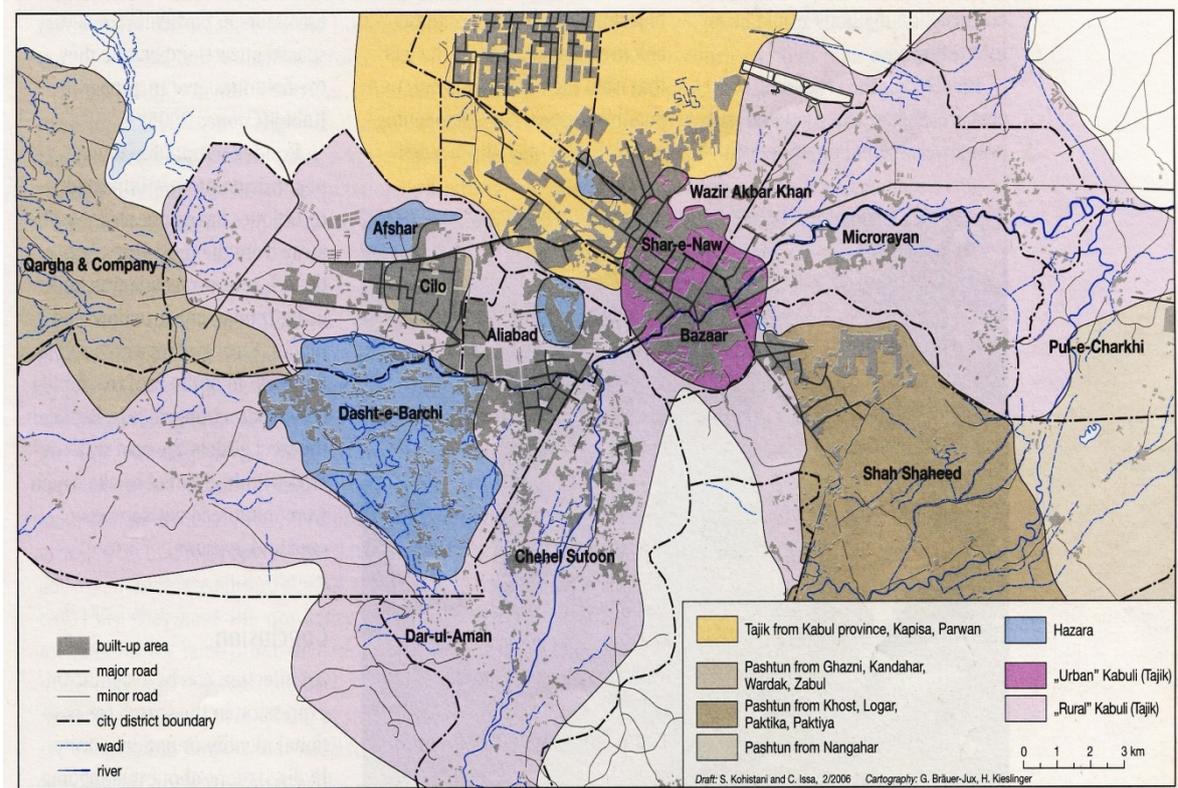
Fig. 2.4: Multiple ethno linguistic segregation in Gilgit city (North Areas of Pakistan).
 (Source: DITTMANN 2004b, p. 518).

The area of present Afghanistan was under the rule of many empires from variable ethno linguistic groups such as Arabs, Mongols, Persians, Indian Moguls and Pashtuns throughout history. So beside the native inhabitants (map 2.2), many ethnic, linguistic and religious groups settled in this region (DITTMANN 2008). Hence Kabul City as the capital of Afghanistan has long been a magnet for members of multitude of ethnic groups (DUPREE 1978, p. 1-2). There for the ancient city of Kabul is a multiple linguistic, ethnic and religious mosaic where each group has specific places (AREZ 1986, p. 20-21). For instance Hazaras have settled in the west part (*Chandawal*), Tajiks in the south and north (*Payan Chawk, Bala Chawk* and *Ali Mardan*), Pashtuns in the eastern side of *Bala Hisar* and a small group of Hindus and Sikhs in the middle of the city in Hindu Gozar Street.



Map 2.2: Afghanistan as a multiple linguistic, ethnic and religious country (Source: Diercke Weltatlas, p. 157). Cartography by Lisett Diehl, Institute of Geography, Uni. Giessen.

The ethno linguistics division in Kabul City is not limited inside the ancient city boundaries but also extended to the outside the downtown (map 2.3). The settlement of Hazaras in *Dasht-e-Barchi* area situated in the west part of the city, Pashtuns in the east and south part of the city and Tajiks in the north part of the city illustrate this division (map 2.3). this segregation can be seen mostly in unplanned areas. The settlement of the various ethnic groups oriented towards the geographic position of their home provinces can obviously be seen all over the city (compare map 2.3 with map 2.2 and fig. 2.5), but this segregation is ignored in the areas where the master plan is fulfilled.



Map 2.3: Kabul City ethnic segregation (Source: ISSA 2006, p. 29).

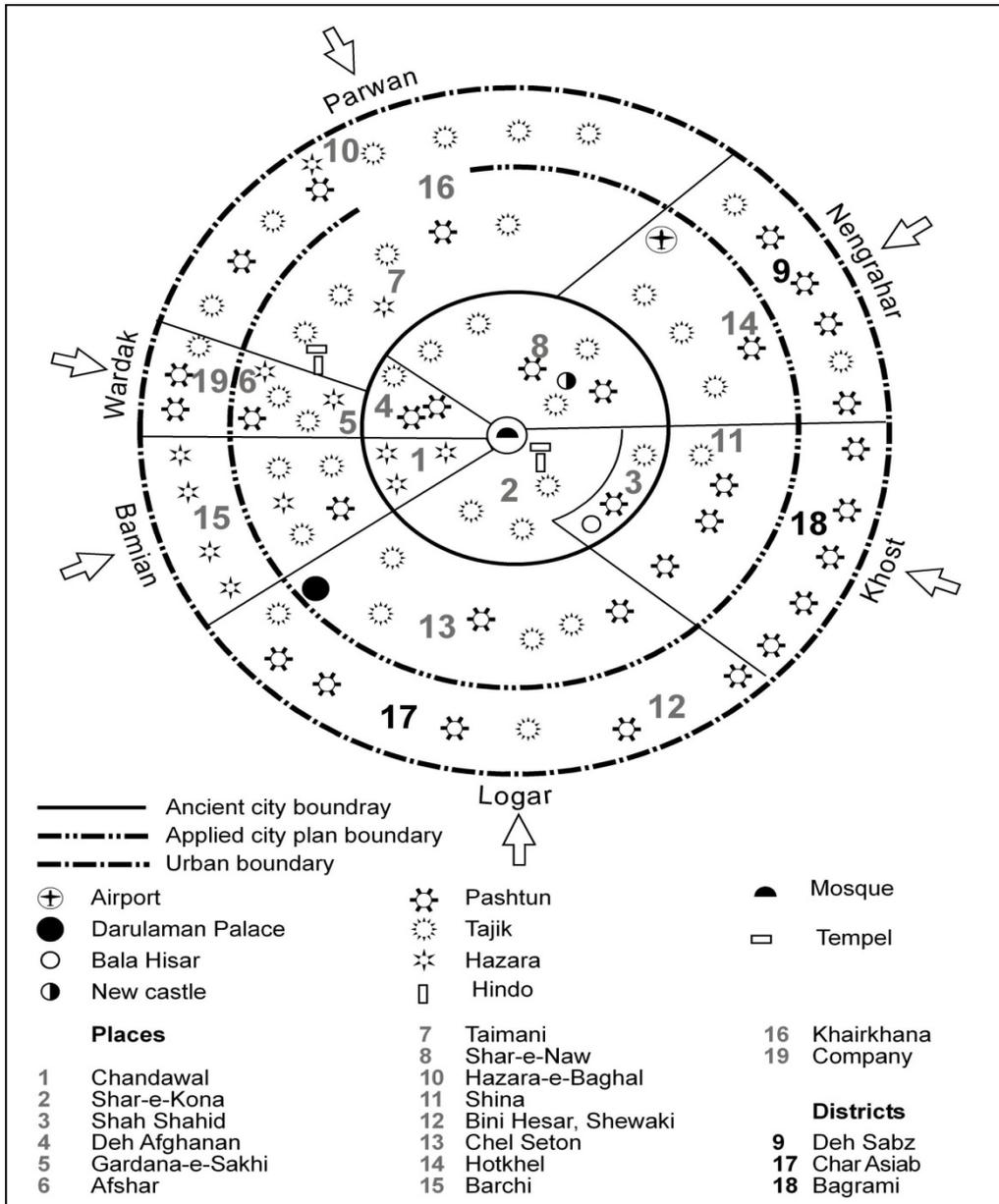


Fig 2.5: Ethno linguistic segregation in Kabul City. (Source: own draft, NOORI 2010).

The multiple ethno linguistic structure of the city has affects on regional relation and economic activities. For instance the trading of wood as the significant source of energy in Kabul City come from eastern part of Afghanistan (natural forest area) (JASIMI 1976) is monopolized by Pashtuns. The wood market is built in the east part of the city (*Benihisar*), so the other linguistic groups go there in order to buy wood (fig. 2.3). In addition *Bazaar-*

e-Karta-e-Naw in the east, *Kota-e-Sangi* and *Bazaar-e-Company* in the west are the areas where the Pashtuns are a majority. *Bazaar-e-Mariam*, *Bazaar-e-Tahya-e-Maskan*, and *Saray-e-Shamali* in the north part of Kabul City, the Tajiks are a majority. *Bazaar-e-Dasht-e-Barchi* (in the south west) is located in an area mostly populated by Hazaras people. Moreover the transportation system in each region is monopolized by the ethnic group which has the majority in the region (field work 2009).

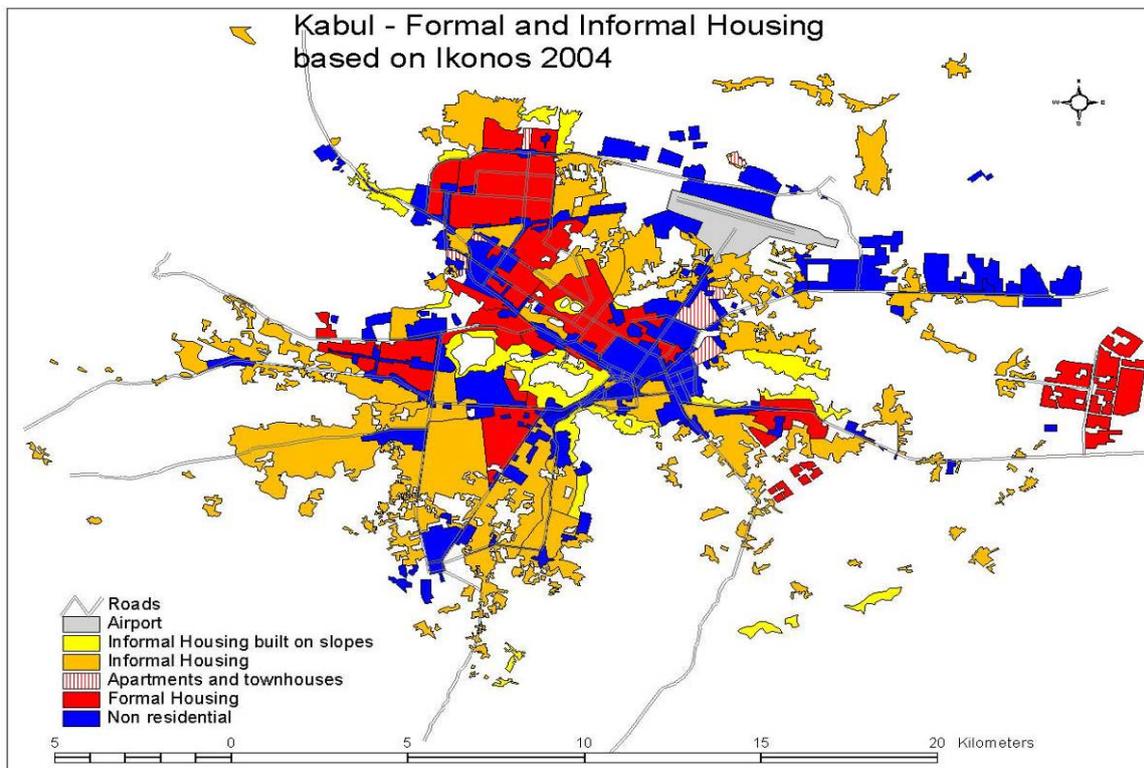
2.2 Sprawling of Kabul

The city sprawled in many directions especially where the topographical structure of the area permits. Informal households sprawled everywhere in the planned area as well. According to the data issued by the Ministry of Urban Development of Afghanistan about 60 to 70% of planned area of Kabul City is occupied by informal settlements (Kabul Municipality 2008). The World Bank also confirmed this number (69 percent) and issued that 2.44 million people are living in unplanned settlements (table 2.2). The unplanned settlements can be categorized into two categories; unplanned settlement on slope areas and in flat areas which sprawled on the edges of planned area not in Kabul City only (map 2.4).

Unplanned built up areas are left aside by the public services and are there for depending on already existing municipal services which have already reach the peak of their capacity. Thus many planned houses close to the border of unplanned areas are shifted to markets, bazaars, private educational centers, private clinic, changing currency centers and workshops for light industries. Also many planned residential areas between the borders of planned and unplanned areas were converted into commercial centers that function as district business nuclei (Periphery business centers). For instance *Bazaar-e-Mariam* in *Khairkhana* is a good example. Many planned houses on both sides of the asphalted roads have also become shops and markets, which is not allowed by the urban construction policy. “The estimated number of shops in Kabul City is 180,000. Of these, Kabul municipality has issued trade licenses to 100,000 shops” (Kabul Municipality 2008). This phenomenon can be seen in many parts of Kabul City which impedes the initial municipal planned organization.

Residential Land Use	Area (km2)	Population	% Area	% Population	Average density (p/ha)
Formal	32,66	531,000	31	18	163
Informal	71,56	2,442,000	69	82	341
Total residential area	104,22	2,973,000	100	100	285

Table 2.2: Distribution of the housing stock by type in 2004 (Source: <http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1150905429722/PolicyNote2.pdf> **06.08.2010**).



Map 2.4: Definition of formal and informal housing in Kabul City (Source: <http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1150905429722/PolicyNote2.pdf> **31.07.2010**).

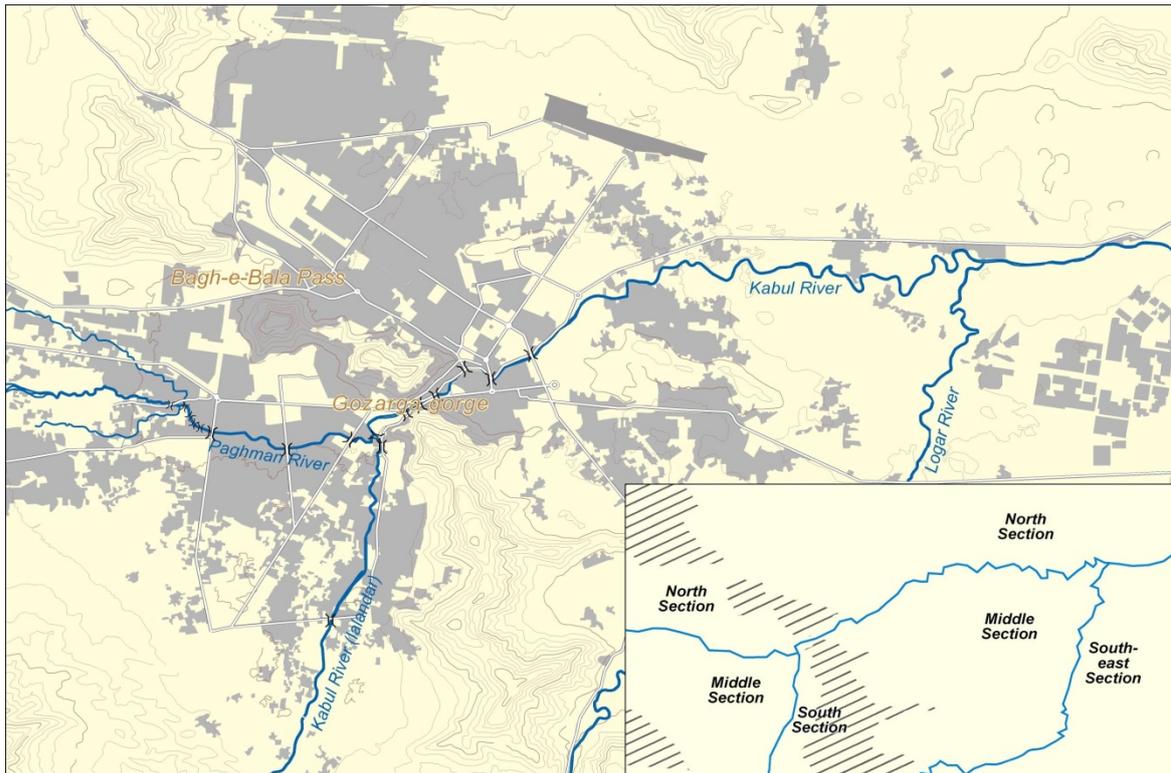
2.3 Physical Isolation

Kabul City extends to the east to *Tange Gharo* and *Bot Khak*, to the west to the *Qorogh* and *Paghman* mountains, to the north to the *Khairkhana* and *Khwaja Rawash* mountains and to the south to *Tajbik* hills and *Chardehi*. The city has been built in a basin that is surrounded by a chain of mountains. It is situated at an altitude of about 1800m above the sea level at 34°31' north latitude and at 69°11' longitude, passing through the city center.

The location of *Asmaye* and *Sher Darwaza* mountains in the middle of Kabul City divides it into two parts (north east and south west) (AREZ 1973). These two parts have been joined by two main roads in *Gozargah* Gorge located between *Asmaye* and *Sher Darwaza* mountains (34.510252, 69.161553 N, E) and the *Bagh-e-Bala* pass located on the north west side of the Aliabad Mountain (map 2.5).

The Kabul and Paghman rivers physically divide the south west part of Kabul City into three sections (north, middle and south) (AREZ 1976c). Kabul River on entering the urban area of Kabul (South West part) joins with its tributary river (*Chamcha Mast*) in the *Chehelseton* region before passing the *Gozargah* Gorge (map 2.5).

The Kabul River by passing *Gozargah* Gorge enters the north east part of Kabul City and after crossing the center joins with the second tributary the Logar River at *Arzan Qimat* area. These two rivers divide the road network of the north east part into three sections (north, middle and south east, map 2.5).



Map 2.5: Kabul City topography (Source: information, NOORI based on AIMS map, Cartography by Institute of Geography of University of Giessen 2010).

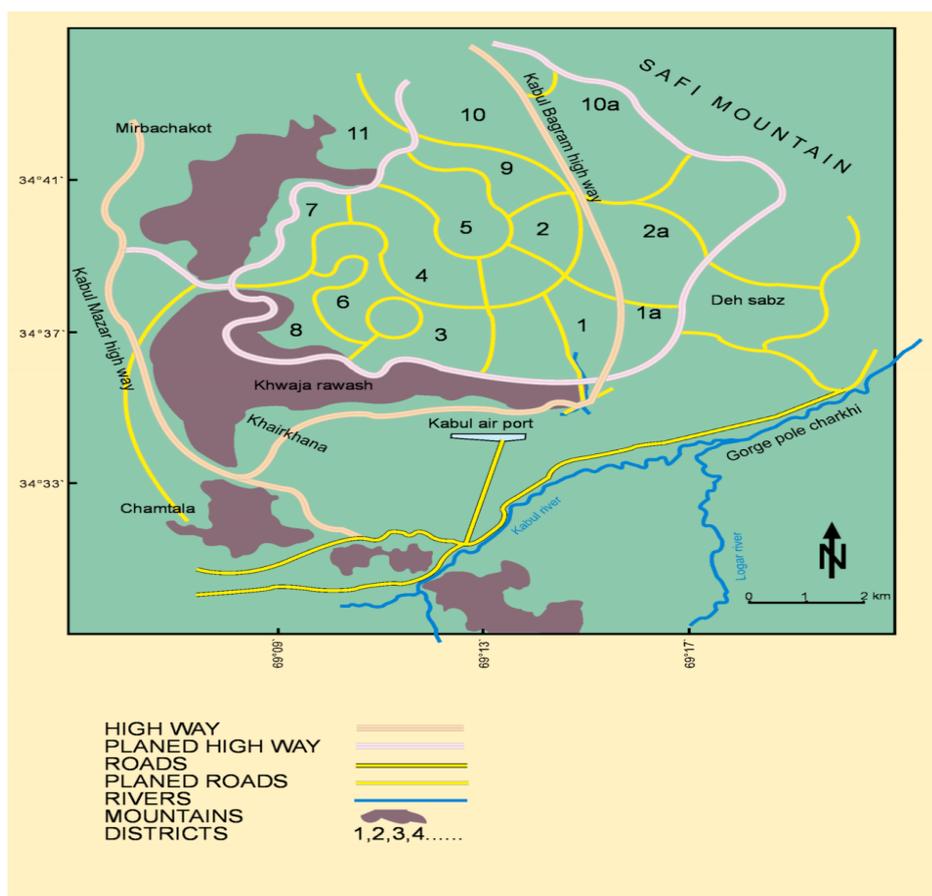
2.4 Future Development of Kabul City and Boundaries

Definition

Because of the rapid population growth and uncontrollable sprawling of Kabul City the Ministry of Urban Development sketched out a plan and shows that “the present area of Kabul City is 1,023sq.kms, which is three times more than the planned area in the 1978 - 2003 Master Plan” (Kabul Municipality, 2008, p. 15). The areas that inserted to the master plan (1978) had been the districts of Kabul Province which are now the district of Kabul City. The added provincial districts are *Paghman*, *Bagrami*, *Char Asyab* and a part of *Deh Sabz*. Because of the lack of information it is not clear which factors are involved in adding provincial districts to the city. But according to the criteria of Standard Metropolitan Statistic Area (SMSA) “counties are integrated with the county containing a central city if 15 percent of the workers living in the county commute to the city, or if 25

percent of the workers in the county live in the city. This measure of integration can be supplemented by other measures based on the market area for newspaper subscriptions, retail trade, public transport, and the like” (HAGGETT, 1979, p. 353).

Also the Ministry of Urban Development sketched out a plan for a new city to be situated in northern Kabul (in 2004) in order to control the city expansion caused by the natural population growth, and provide spaces for the new comers (refugees and immigrants from suburbs to the city). The new planned city was called Paimunar City (map 2.6). This city was to be divided into 11 districts and its transportation network was planned according to the contour lines. Paimunar City was connected with Kabul city by two main roads. But the sketched plan had been canceled and a new master plan was prepared instead (photo 2.2). This city is supposed to be a satellite city and its main purpose is to provide inhabitable space for the surplus population of Kabul City.



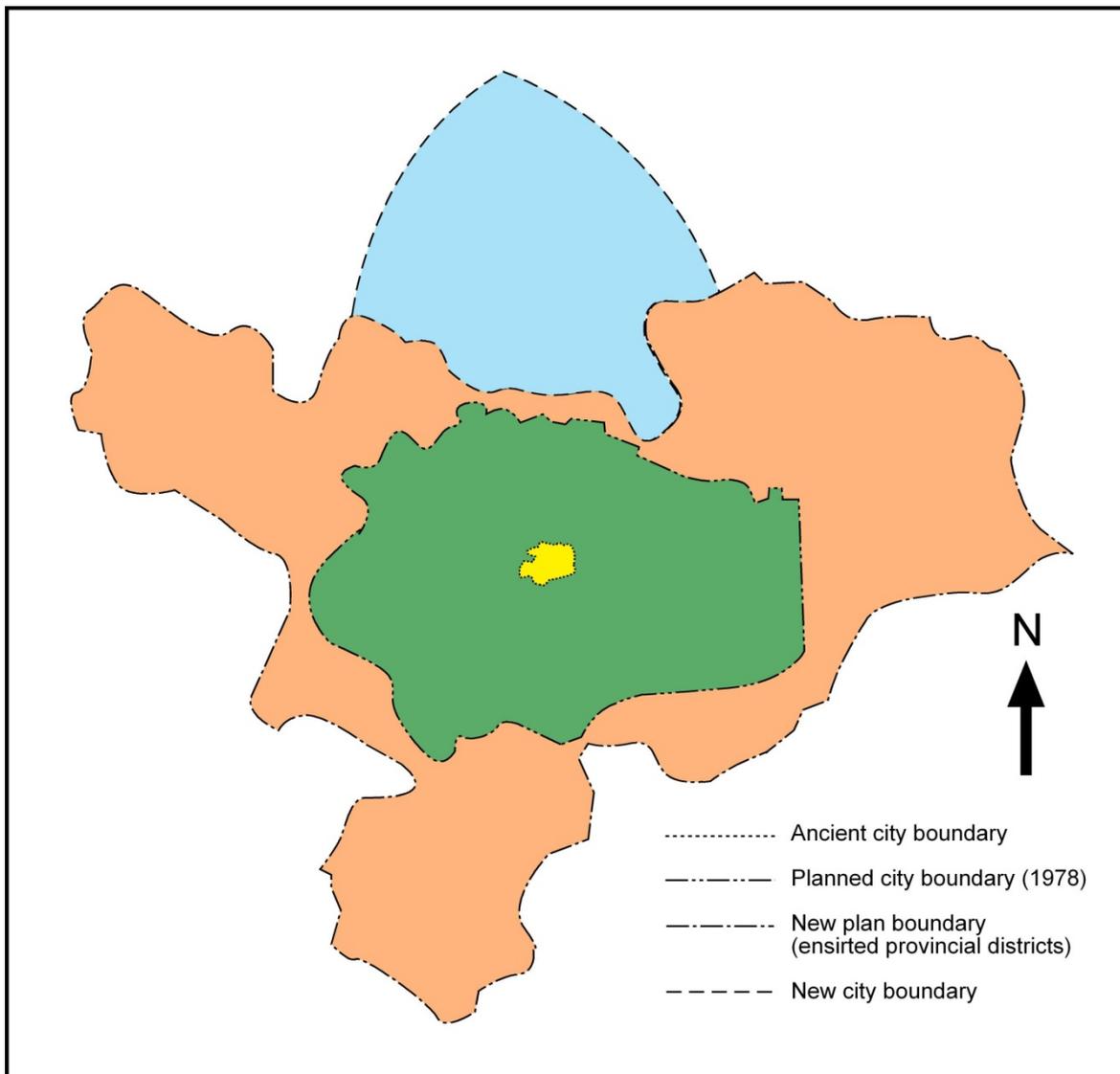
Map 2.6: Paimunar City preliminary site plan in the north Kabul (Source: based on: <http://www.export.gov/afghanistan/pdf/construction-presentation.pdf> 1. 03. 2007 Cartography: NOORI 2007). Coordinate: Afghanistan National Atlas.



Photo 2.2: The new city plan instead of Paimunar City site plan in 2008 (Source: Ministry of Urban Development of Afghanistan, especial issue No. 11 world Urban Forum 4 October 2008).

Kabul City was characterized into three sections: ancient city, new planned city (1949) and urban periphery (SADID 1976a). But considering the development of Kabul City along history, its topography (physical isolation), multi ethnicity and urban land use specificities which identify the urban structure, Kabul City can be characterized according to the following variable parts (map 2.7).

- The ancient nucleus of the city and its boundaries, which are now a part of the historical heritage and CBD
- New city boundaries based on the master plan (1978) extending on both sides of the central mountains with the new urban CBD
- Boundaries of the sprawled areas on the outskirts and inserted provincial districts
- New planned city (*Kabul-e-Jadid*) in the north part of the present Kabul City



Map 2.7: Definition of Kabul City boundaries. Source: Ministry of Urban Development, special issue No. 11 world Urban Forum 4 (October 2008, p.15). Cartography: NOORI 2010.

2.5 Kabul City Function and Population

Kabul, the capital of Afghanistan, is the most important political, trading and cultural center of the country. As a political, trading and cultural center Kabul City has been the main destination of immigrants. Hence the population rate has increased in the recent years (fig. 2.6). So Kabul City is ranked first in terms of population, commercial and cultural activities in comparison to other provinces in Afghanistan.

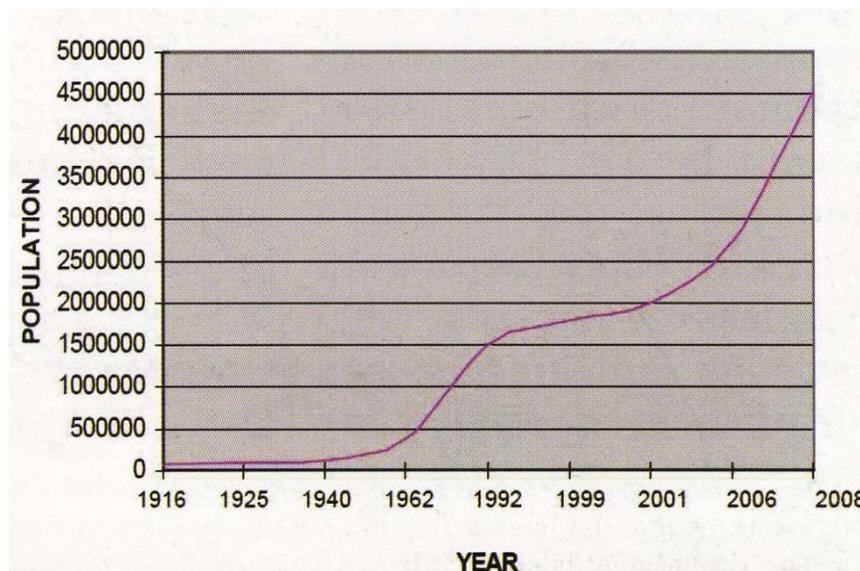


Fig. 2.6: Kabul City population. Source: Ministry of Urban Development of Afghanistan, special issue No. 11 world Urban Forum 4, (October 2008, p.15).

The exact number of Kabul City population is not known although many figures have been issued by different sources. According to the estimation made by the Afghan Statistics office on the basis of data collected during the 1979 census, and more recent data, it has a population of 2.8 million people in 2008 (fig. 2.7). Meanwhile, other sources such as the Kabul Municipality and the Ministry of Urban Development have estimated the population of Kabul City to be even up to 4.5 million in 2008 (fig. 2.4). “Between 1999 [1.78 million] and 2002 the city’s population grew at 15 percent [out of which 12 percent was due to migration] per year and was estimated at approximately 3 million in 2004. Growth will remain at about 5 percent (about 3 percent natural growth plus 2 percent migration) for the next few years. This represents a yearly increase of about 150,000 people or about 20,000 households” (World Bank)⁸ which will be about 4 million in 2010.

The differences between these data make the research and analyzing process difficult. But the effort will be made relaying on World Bank data which is in between the two other numbers.

⁸ <http://siteresources.worldbank.org/SOUTHASIAEXT/Resources/223546-1150905429722/PolicyNote3.pdf> (01. 09. 2010)

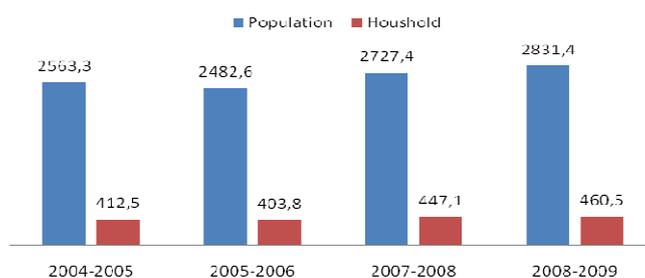


Fig. 2.7: Kabul city population and household based on census 1979. Source: AFGHANISTAN STATISTICS OFFICE (2007).

Kabul City as each capital has a significant role in the political and administrative affairs of the country. 44 governmental institutions (ministries and departments) are situated in Kabul City (Afghanistan Statistic Year Book 2007). “The household survey 2007 conducted by the Strategic Development Planning Unit, Ministry of Urban Development, indicates that 28 percent of the workforce is in governmental employment” (Ministry of Urban Development, 2008, p. 17). This is due to the administrative function and political importance of Kabul City. About 2.3 percent (based on population number estimated by World Bank in 2008) of the Kabul City population are governmental employees (fig. 2.8). These factors illustrate the political and administrative importance of Kabul City.

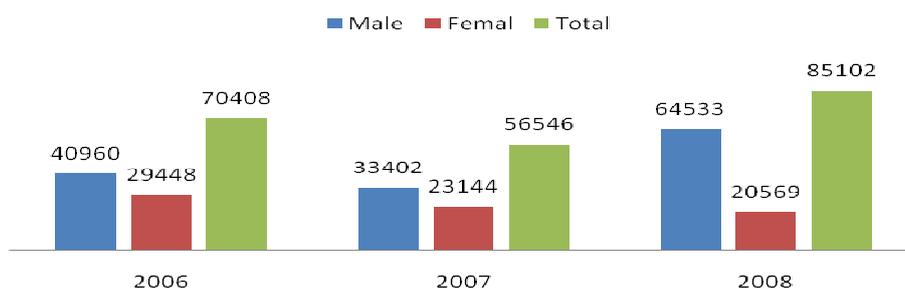


Fig. 2.8: Number of governmental employees in Kabul City. Source: AFGHANISTAN STATISTICS OFFICE (2007).

As to commercial activities, most of the Kabul workforce is employed in the trading sector (fig. 2.9), although the monthly income is limited. “The primary survey conducted by International Consultants and Technocrats in 2008 with regard to the occupational structure reveals that 75 percent of the workforce is in the tertiary sector, of which

government, construction, trade and commerce are the major employers. Nearly seven percent of the workforce is in the secondary sector, mainly in household industries. The primary sector accounts for five percent of the total workforce, largely comprising of cultivators” (Kabul Municipality, 2008). The survey in 2009 shows that about 90 percent of the workforce (tertiary and secondary sector) have 3000-10000 AFG.⁹ per month and about 10 percent more than 10000 AFG. income per month (table 2.3). The construction of modern buildings, super markets and modern economic activities such as banking system and communication system (internet and mobile telephone) imply the significance of commercial function of the city.

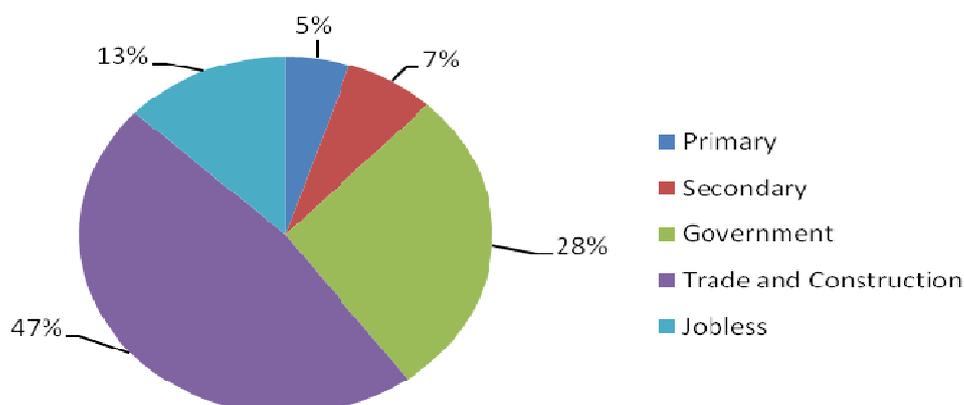


Fig. 2.9: Occupational structure of workforce in Kabul City. Source: Ministry of Urban Development of Afghanistan, special issue No. 11 world Urban Forum 4, (October 2008, p.15).

Monthly Salary in Afg.	Number of interviewed people	Percentage
3000 - 5000	709	58,35
5000 - 10000	358	31,68
more than 10000	120	9,87
Total	1187	100,00

Table 2.3: Monthly income of the workforce employees (Source: field work, NOORI 2009).

⁹ One Euro is equal to about 70 AFG (Dec.2009).

Kabul City has a tremendous role in the development of cultural activities. About 20.5 percent (737265 people) of the population are students out of which 20 percent are school students and 0.5 percent is University students (Afghanistan Statistic Office, 2007). Besides the four governmental universities, two private universities, seven technical high schools, 11 vocational high schools and 110 general schools as well as 68 libraries exist in Kabul City. Moreover 170 magazines, 204 publications and 34 newspapers are being published. Also eleven TV channels, six Radio stations, seven cinemas and 102 film production companies are present in the city (Afghanistan Statistic Year Book 2007, p. 99-127). Considering these information cultural function of Kabul City is ranked first in comparison to the other cities in Afghanistan. The major factors of population density in Kabul City are its administrative, cultural and economic function (RAHMATI 1970).

Assessment

The studies in this chapter illustrate that Kabul City as a multifunctional (administrative, commercial and cultural) city is growing fast. The development of urban infrastructure (technical and social), modern construction and economic activities turned the city into a trading center which provides a numerous work facilities for the people. Besides, the development of educational system and existence of several universities, schools, mass media and publishing provide the educational facilities and opportunities for the people. Hence the percentage of the immigrants is higher which increase the population growth rate and intensive sprawling of the city.

Besides the increase in the development process of Kabul City the transportation system as one of the important elements of the urban and economy development is not upgraded and needs more work which is studied in the next chapters.

3. Organizational Urban Transport Infrastructure in Kabul City

The purpose of transportation is to transform the geographical attributes of goods, passengers and information using processes of air transport, shipment, land transportation, pipelines and telecommunications (HANSON and GIULIANO 2004). These processes are categorized in different scales, such as global, regional or local. Regarding urban transportation as land transportation (focused on personal transportation) in local scale, transferring processes are performed by a set of different transportation modes as follow (ALLPORT 2000, p. 36):

1. Walk
2. Bicycle
3. Paratransit and Taxi
4. Bus and Trolleybus
5. Light rail tramways (skyway, suspension railway) built in the center of a road
6. Railway
7. Metro, Subway

Moreover, the personal transportation system is divided into two sections, public transport and individual transportation. Individual transportation consists of motorized transportation means such as passenger car, helicopter and airplane and non-motorized options are walking, bicycle and skating. Public transportation is also divided in to two section, short and long distance transport. Short distance transport has two forms, road traffic and track traffic which is limited inner city. The long distance performs by national railways and airplanes. The third part of transportation system is the Freight transport which is done by road transport, air transport, track transport, shipment and pipeline. (SCHNABEL and LOHSE 1997, p. 24, cited in GATHER, KAGERMEIER and LANYENDORF, 2008, p. 27, fig. 3.1).

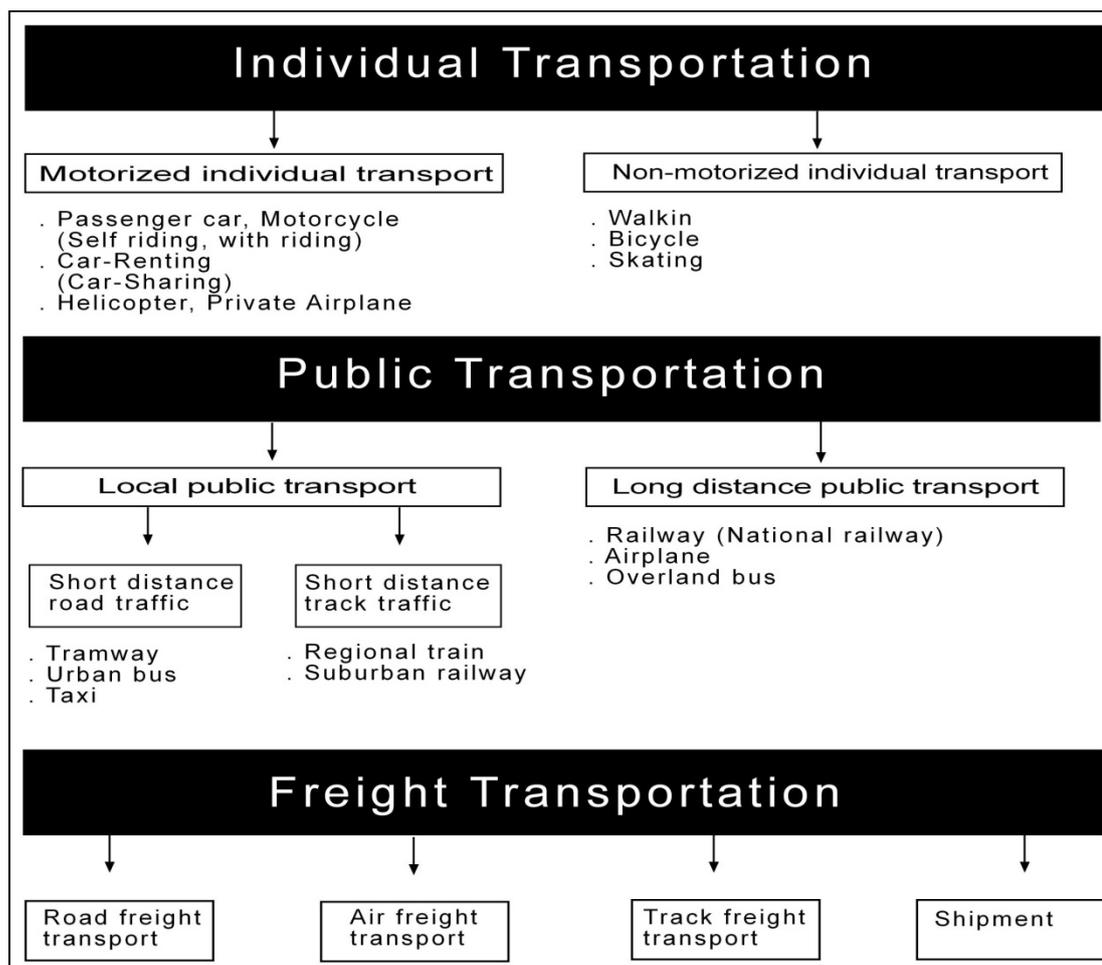


Fig. 3.1: Division of public and individual transportation (Source: SCHNABEL and LOSE 1974, p. 24, cited in GATHER, KAGERMEIER and LANYENDORF, 2008, p. 27).

“The term public transportation means transportation by a conveyance that provides regular and continuing general or special transportation to the public but not include school bus, charter, intercity bus transportation or intercity rail transportation provided by the entity” (DJALLALZADA 2009, cited in AMTRAK, chapter 243)¹⁰. Urban public transport has two forms: the fleet operation concept and individual operation concept (fig 3.2). Fleet operation and individual operation can be separated as follows:

- Fleet operation is working under regular rules, such as schedule, specific line and specific destination.
- Individual operation has freedom of time, line and destination.

¹⁰ http://www.uncrd.or.jp/env/4th-regional-est-forum/Presentations/05_BS1_Afganistan.pdf

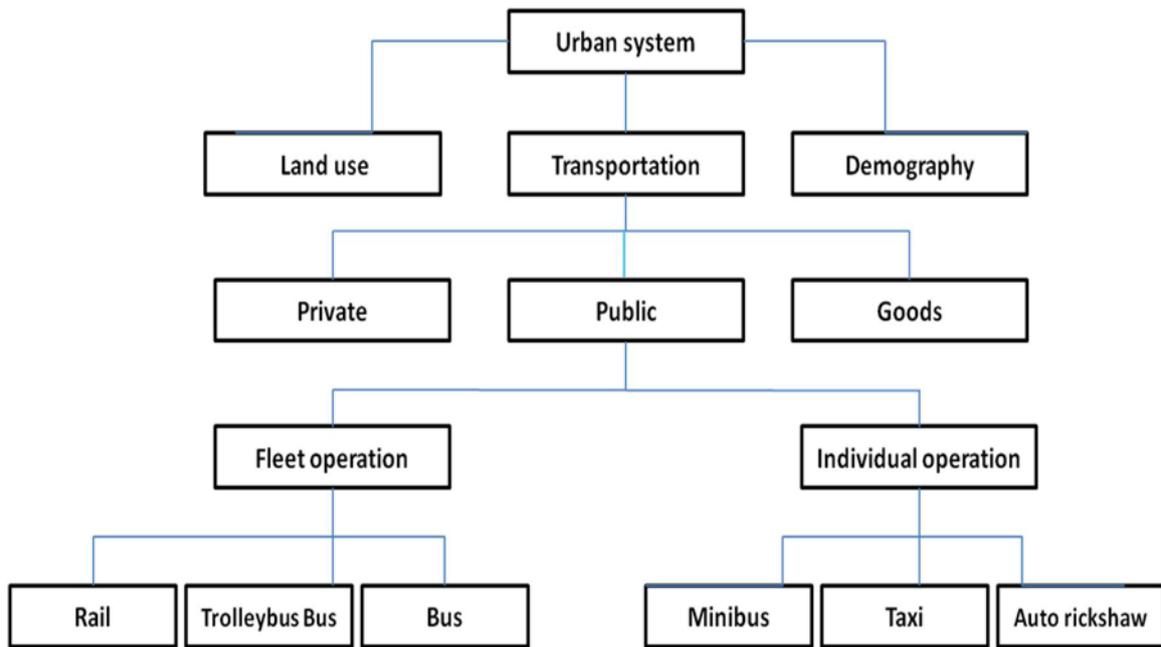


Fig. 3.2: Concepts of public transportation system (Source: Policy paper for Ministry of Transportation of Afghanistan 2003).

Efforts are made in this chapter to describe the transportation system (personal transportation) in Kabul City in a combination based on fig.3.1 (public and individual transportation) and fig. 3.2 (fleet and individual operation). In this regard two kinds of systems have to be separated in Kabul City: formal and informal (paratransit) transportation. The formal transportation system both fleet and individual operation includes transportation companies that are registered at the Ministry of Transportation and have the permission to service for the public. It comprises state-run and private personal transportation companies (public private collaboration). The Millie Bus personal transportation company and KAMAZ¹¹ transportation company (focused on goods) are the only governmental transportation companies. In addition, 12 formal private personal transportation companies operate in Kabul City seven of them perform fleet operation and five of them are taxi unions performing individual operation. Anyway, the informal transportation system (paratransit) is the most dominant individual personal transportation system. The survey (2009) implies that formal transportation means (buses) perform 30 percent of the city trips and informal transportation means (paratransit) perform 45 percent.

¹¹ KAMAZ is a Russian company producing Trucks but the name was used for governmental good transportation company in Afghanistan.

This chapter will describe the organizational structures and processes of the urban transportation system in Kabul City.

3.1 The Governmental Transportation System (Fleet Operation)

Kabul City has only one kind of public fleet operation system, which is performed by buses. There was also another fleet operation system that performed by rail. The first railroad built in 1924. “A 2'6" gauge tramway ran for about 7km from Kabul southwest to Darulaman [between *Darulaman* and *Dehmazang*]”¹². But unfortunately this system did not develop and was abandoned after a year (AREZ and DITTMANN 2005, p. 17). Now all fleet operations are performed by state-run bus company (Millie Bus) and formal transportation unions buses.

The road passenger transportation in Afghanistan is divided into three sections: long distance, regional and urban (fig. 3.3). The Millie Bus company operates only in urban area and formal private transportation unions provide services for all long distance, urban and regional travels. The Millie Bus company had been established under the supervision of Ministry of Finance in 1975. After a couple of years it shifted to the Ministry of Transportation. The Millie Bus depot and administrative center was constructed on five hectares of land in *Zendabanan* area and extended its services all over the country. For the first time a branch of Millie Bus was established in *Mazar-e-Sharif* in 1984, two years later in Jalalabad and until 1991 in many other cities of Afghanistan. Now this company operates in 30 provincial cities and performs urban services.

¹² <http://www.andrewgrantham.co.uk/afghanistan/railways/kabul-to-darulaman-railway/#fnref-1461-2>
(18.09.2010)

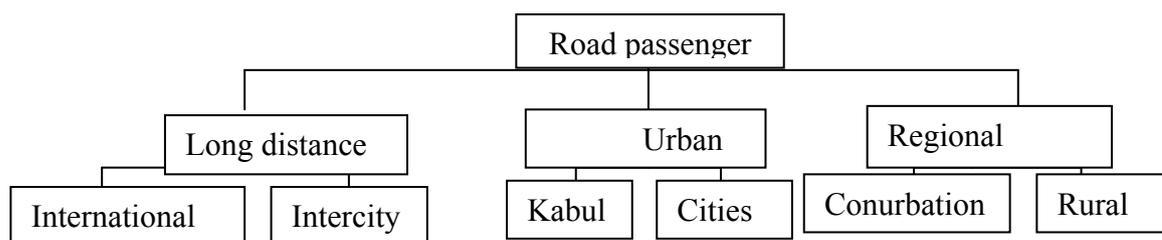


Fig. 3.3: Road passenger transportation in Afghanistan (Source: Policy Paper for the Ministry of Transportation of Afghanistan).

3.1.1 The “Millie Bus” Operation System

The Millie Bus company has a total of 926 buses and about 450 of those are operating in Kabul City, more than 380 buses are operating in other provincial cities and about 170 buses stay at central depots *Zendabanaan* and “Silo” because of the lack of professional drivers. Since 2002 and after donation and support from different countries (table 3.1), the Millie Bus company is able to prepare partial transportation facilities for Kabul citizens, although it still needs more support to provide better services (Ghaznawi 2007, Appendix 3, interview 1).

Donor	Model and Capacity	Total
India	554 (TATA ¹³ and Ashok Leyland) big cap.	631
	77 (TATA) small cap.	
Pakistan	100 (Hino) big cap.	111
	11 (Caster) small cap.	
Japan	98 (Isuzu) big cap.	98
Iran	50 (Shahabkhodro) big cap.	50
Italy	36 big cap.	36

Table 3.1: Countries which donated buses to the Millie Bus company (Source: Ministry of Transport, 2007).

¹³ TATA is an Indian company producing buses and trucks

The Millie Bus company has four depots: *Zendabanan* depot with 53.8 hectares, *Silo* depot with 40.8 hectares, *Syahsang* depot and *Timani* depot with 19 hectares. Two of them (depot No. 1, *Zendabanaan*, and depot No. 2, *Silo*) are in service. 11 provincial lines' buses and 39 municipal lines' buses are operating from depot No.1, and 12 municipal and four provincial lines' buses are operating from depot No. two (*Silo*). Totally, 52 municipal lines and 14 provincial lines in different direction (radial system) are extended from these two depots (Appendix 1, map 1), more detail in table 3.2 and 3.3.

No.	Lines	Depot No.	Main Station	Length of double line operation km
1	Hesa-e-Awal Khairkhana	1	Charahi Sedarat	18. 4
2	Hesa-e-Dowom Khairkhana	1		20. 5
3	Hesa-e- Sewom Khairkhana	1		18. 5
4	Qala-e-Najarha	1		22. 8
5	Poroja-e-Panjom Khairkhana	1		24
6	Deh Kepak	1		12. 8
7	Sharq-e-Panjsad family	1		20
8	Mirwais Maidan	2		14
9	Poroja-e-Taimani Golaye Park	1	Darwaza Shamali welayat	16
10	Qala-e-Fathulah	1		9
11	Charqala-e-Wazerabad	1		8
12	Kolola Poshta Tahya e Maskan	1		12. 8
13	Sarak-e-Chelmetra-e-Taimani	1		14
14	Wazir Akbarkhan	1	Charrahi Malek Asghar	05. 4
15	Microraion 3 rd and 4 th	1	Moradkhani (jonob Darya)	11. 6
16	Maidan-e-Hawayi	1		13. 4
17	Tangi Pul-e-Charkhi	1		42.8
18	Qala-e-Zamankhan	1		11.8
19	Dehkhodaydad	1		10. 8
20	Qasaba-e-Khanasazi	1		
21	Shahrak-e-Khorasan	1		14. 8
22	Microraion 1 st	1		07. 4

23	Chehelseton	1	Cinema Pamir Lab e Darya	12. 7
24	Nohborja-e-Chehelseton	1		14
25	Dehdana Chehelseton	1		15
26	Waselabad	2		10. 7
27	Char Qala-e-Sarai-e-Ghazni	2		21
28	Dasht-e-Barchi	2		22. 1
29	Sharak-e-Omid-e-Sabz	1		31
30	Proja-e-Rahman Baba	1	Cinema Pamir	37
31	Sar-e-Tapa-e-Rahman Mena	1		15
32	Masjed-e-Etefaq	1		07. 7
33	Karta-e-Naw and Nasaji	1	Jonob-e-Cinema Pamir	15
34	Rahman Mena	1		13. 8
35	Qala-e-Hshmat Khan	1		11. 3
36	Qala-e-Ahmad Khan	1		21
37	Qala-e-Hasan Khan Shewaki	1	Sepahi Gomnam	17. 5
38	Syabhini Welayati	1		16. 5
39	Qarya-e-Butkhak	1		35.5
40	Qarya-e-Hosainkhel	1		24. 5
41	Qarya-e-Shina	1		25. 5
42	Qarya-e-Kamari	1		25. 5
43	Nohborja-e-Shewaki	1		24. 5
44	Karta-e-Se	2	Shah-e-Doshamshera	14.57
45	Pohanton	2		10. 5
46	Mirwais Maidan	2		11. 5
47	Dehdana	2		22. 6
48	Dawazda Emam	2		09. 8
49	Barchi	2	Cinema Pamir	30
50	Mirza Abdulqader	2		24. 4
51	Reshkhoh	1		39
52	Company	2	Kota-e-Sangi	11. 57

Table 3.2: Municipal Bus Lines (Source: Millie Bus company 2007, appendix 3, interview 1).

NO	Line	Depot No.	Main Station	Length of double line operation km
1	Woloswali Char Asyab	1	Sepahi Gomnam	34.5
2	Mamozai	1		23.4
3	Wakh Jan	1		88
4	Welayat-e-Logar	1		130
5	Welayat-e-Maidan Wardak	2	Mirwais Maidan	60
6	Kota-e-Ashro	2		84
7	Woloswali Charkhab	1	Estgah-e-Logar	190
8	Woloswali Qarabagh	1	Dehkepak	69
9	Woloswali Mirbachakot	1		47
10	Woloswwali Guldara	1		48
11	Hada-e-Shamali	1		16
12	Padshah Sahabe Paymunar	1		38
13	Paghman	2		25.8
14	Paghamn Caster	2		25.8

Table 3.3: Provincial Bus Lines from Kabul to the nearby provinces and districts (Source: Millie Bus company 2007, appendix 3, interview 1).

Since its establishment the Millie Bus company was subsidized by government and all its technical and administrative affairs were under the supervision of the government. Fuel, spare parts, employment of experts (technicians, drivers and conductors) and administrative affairs were performed by government. But after 2003, the government decided to commercialize the company to become self-sufficient. Millie Bus company has put efforts to make better bus line operation. The authorities carried out a survey to answer the following questions:

- How many times can a bus operate on the line per day?
- How many passengers can be transferred per day?
- How much should passengers pay for a single trip?

- How should tickets be controlled and money collected?

The survey team used a mathematical formula which is defining the number of operations of each bus per day and the number of passengers that can be transferred.

Number of buses	411
Average number of seats	33.8
Total capacity of seats	13.890
Coefficient of availability	0.7
Coefficient of mileage usage	0.9
Coefficient of bus capacity usage	1.46
Average of mileage in 24/ h /bus	115 km
Average of passenger transportation	8.5 km
Days of the year	365

Coefficient availability is 0.7 meaning 70 % (288) buses from the existing 411 buses are in operation and 30% (123) buses are out of operation.

Coefficient of bus capacity means that a bus has 52 seats but 23 places for standing passengers. The total capacity of a bus is 75 passengers or 1.46.

Coefficient of millage usage means that a bus should travel 115 km per day (operation time) but 10 percent is deadhead.

$$0.7 \times 0.9 \times 1.46 \times 115 \times 365$$

$$\text{Number of persons per year per seat} = \frac{\text{-----}}{8.5} = 4542.2 \text{ persons per seat}$$

$$\begin{aligned} \text{Total volume of passenger transportation} &= 4.542.2 \times 13.890 = 65.0 \text{ million in a year} \\ \Rightarrow 178.082 \text{ passengers in a day} / 411 \text{ (number of buses)} &= 433.28 \text{ passengers per bus} \end{aligned}$$

Volume of passenger transportation

$$\text{One-way and return trips per year} = \frac{\text{-----}}{\text{Coefficient of capacity usage} \times \text{average capacity}}$$

$$\begin{aligned} &65,000,000 \\ \text{-----} &= 3608.7 \text{ trips} \\ (33.8 \times 1.46 \times 365) & \end{aligned}$$

$3608.7 / 411$ (number of buses) = 8.78 number of round trips in a day per bus.

According to the mathematical formula and considering the operation capacity of the Millie Bus company, the survey team realized that on average a bus is capable transferring 433.28 passengers in eight round trips per day. So the government provides an annual plan for the Millie Bus company based on the formula above. Theoretically, a bus transfers 54.16 passengers per each round trip and they should operate eight round trips per day. But practically Millie Buses operate 10 to 12 round trips per day. The reason is that the Millie Bus company leased the buses to the drivers. Officially the driver is responsible for operating eight round trips and transferring 433.28 passengers per day. That is why the drivers give a fixed amount of money to the Millie Bus company based on eight round trips and the money made out of the remaining 2 to 4 round trips operation stay with the drivers. This is like a half ownership system that encourages the drivers to operate more than the number of operations as estimated by the mathematic formula in order to pay the fixed price for the Millie Bus company and earn for themselves too.

During the off peak, Millie buses do not operate because of the decreasing number of passengers. Some buses that operate at off peak hours (12:00 – 14:00) wait for a quite long time (20-30 minutes) for loading passengers at the main bus station. Also, they wait for passengers at each bus stop and load and upload passengers not only at the bus stops but everywhere they can. In such conditions, most of the passengers prefer minibuses (paratransit). In spite of the fact that the price of minibuses is twice that of the Millie bus, they are fast, comfortable and flexible, so Millie bus cannot operate under such conditions. The Millie Bus company has been self-sufficient since 2003 covering all its expenditures and costs. It lost governmental supports and the subsidy system. That is why the Millie Bus company administration decided to take five AFG. instead of two AFG. from each passenger in order to cover busses costs.

The fare price depends on free market conditions and rises when the price of fuel and spare parts is getting higher. As a public (governmental) transportation company, Millie Bus company still benefits from some governmental support, such as fuel at a reduced price (Zia Ghaznawi, vice dean of the Millie Bus company). This is meant to reduce the fare price under the level of private transport. However, since the prices are agreed upon by vehicle owners and private carriers talking into amount fuel and spare parts costs, transportation fees are the same for public and private transport (table 3.4).

Transportation mode	Available seats	Used seats	Fare Price per passenger in AFG. 2009	Fare Price per passenger in AFG. 2004
Millie Bus/ Private Bus	52	70	5	2
Millie Bus Small Bus/ Private Bus	32	50	5	5
Taxi share	5	8	20	10
Mini Bus	8	14	10	7
Rickshaw	4	7	5	
Taxi	5	2 - 8	10 km ~120 Afg.	10 km ~70 Afg.

Table 3.4: Capacity and fare price of transportation modes in Kabul City (Source: field work: NOORI 2009).

Until 1991 the system of revenue collection and purchasing tickets were based on serial numbers. The conductors were responsible for selling tickets and collecting fares. Also there was another system of ticket selling which was called “pass” (pass was a quarterly and annual ticket). Until 1990, volunteer students under the agreement between Ministry of Education and Millie Bus company were responsible for controlling tickets and passes, and for this volunteer job, all students were free of fare charge (Zia Ghaznawi vice dean of the Millie Bus company). Unfortunately, after 1991 the ticket purchasing and controlling system collapsed because of civil war and anarchy in the governmental management. Hence, there was a significant leakage in revenue collection system through staff fraud, fare evasion and physical problems of fare collection. Some of the conductors did not give the ticket to the passengers and stole the money. It was extremely hard to control the system. For this reason, the government decided to lease the buses to the drivers as half ownership. After this decision, as mentioned above, the drivers should pay a fixed price to the Millie Bus company regarding to the annual plan of ministry of transportation. For the controlling operation system every bus driver is responsible to confirm bus documents (*chalan*) at the depot where the bus is belong to. A signed *chalan* indicates that the bus is operating. If a bus driver misses his single and return trip, he is charged to pay

the cost of the round trip. For instance missing a round trip (20 km) of *Khahirkhana* is charging about 700 Afg.¹⁴ forfeit. This is the price that a big capacity bus can earn per round trip. For a short distance like *Mekrorayan* (Microraion) single and return trip (7.4 km) 240 Afg. (dean of the department of Planning of Millie Bus company 2008).

The Millie Bus company performs some services for the government as well. Every year, the governmental institutions made an agreement with Millie Bus company for transferring their employees from home to work and return home (table 3.5). But now the situation of contract between Millie Bus company and institutions has changed. Half ownership system prefers to perform public operation because they can earn more money than they received from the contract with government.

Institutions	No. of contracted buses
Ministry of Finance	22
Ministry of Commerce and Trade	7
Ministry of Transportation	6
Ministry of Interior affairs	5
Ministry of Irrigation and water resources	12
Ministry of Aviation	6
Ministry of Public health	10
Ministry of Public work	12
Ministry of Work and Social affairs	9
Ministry of Agriculture	1
Kabul Customs and Duties Department	6
Department of kindergartens	5
First Department of National Security	2
Technical Department of Kabul	3
Medical Secondary Educational School	3
Malalai Hospital	6
Ebne Sina Emergency Hospital	20

¹⁴ One Euro is equal to about 70 AFG.

Rabeha-e-Balkhi Hospital	7
Ali Abad Hospital	4
Private transportation sector	3
Central Statistical Office	6
Educational Center of National security	2
Esteqlal Hospital	5
Urdo 102 beds Hospital	4
Total	156

Table 3.5: Millie Bus company in service for governmental organization (Source: Millie Bus company 2005).

The Ministry of Transportation developed the urban transportation system in Kabul City. Beside the diesel buses, a trolley bus system was installed in 1979 with the support of Czechoslovakia. The Millie Bus company administration provided an operation plan (timetable, line and destination) in order to build an effective transportation system. But because of its small capacity, lack of professional staff and employees both the Trolley bus system with 86 buses and the Diesel bus system with 150 TATA buses were accompanied by private sector during the daily operations with five times higher price. Unfortunately, the civil war (1991- 1996) completely destroyed the Trolley bus system and created many problems for the urban transportation. However Mille Bus company is still struggling to provide better services for the Kabul residents.

3. 1. 2 The Trolley Bus System

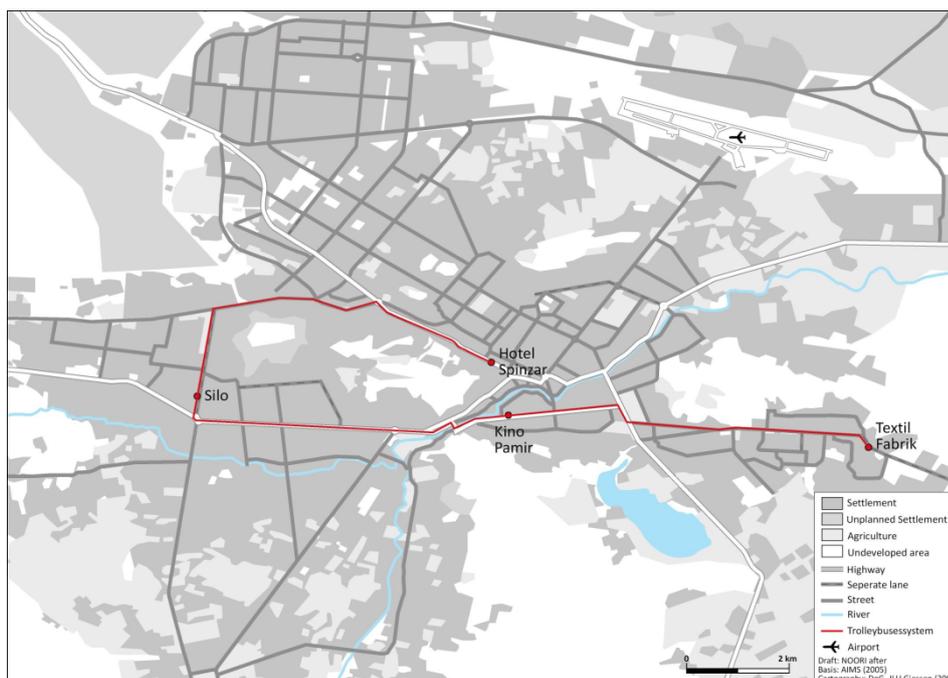
The Millie Bus company was divided into two sections. The first section, which exists until today, is operating with diesel buses. The second section was trolleybus system. 86 trolley buses of type 9TrH23 (products of Skoda Ostrov) were delivered to Kabul City in 1979 (photo 3.1). The first trolley bus line was built by German engineers in Kabul in 1929 and was modernized by Russian technology with the assistance of Czechoslovakia in 1970

(Policy paper for Ministry of Transport of Afghanistan 2003, p. 17/42). 55 to 60 buses were in service and the rest 26 were out of operation because of technical problems.



Photo 3.1: Arrival of Trolley buses to Kabul City. Source: (Zravy1979: p. 4).

The route of trolley buses was planned and overhead wiring was installed by Afghan engineers. It was divided into three parts: from Silo to Cinema Pamir, from Silo to Spinzar Hotel and from Pamir Cinema to *Bagrami*. Two transfer points were implemented at Silo and at Cinema Pamir (map 3.1).



Map 3.1: The route of Trolley buses (Source: information: NOORI, field work 2007, Cartography: Department of Geography, University of Giessen).

Trolley buses were in service only for a very short time (1979-1991). Now there is nothing left but its wrecks deposited at the Silo depot (Photo 3.2) and the Millie Bus company own them. The study shows that the Millie Bus company is not able to repair these wrecks, so it is not clear what will happen to the wrecks. They may be sold in the free market¹⁵. But the power lines that were made of copper were stolen by the poor and were sold to the second hand material dealers which were later exported to Pakistan.

¹⁵ Sometime the governmental organizations sell their old equipment (vehicles) or buy something on the free market. The process is performed as follows:

- An organization makes known its need for something such as product or services or a combination of these or sells something. It informs potential suppliers of the need or purchasers, and invites them to request detailed specifications and terms.
- It may, optionally, hold briefing sessions with potential suppliers or purchasers to clarify the specifications and terms.
- Bidders submit responses to the solicitation.
- The organization evaluates these.
- The organization makes a selection from among the bidders, and informs the bidder, and optionally, publishes the results of the bidding processes.



Photo 3.2: Destroyed Trolley buses deposited in depot No. 2 (*Silo*). Source: (photo: NOORI 2007).

Zravy¹⁶ mentions three significant challenges that the Trolley bus system was facing:

- “Bad condition of roads because of the hand sellers (hucksters) on the road sides. One of the curiosities of trolleybus routes in Kabul was driving trolleybuses through the Market Square (*Jada-e-Maiwand*). Overhead wiring was led right above merchants and customers, but the trolleybus itself was running outside the Market. Trolleys and overhead really suffered from these conditions”.
- “Involving private sector to the urban transportation system and higher price. Trolley buses were the cheapest transport means in Kabul at that time. That is why they were always overcrowded and followed by a bus of a private company which took remaining passengers, but for five times higher price”.
- “Prediction of destruction of trolley bus system in Kabul city. “Even if there had been no war, trolley buses in Kabul would have been doomed to extinction because

¹⁶ http://www.spvd.cz/?p=svet/af/kabul_en.html&m=menu_svet.html (18. 09.2010)

the company lacked technical expertise and professional background and made no effort to repair overhead and vehicles”.

These three points are still considerable challenges for public transport. Unpleasant conditions of road (distraction and crowd) are problems that affect the bus transportation system. This topic is going to be described in detail in chapter four. Secondly, public transport lost its position in urban transportation in competition with private transport. The reason is that public transport has to follow the municipal rules such as specific routes, destination and time schedule which slow the operation speed. For instance Public buses should stop on each bus stations and follow the lines which are ignored by private sector or individual operation, so private transport is faster than the public transport. Thirdly, Public transportation company (Millie Bus) has different type (big and small capacity) of municipal buses (table 3.1). Moreover, this company has neither adequate engineers nor spare parts or well equipped workshops (ZIA GHAZNAWI, appendix 3, interview 1). So, it means after some years if a bus get damaged it will not be repaired again and thus becomes out of operation. The public transportation also faces lack of drivers. Millie bus company drivers receive less monthly salary from the government than on the free market. This is why most of the bus drivers (60 %) left the Millie Bus company and work at private transportation companies (ZIA GHAZNAWI, appendix 3, interview 1). These problems still exist in Kabul City public transportation system.

In 2003 the second section of Millie Bus company began to operate again, not with trolley buses but with diesel buses instead. According to the administrative reform after 2004 these 2 sections were merged together but still have separate depots.

3.2 Formal Private Transportation (Public - Private Collaboration)

The formal private transportation system describes private personal transportation unions which are registered at the Private Transportation Sector Office and pay tax for the government. Public private collaborations comprise of fleet operation (buses) and individual operation (taxies).

According to the rules (new strategy) of the Ministry of Transportation, private transportation companies (fleet operation) that want to operate in the city have to pay an operational tax of about three percent of their income (Faroq 2009, Appendix 3, interview 2). But what is the benefit of registration for private transportation companies? Firstly, they get the official permission for operating on municipal lines and are recognized as formal bus unions. Secondly, they get the right to use main bus terminals. At these bus terminals, they should begin their operation according to the applied plan which has been organized by the private transportation sector in cooperation with the Millie Bus company (table 3.6). Thirdly, each registered private transportation company has a delegate or dispatcher on their corresponding main bus station. The dispatchers are responsible for controlling and organize operation priority roles for the registered buses. But this is not their only response; dispatchers illegally collect money from the informal public transportation (intermediate public transport) because they claim that intermediate public transport (IPT) decline their amount of revenue by transferring their passengers. This means that each of the public private collaboration companies illegally occupies a municipal main bus station in order to get money.

Transport Company	No. of buses	Main Bus Station	Area of operation
Ehsan	152	Feroshgah, mirwais maidan	Dashte barchi, Wazir Akbar khan, Charqala-e-wazirabad, Qala-e-Fathulah
Saber	150	Mirwais maidan shah e Doshamshera	Mirwais Maidan, Charqalaala/e/Chardehidehi, Qrgaha, Company, Darulaman
Gulistan	112	Charahi sedarat feroshgah	Hesa-e-Awal,Dowom, Sewom Khairkhana, Qala-e-Zaman khan
Shiraz Tufan	19	Feroshgah	Kolola Poshta
Kabul Tour ¹⁷		Feroshgah	Midan-e-Hawaye, Bibi Mahro
Hamayun	90	After 2000	Khairkhana
Mir Barak	179	After 2000	Company

Table 3.6: Formal private transportation unions registered at Ministry of Transportation (Source: Private Transportation Sector Office 2007, appendix 3, interview 14).

¹⁷ The number of buses of Kabul Tour is unknown.

The Main bus station usage controlling caused conflict between Kabul traffic office, members of formal private fleet operation unions and Ministry of Martyrs and Disabled. It caused by the creation of unplanned bus terminals in diverse places in Kabul City (Appendix 1, map 1).

This conflict emerges only in planned main bus stations. The members of formal private fleet operation unions claim that they pay three percent tax for the government. So they have the right to take money (tax) from the IPT that operates in municipal lines. But the Kabul traffic office refuses their claim for having the right to get the illegal imposing tax from the IPT. Kabul traffic office replies that unplanned main bus stations do not exist in Kabul City master plan and hence, the private transportation sector has no right to use the unplanned bus stations. In addition, most of the unplanned buses stations are occupied by disabled people. Disabled people under the support and patronage of Ministry of Martyrs and Disabled control the unplanned main bus stations. They organize operation priority rules for the transportation modes operating. So, the Ministry of Martyrs and Disabled claims that the ministry is responsible for creating jobs for the disabled people. The work of controlling unplanned bus terminals is a good source of income for disabled people: doubly so as they collect money from the transportation modes. This problem is yet to be resolved that sometimes causes serious conflicts between Ministry of Martyrs and Disabled and Kabul traffic office (Appendix 3, interview 10).

3. 2. 1 Registered Private Transportation Unions (Fleet Operation)

The Private Transportation Sector Office was established under the supervision of the Prime Ministry in 1956. According to the functional importance (transferring passenger, freight, official letters and information) it was transferred to the Ministry of Interior (end of 1956). By development of trade (import and export) in Afghanistan, the private transport office belonged to the Ministry of Trading (1957). After the establishment of the Ministry of Transportation (1978), the Private Transportation Sector Office had been transferred to the Ministry of Transportation. The private transportation sector has several agencies in all interior ports (*Hairatan, Shirkhan, Torghondey and Torkham*) in Afghanistan and abroad

in Pakistan, Iran and Tajikistan. This office registered 165 long distance private bus unions; 101 based in Kabul and 64 in provinces as well as seven municipal bus unions operate in Kabul urban area. The office is responsible for directing private and governmental freight transferring companies, private municipal and provincial registered bus companies and taxi companies over all the country (Ministry of Transportation, 2009). According to official information of the Ministry of Transportation, seven bus unions (companies) with a total of some 900 buses are registered (table 3.6) but only 483 buses are operating in Kabul City (Private Sector of Ministry of Transportation 2007). They are supposed to operate at all municipal lines and cooperate with public buses. But they do not have enough buses to cover all municipal lines and provide sufficient services for the urban transportation demands.

Formal bus unions perform charter operations as well. Charter buses are usually used by the government in order to transfer governmental employees from home to work and vice versa. Every year, governmental institutions and ministries ask private transportation unions to transfer their employees¹⁸. The government bears the full commuting costs of their employees, who thus do not have to worry about commuting expenses. The average cost per passenger is about 70 Afg. from residence to work and return. For instance, the Ministry of Work and Social Affairs hired 28 charter buses for commuting of its 850 employees in 28 municipal lines. The total cost of 28 buses is 66.000 Afg. per day (Rabani, 2009, Appenidex 3, interview 3). Hence, the fare price of charter is seven times higher compared to public busses (10 Afg. per single and return trip). Moreover, the Central Statistic Office hired 12 charter buses (52 seats) for 620 commuting employees in 12 municipal lines. The total cost of 12 buses is 35.550 Afg. per day (Hashemi, 2009, Appenidex 3, interview 4).

Apart from that, private bus unions with their mainly old buses provide charter services for people who need buses for their ceremonies, like wedding parties to transfer their guests and for accompanying people to cemetery. Although the charter buses are expensive, they are available whenever one wants.

¹⁸ Charter buses are for commuting lower ranking employees (in Afghanistan there are 10 degrees for the governmental employees. It begins with 10 and after three years work s/he is able to promote to the next step until rank one. Rank one and above one are the high ranks). For high ranking employees each governmental institution has its own cars. For instance, the Ministry of Work and Social Affairs has 71 cars (9 intermediate buses and 62 limousines) and the Central Statistic Office has 61 land cruisers. The total number of governmental vehicles in Kabul City is 42.897 (Kabul traffic office 2009).

3. 2. 2 Formal Private Transportation Unions (Individual Operation, Taxi)

As mentioned in fig. 3.1, individual operation consists of intermediate operation, taxi and auto rickshaw, but only taxi is a branch of public transportation. On the other hand taxi transportation system is a mixture of public and private transportation systems. That means taxies pay tax for the government and are allowed to operate according to public regulations, such as specified operating areas, presence on roads and fare prices.

The organization of taxi network in Kabul City is more efficient than the other transportation modes. Beside individual trips by taxi, taxi share system with cheaper fare price provides better services for the Kabul City residents. There are two kinds of taxis in Kabul City. Taxis that operate in the city and taxis that operate outside (between nearby towns and Kabul City). The Kabul Traffic Department is responsible for managing and determining operating zones for the taxis inside and outside the city. Taxis in Kabul City operate in specific zones that are written on the vehicle itself. Officially taxis are supposed to operate within their determined zone only, but because of the high demands nobody cares about it. Nevertheless outside taxis which so called “*Nema shahri*” (between districts and city) and provincial taxis are strictly prohibited to circulate within the city. Taxis are always overloaded because of the small number and the high demand during peak hours. The number of taxies in Kabul city has not much increased in comparison to the other transportation modes in the last five years (table 3.7 and fig. 3.4). According to official sources there are five Taxi unions in Kabul City (table 3.8). Although three of them have been established in the last 10 years, still the number of taxis has not increased, because the Kabul Traffic Office tried to avoid traffic congestion by limiting the delivery of taxi licenses.

Transportation means	2006	2007	2008	2009
Private Cars	167182	184937	202607	240484
Taxis	26661	26661	26677	26761
Trucks	43850	46417	48091	53947
Buses	20299	21134	21755	23560
Motorcycles	12746	13319	13637	14660
Gov. Vehicles	27382	27968	38150	42897
Temporary No. Paltes	11123	11349	12131	12131
Gov. & NGOs Vehicles	5425	5589	5947	6367
United Nation	5179	5454	5651	5977
Core Diplomat		1439	1607	1831
Total				428615

Table 3.7: Existing vehicles in Kabul City (Source: Kabul Traffic Office).

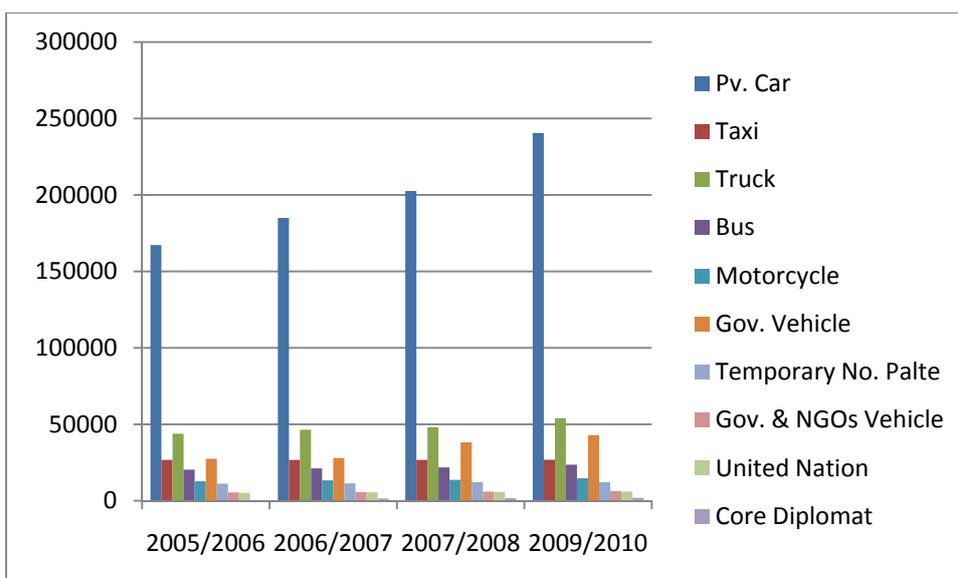


Fig. 3.4: Increasing number of vehicles in Kabul City (Source: Kabul traffic office).

Taxi unions	Year of establishment
Khorshed	1978
Hasib	1978
Paghman	1988
Noorani	2002
Abasin	2002

Table 3.8: Number of taxi unions in Kabul City (Source: Private Transportation Sector 2007, appendix 3, interview 14).

The individual trip fare price of taxi is variable and negotiable. In peak hours and crowded areas the price gets higher. Commonly the individual trip fare price is about 10 Afg. per kilometer. For instance the fare price from *Khairkhana* to the city center (10 Kilometers) is about 100 Afg. and rises up to 160 Afg. in peak hours (Walid A. Noori, Aug. 2009). The fare price in some places like Kabul airport is higher because of an additional tax of 50 Afg. per trip. Also for security reasons, taxis that operate at the Kabul air port have to be registered at the Kabul airport transportation department. Kabul airport taxis carry a green stamp as a sign of recognition, so that other taxis cannot operate at that area. In some cases the fare price rise up when the taxi driver knows that the passenger is a newcomer to the city. A newcomer passenger might be a person coming from outside Kabul or a foreigner, in which case the taxi driver takes advantage of the situation to increase the price. But as a rule, most passengers negotiate the fares according to the situation.

But the taxis share system is cheaper and has a fixed price of 20 Afg. equal to 0.15 Euro per passenger in all municipal lines. The price is fixed, no matter the distance or the place. Taxi share is always overloaded and usually carries five to eight passengers. Most of the Japanese Corolla cars (Kombi) transfer eight passengers, two in the front seat, three in the back seats and three passengers in the luggage space (table 3.4). However, the luggage space fare price is cheaper and often used by women and children as well as for goods. People tend to use taxi share (9.3 %), more than classic individual trips (5.6 %) because it is cheaper (table 3.9).

Usual Mode	Percentage
Bicycle	8,24
Bus	30,75
Governmental	2,23
Horse	0,08
Minibus	34,38
Motorcycle	4,04
On foot	4,95
Private	0,4
Taxi	5,61
Taxi Share	9,32
Total	100

Table 3.9: Travel options (Source: field work 2009, appendix 3, Questionnaire).

Taxis are also used for good delivering. Most of the Japanese Kombi with bigger luggage space is used for good delivering. The fare price for good delivering related to the volume and limit of goods.

Generally, taxi color is yellow and white in Afghanistan, but in different patterns. Taxis operating in the cities have white doors and the rest of the car is yellow, but provincial taxis and the taxis operating between nearby towns and cities have yellow sides and the rest of the car is white. By this differentiation people knows if the taxi is a provincial or city taxi.

The Kabul taxi network is functioning well and both individual trip and taxi share are available everywhere. Of course the fare price in both cases is higher than the other city transportation means, but they are comfortable, fast and reliable.

3. 2. 3 Informal Public Transportation (Paratransit)

The informal public transportation (paratransit) consists of IPT (private minibuses), private cars and auto rickshaws which are not registered at the Private Transportation Sector and

have no permission to operate for the public. The study implies that neither the Millie Bus company nor formal private companies (fleet operation), because of their small capacities are able to provide sufficient services for the demand of the urban passenger. So this is an opportunity for informal vehicles (paratransit) and has become a dominant public transportation system in Kabul City. The survey on 9 Aug. shows that about 35 percent (table 3.9) of Kabul City residents uses minibuses. Beside these private cars (as taxi share) and auto rickshaws are also common in Kabul City and perform about 10 percents of the public trips (table 3.9).

3. 2. 3. 1 Intermediate Public Transportation

“Intermediate transportation modes mean vehicles that have 8 to 18 seats including vans, jitneys [means Five Cent piece, the fare price of this service]¹⁹, shuttles, microbuses, and minibuses” (CERVERO 1998).

Japanese Toyota minibuses “Townace” (photo 3.3) are the major transportation mode operating illegally on all municipal lines in Kabul City. IPT has no predetermined line, no schedule and no bus stops. They operate ever where they want. There is no rule for them and no tax system. The only tax they pay is 10 Afg. per round trip that is collected by the delegations of registered personal transportation unions at the municipal main bus stations. IPT are always crammed and carry more than their normal capacity. Normally this kind of transportation mode has 8 seats but they are used to transfer up to 14 passengers (table 3.4). Also some of them have 18 seats but are used for 32 passengers.

Japanese “TOYOTA” minibuses are mainly new but unsafe and risky because most of them are not fit to the Afghanistan’s right-hand road system which has been followed since 1959. These cars are imported from Japan where left hand road system is in use, via Dubai and a route across Iran. Their steering wheel is on the right hand/side. The Passengers get in and out from doors which are situated on the left side, towards the middle of the road. This is of course a dangerous situation that causes deadly accidents. Most of the right hand driving vehicles were imported to Afghanistan from 1995 until 2004. The vehicles were supposed to re-export to Pakistan where the left hand driving road system is functioning. Nevertheless most of them got the operation permission from the government because of

¹⁹ <http://www.wisegeek.com/what-is-a-jitney.htm>

the lack of control. Since July 2004 the government²⁰ forbade further imports of right hand driving vehicles (PATERSON 2005), but the vehicles which previously got the operation permission still operate all over Afghanistan not in Kabul City only. Because of the administrative disarrangement at Kabul Traffic Office the exact number of right hand driving vehicles is not available but it seems to be more than 20 percents most of which are Japanese minibuses (field work 2007, 2008, 2009).



Photo 3.3: Private Minibuses (IPT) in competition with Millie bus (Source: photo: NOORI 2008).

The fare price of IPT is fixed and it is 10 Afg. in most of the municipal lines regardless of the distance. For instance the fare price of a single trip from the city center to Kabul University (5.2 km) is as same as the fare price of a single trip from the city center to *Khairkhana* (10 km). It is not clear why the fare price is the same in short and longer distance. One reason can be mentioned that a longer distance line has the higher potential of loading and alighting that equate the revenue with the shorter line.

²⁰ A commission in the Ministry of Interior which consists of members from the Ministry of Transport, Ministry of Interior, Kabul Traffic Office, Kabul Municipality and National Security Office makes the finale decision for road arrangement (Appendix 3, interview 10).

According to unofficial sources some 2000 minibuses are operating in Kabul City (Appendix 3, interview 5), but it does not necessarily mean that this is the real number. Because the lack of data it is too difficult to know the exact number of IPT. IPT operate all over the Kabul city and cover 35 percent of the municipal trips. They are fast and flexible but not reliable and unsafe. They have no official responsibility so they operate when they want regardless of the transportation demand.

3. 2. 3. 2 Private Cars Operation for the Public

Many Kabul drivers rely on their vehicles in order to make a living. Most of the Kabul citizens are immigrants and have no other assets such as real estate and agricultural land, so vehicles as a form of small scale investment increased rapidly (PATERSON 2005).

Private informal taxis are obviously seen during peak hours in the morning and afternoon. There are two kind of private cars operating for the public. Some operate all day long and some have a determined itinerary, mostly picking up passengers from their work place to take them back home. Private taxis function along the same rules as public ones. They can be hired for individual or shared trips. The price is also the same as for public taxis. The number of informal taxis increased when the Kabul traffic office limited the issue of taxi license. Nowadays private cars operating as taxies during the peak hours when the fare price is higher.

3. 2. 3. 3 Auto-Rickshaw

Another paratransit mode of transportation in Kabul consists of three wheeled vehicles. This mode actually three wheeled motorcycles, imported from China, is used to carry small amounts of goods although people also use it as a means of transport. Three wheeled motorcycle owners add a frame to their motorcycles and turn it into a rickshaw with six seats on the back for the passengers (photo 3.4). This transportation mode is new in Kabul City and because of their informal operation they are not spread overall the city. They operate only on short distances in the western part of Kabul City such as *Pul-e-Sorkh*, *Kota-e-sangi* and *Company-Paghman*.

With regard to the price of vehicle and trip fare, three wheeled motorcycles are the cheapest transportation mode. The trip fare is five Afg. per passenger. They are flexible and fast but unsafe and uncomfortable. Their 250 cc Chinese engine is of poor quality and is available for US\$300-700 at the market. “China now produces half of all motorbikes in the world. China’s market share has grown particularly in developing countries, as the average price of a Chinese motorbike worldwide has fallen from US\$700 in the late nineties to US\$200 now” (PATERSON 2005, p. 22). The number of three wheeled Chinese motorcycle that operate as public transportation means is not high in the city, but because of their lower cost and higher revenue their number will predictably increase and they will spread all over the city.



Photo 3.4: Three wheeled motorcycles turned to the auto rickshaw form for transferring passengers (Source: photo: NOORI 2008).

3.3 Private Motorized Transportation Modes

The number of cars increased from 53 million to 400 million in the world from 1950 until 1990. Some of the developing countries experienced the most rapid increase in road

vehicles (passenger cars) between 1975 and 1990. The number of passenger cars per thousand inhabitants doubled in Mexico (from 55 cars per 1000 inhabitants in 1975 to 91 cars per 1000 inhabitants in 1990), tripled in Malaysia (from 39 cars per 1000 inhabitants in 1975 to 127 cars per 1000 inhabitants in 1990) and increased in Ecuador from 7 cars per 1000 inhabitants in 1975 to 39 cars per 1000 inhabitants in 1990 (PACIONE 2008, p. 577). Private vehicle ownership increased since 1995 in Kabul City. The major factors are the administrative and economic function of Kabul City as the capital of Afghanistan, economical development through vast injection of foreign cash, population growth, lack of public transportation, the relatively cheaper price of vehicles and the lack of regulations of the importing of salvaged cars that lead to the increase of private car ownership. Since 2002 international donors have supported Afghanistan in order to rebuild the land. More than six billion US Dollars were donated to Afghanistan in 2006 and 2007 (Afghanistan Statistical Year Book, 2007, p. 266, tab. 15-1). Kabul City with its economic and administrative function has been the focus of international donors. About 854 international NGOs existed only in Kabul in 2005 (DITTMANN 2006) that had an effective influence on the process of economic growth of Kabul residents, and consequently favored the increase of car ownership. The number of private car ownership was 0.4 car per 1000 people in Afghanistan from 2002-2004 (GATHER, KAGERMEIER, LANZENDORF 2008, p. 267, tab. 12-1) which increased to 17 cars per 1000 people in 2007²¹.

The imports of vehicles to Afghanistan increased since 1998 and 311123 (without motorcycles, table 3.10)²² were imported from 2001 until 2007 (Afghanistan Statistical Year Book 2006, p. 248, tab. 12-4 and Afghanistan Statistical Year Book 2007, p. 242 tab. 12-4). Most of them are second hand Japanese vehicles imported from Germany, Canada and via Dubai and Iran by Afghan traders. After the shipment of vehicles from Dubai to Bandar-e-Abas Maritime port the vehicles are transferred to Islam Qala Port in Herat via land across Iran. Almost all the passenger cars are Japanese TOYOTA, Korean Hyundai and most of the imported trucks and buses are German vehicles from Mercedes Company. (PATERSON, 2005). In 2007, of the 52124 motorized vehicles were imported to

²¹ Total number of private passenger cars in Afghanistan was 503097 in 2007 (Ministry of Transportation of Afghanistan Department of Economic Affairs 2009, appendix 2) and the population number of Afghanistan was estimated 29 million by World Bank in 2008 (Source: <http://webcache.googleusercontent.com/search?q=cache:SbBaFU1go00J:data.worldbank.org/country/afghanistan+World+Bank+Afghanistan+population&cd=1&hl=de&ct=clnk&gl=de> (19.09.2010).

²² But in the case of motorcycles, they are new and imported from China. Until 2007 about 199.980 motorcycles (table 3.11) were imported to Afghanistan (Afghanistan Statistical Year Book, 2007).

Afghanistan only 22981 (44.08 percent) received permission from the Kabul traffic office to operate in Kabul City. 58.8 percent (17,755) of them are private cars (passenger cars), which shows the high percentage of car ownership compared to the other modes of transportation (table 3.11).

Vehicles are not too expensive in Afghanistan and the price is related to their condition. For instance the price for a 1991 model of Toyota Corolla begins from 3000-6800 US Dollar on the markets (Appendix 3, interview 6). As mentioned earlier most of these cars are used to ensure an income by informally operating for the public.

Vehicles	Second hand	New	2001	2002	2003	2004	2005	2006	2007	total
Trucks	x		315	316	12536	3412	1498	1353	6831	26261
Buses	x		494	197	13	10	84	26	0	824
passenger cars	x		885	24442	72984	48909	38779	67876	30163	284038
Motorcycles		x	54	2098	25188	61912	44443	51155	15130	199980
Bicycles		x	24000	223000	227000	475000	175000	324000	185000	1633000
Bicycle for children		x		1000	911000	32000	191000	99000	163000	1397000

Table 3.10: Imported vehicles to Afghanistan (Source: Afghanistan statistical year book 2007, p. 242, tab. 12-4).

Imported vehicles to Afghanistan in 2007	Registered vehicles at the Kabul traffic office in 2007	Percentage of imported vehicles that registered at Kabul City
Passenger Cars	30163 Private Cars 17755	58.8
Trucks	6831 2567	37.5
Buses	0 835	
Motorcycles	15130 573	3.7
Gov. vehicles	586	

Temporary plate	No.	226	
NGOs		164	
United Nation		275	
Total	52124	22981	44.08

Table 3.11: Imported vehicles to Afghanistan and registered vehicles at Kabul Traffic Office (Source: Afghanistan Statistical Year Book 2007, p. 242, tab. 12-4 and Kabul Traffic Office 2009).

3.3.1 Private Cars

According to the classification of the Kabul traffic office, private cars consist of limousine, kombi, four wheeled drive pickup (small trucks), jeep and minibuses. Big capacity buses, trucks (although they are private), united nation vehicles, governmental vehicles, core diplomat vehicles and vehicles belonging to foreign organizations are not in this category. According to the rapid population growth in Kabul City there is excessive demand for urban transportation that neither state-run transportation nor private formal transportation unions are able to provide. Thus the population growth raises the need for having private cars. The number of private passenger cars is 240484 in Kabul (table 3.7) which implies 60 private cars per 1000 inhabitants in 2007.

3.3.2 Motorcycles

The number of motorcycles increased since 2000 when new cheaper Chinese motorcycles entered the Afghanistan markets. According to official data 14660 motorcycles circulate in Kabul City (Kabul traffic office) and about 4.5 percent (only men) of Kabul city residents use them (survey Aug. 2009).

Motorcycles are used for delivering goods, by small shops owners for instance, not for personal trips only (photo 3.5). Because this is the cheapest way to deliver goods, by minimizing transportation costs and thus maximize profits.



Photo 3.5: Motorcycle used for goods delivery (Airport Road). Source: (photo: NOORI 2009).

Regarding the Afghan culture women are not allowed to drive motorcycles or bicycle. This is why the number of motorcycles has not as much increased as the other transportation modes. According to the existing data from the Kabul traffic office, 114660 motorcycles are registered and were allowed in the last five years (table 3.7).

3.4 Non-motorized Transportation Modes

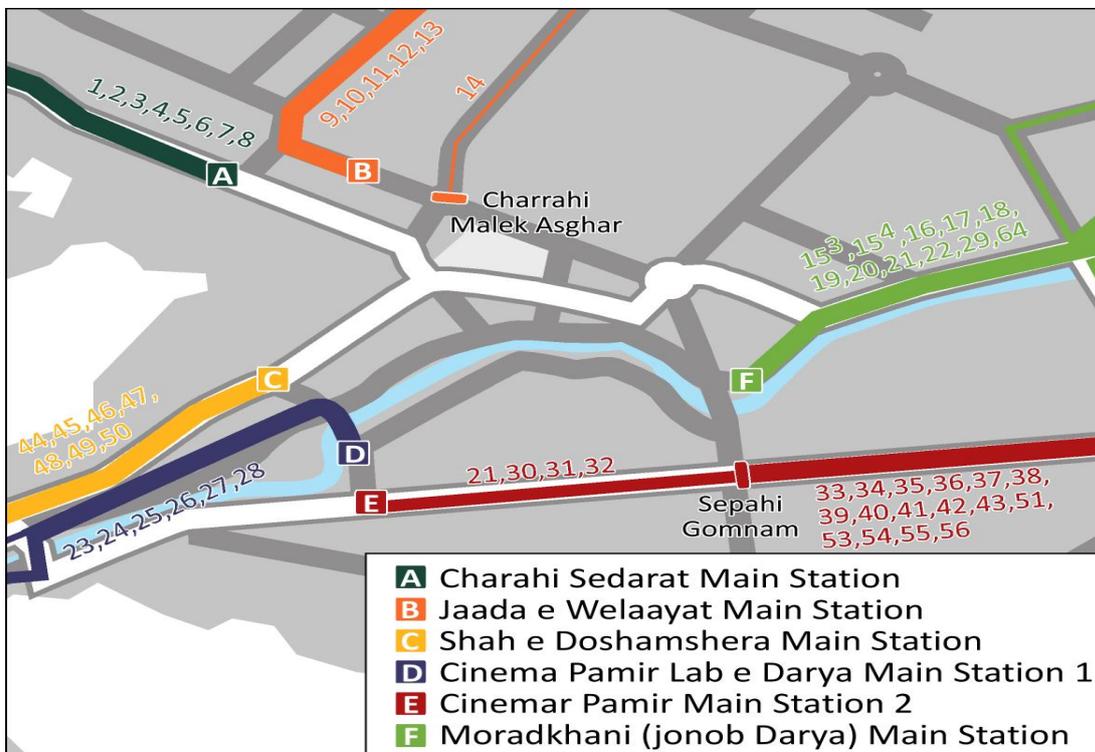
Walking, human and animal-powered vehicles for passengers and freight are the basic form of non motorized transportation in third world cities. Animal transportation and handcarts, typical to developing cities, and bicycle can be seen everywhere in Kabul City. Non motorized transportation in Kabul City is not so much used compared to the other South Asian populated cities. In many South Asian cities such as Phnom Penh, Indonesian and Indian towns, human-powered vehicles operate as public transport (PACIONE 2008). But in Kabul City bicycle is the common mode of personal transport and no one uses it to transfer passengers, because they see it as a very base means of transport from the cultural perspective. However bicycles and handcarts are a common means of transport for transferring freights in Kabul City as in many developing cities.

3.4.1 Walking

As mentioned above because of inefficient transportation people choose walking as a travel option. Almost all daily trips, as to the local bazaars and schools are done on foot.

Also, considering the city development (land use) a large parts of the city (60-70 %) developed in an uncontrolled way (Ministry of Urban Development, 2008), so that many roads are narrow and unpaved which induces people to walk or use bicycles instead of public transportation. The survey in August 2009 shows that 5.83 percent of Kabul City residents walk to the city center. In some unplanned areas, situated on foothills (slopes), such as *Sher Darwaza* and *Asmaye* mountains which consist of squats, roads are inexistent; one can only reach the next bus stop on foot.

Regarding the organization of the bus lines, some planned stations located in different parts of the city center, are situated far from one another (1-2 km), without being connected by any bus line (for instance, *Cinema Pamir* and *Jada-e-welayat*). Once again, the only option is walking (map 3.2).



Map 3.2: Main bus stations in Kabul City center (Source: information based on field research 2008). Cartography by N. Vorbeck, Department of Geography of Uni. Giessen 2009

3. 4. 2 Bicycles

In 2007, 340000 Chinese bicycles were imported to Afghanistan (Statistical office of Afghanistan, 2007). Because of the lack of exact data the number of bicycle users in Kabul City is not available but according to the survey (August 2009) 8.42 percent of (male) Kabul residents use bicycles. Bicycles are the most common personal means of transport, especially among male students²³.

People use bicycles to deliver goods as well. Most of the local shopkeepers use bicycle. In 2008 in *Khairkhana* area asked why he chose to use a bicycle, a local shopkeeper said: “because it has no cost and spares my time. I have a small shop and must go shopping 3 times a week to the main bazaar, and carry about 50 kg every time. Taxi is too expensive and public buses keep me waiting too long. That’s why my bicycle is my best friend; it makes me earn money” (Bagramwal 2008, Appendix 3, interview 7).

Bicycles are subject to the Afghanistan traffic law regulation (KHAIRKHWAH 2006), although they are not a part of the infrastructure. There are neither bicycle lanes, nor parking areas. The greatest numbers of bicycles are to be seen around schools and universities, although these places are deprived of parking areas. The same goes for around shops and markets, where people park their bicycles anywhere, thus impeding the normal traffic.

3. 4. 3 Handcarts

Handcarts are commonly used to deliver freight (photo 3.6). They can be seen everywhere, and especially in the central business district where motorized vehicles are not allowed. There are different kinds of handcarts, 4 wheeled, 3 wheeled, 2 wheeled, and one wheeled handcarts. They can also be used as mobile shops.

²³ Referring to the cultural perspective females are not allowed to ride bicycles.



Photo 3.6: Two wheeled handcart delivering goods (*Jada-e-Maiwand*). Source: (photo: NOORI 2008).

3.4.4 Animal Transportation

Animals also play their role in Kabul City transportation system. As mentioned in the history of transport in Kabul City, animals had important roles in transportation both in passenger and freight transferring. Increasing motorized vehicles lead to a decline of their roles. For instance five years ago horse carts transferred passengers in the city center but now they are replaced by rickshaws. Nowadays there are no horse carts for transferring passengers, but still people use animals for the transfer of goods.

Animal carts are used as mobile small shop as well. Farmers from nearby suburbs bring their agricultural products to the city center for selling and on the way back take other commodities such as tea, sugar, washing powder and so on. Animal carts as mobile shops can be seen in residential areas too. Beside their own agricultural products, most of them buy vegetables and fruit from the main bazaars and resell them in residential areas. Main advantages are the reduction of traffic, with positive consequences on the environment (reduction of air and noise pollution). But on the other hand, it might cause traffic congestion by impeding the motorized circulation on main roads. However, positive aspects are more important than negative ones.

As in the case of bicycles, animal carts and handcarts come under the regulation of the general traffic law (KAHIRKHOWAH, 2006), but they are not allowed to use the crowded roads.

3.5 Goods Transferring System

The transport of goods is classified by two categories: bulk (big and small freight) and the distance (short or long). These transportation activities are performed by the governmental goods transferring company, formal private goods transportation unions (registered at the ministry of transportation) and informal private goods transportation. Almost all large scale goods transferring activities on long distances are performed by governmental and formal private transportation unions, but small scale transferring on short distance is performed by informal private transportation means in Kabul City (motorized and non motorized means).

3.5.1 Governmental Transportation Company

According to official information (appendix 1) Central Freight Company is the only goods transferring company in Afghanistan which operates under the supervision and control of Ministry of Transportation. Central Freight Company is the combination of eight KAMAZ freight companies (CENTRAL STATISTICS OFFICE 2007, p. 196/197). The name KAMAZ was left from 1980s when the goods transportation systems in Afghanistan were supported by Russia. In that time there were eight governmental goods transferring companies: KAMAZ company number two, three and four operated in the central zone (short distance in Kabul) and the rest operated in long distance. These freight companies were responsible for transferring only governmental freights and formal private unions transferred commercial freights. After the collapse of the communist regime and later during the privatization process these KAMAZ freight companies were united and now there is only one which is called the Central Freight Company.

Central Freight Company transfers both governmental and commercial freights. It has 207 Russian KAMAZ and Japanese HINO trucks with an average capacity of 9 Tons per truck. This company transfers goods on long distances from territorial ports to Kabul City and vice versa, as well as in short distances within Kabul City, although in that case its activity

is limited. Within the town, where distances are short, transport activities are incumbent to informal private (motorized and non-motorized) transportation. Since the Central Freight Company belongs to the government, it is not bound to pay neither tax nor fare, but the fare rate applicable to commercial goods is set by the free market (Appendix 3, interview 2).

3. 5. 2 Formal Private Freight Unions

Private freight unions are not predominant in Kabul City. Currently only a few urban formal freight unions operate in Kabul City. Most of them have big capacity trucks and transfer large scale goods, but their activity is limited. This is due to economical and practical reasons. Entrepreneurs are first dissuaded by the 5 % income tax, and on the other hand, most of the small scale freight is distributed by informal freight transportation and passenger cars such as taxi and private cars. Besides, non motorized transportation is also competing for the market. These factors all together limit the formal freights transferring unions' activities in the city.

3. 5. 3 Informal Goods Transportation

As mentioned above most of the goods distribution in the city is performed on small scale by informal private transportation such as small trucks (pickup), private cars, taxis, motorcycles and non motorized transportation (animal carts, handcarts and bicycles). Also many small shops and markets have their own small trucks used to deliver goods to customers.

The central business district where motorized vehicles are not allowed is the area for non motorized transportation, especially handcarts (photo 3.6). The system of goods transferring in the central business district is quite archaic. Each market, constituted of several shops, is monopolized by a group of handcart owners. Their leader, called “*Kalantar*”²⁴ (elder), organizes the transfer of goods, loading and unloading, and is a

²⁴ The term *Kalantar* remains from the *Abdur Rahman Khan* era. He elected representatives to organize the city. These elected representatives so called *Kalantar* (Source: Kakar 1979, p. 53-53 cited in Daniel Esser 2009, p. 5, Who governs Kabul? Explaining Urban Politics in a Post-War Capital City, Columbia University New York, <http://www.crisisstates.com/download/wp/wpSeries2/WP43EsserR.pdf> 21.09.2010).

trustworthy person that has been present on the market for a long time. This system was initiated by the handcart owners without any interference by the government.

4. Technical Urban Transportation Infrastructure in Kabul City

The technical transportation infrastructure is the basic physical structure needed for the operation of vehicles, or the services and facilities necessary for geographical mobility of goods, passengers and information. In general technical transportation infrastructure includes roads, railways, bridges, tunnels, ports (for maritime and inland water transport), airports, urban transportation infrastructure (mass transit systems), dry ports, inland container depots (intermodal infrastructure), pipe lines, and signage and traffic management systems (UNESCAP 2006). In the case of urban areas, technical urban transportation infrastructure includes roads, tramways, bus lanes, terminals, bus stations and bus stops, parking places, bicycle ways, footpaths, pedestrian crossings (zebra cross, footbridges and underground passes), road junctions (intersections and interchanges), bridges, tunnels and signage and traffic management systems (electronic devices) (KAIJSER 2005). Some developed cities' transport infrastructure includes railway and water transport. For instance the urban transport infrastructure of Hamburg City includes a railway system from the Hamburg main station to Hamburg Altona station.

4.1 Roads and Road Condition-Technical Point of View

Regarding the technical transport infrastructure, roads are the principal mode of transportation infrastructure in Kabul City. After the freedom of Afghanistan in 1919 Kabul City as the capital of Afghanistan was on the way to be a modern city. Improving the urban transportation system was the main objective in the urbanization process. The government thus decided to develop the transportation system in Kabul City. In 1924 for the first time a railroad was built (AREZ and DITTMANN 2005, p. 17) but unfortunately it was not developed and destroyed after a couple of years (photo 4.1 and 4.2), so now roads are the only main technical transportation infrastructure in Kabul City.



Photo 4.1: the first railroad in Kabul City (Source: <http://www.andrewgrantham.co.uk/afghanistan/railways/kabul-to-darulaman-railway/> 27.05.2010).



Photo 4.2: Remains of local railway (Source: Photo: Prof. Dr. A. DITTMANN 2006).

Referring to the Kabul City road network master plan from 1978 (see photo 2.1) the city road network consists of different types of roads (20 – 140 m wide, table 4.1) that are geometrically crossed in right angle at variable junctions (intersections and interchanges).

Type of Roads	Width in meter	Foot pad width in meter	Total
Residential streets	12	3	20
Residential streets	22	3	25
Arterial highways of local importance	27	3	30
Arterial highways of local importance	35,5	4,5	40
Arterial highways of local importance	36,5	8,5	45
Controlled traffic arterial highways of city wide-importance	48,5	6,5	50
Controlled traffic arterial highways of city wide-importance	54	6	60
Controlled traffic arterial highways of city wide-importance	64	6	70
Municipal expressway	140		140

Table 4.1: Type of roads refers to the Kabul City road network master plan (Source: Kabul municipality 2008).

According to the master plan (1978), more than 1100 km of the roads in Kabul City should be asphalted, but only 30 percent of the road network master plan has been fulfilled. This means 350km of roads in Kabul City have been asphalted. 60 percent (210km) of these roads have been partly destroyed in the last three decades and need reconstruction. Still 700 km of planned city roads are unpaved (Appendix 3, interview 8).

Kabul municipality is the only institution that is responsible for the road maintenance, but the municipality has no sufficient budget to fund this process of road construction and reconstruction. So the city roads are still in poor condition.

Since 2002 Kabul municipality has received more than 50 million US Dollars from international donors (table 4.2) in order to construct new roads and reconstruct the main roads in Kabul City.

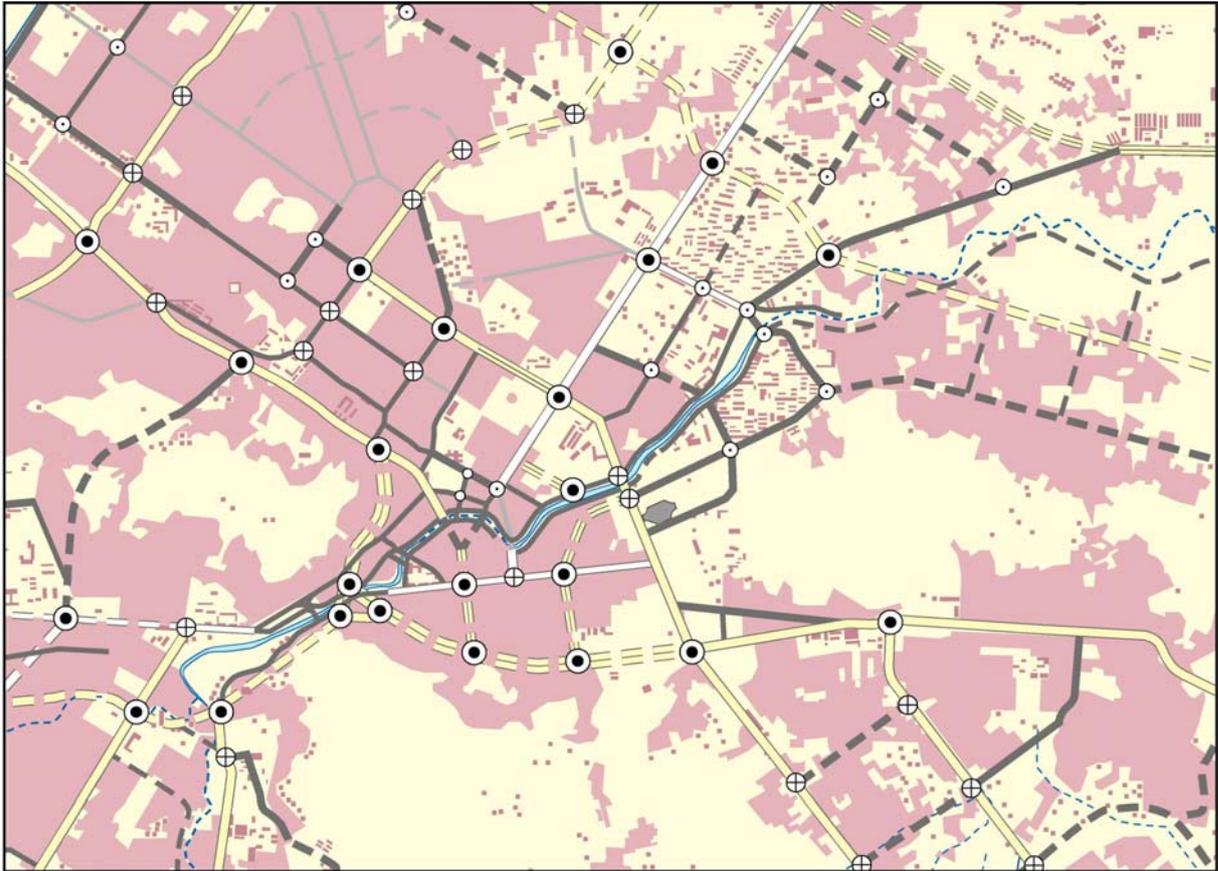
Donors	Donation in USD
World Bank	18,000,000
Japan	6,000,000
United Arab Emirates	30,000,000

Table 4.2: Money donated to Kabul municipality for construction and reconstruction of Kabul City main roads. Source: BBC Pashtu service 11.08.2008

Beside the money donated by international donors mentioned above, the annual budget for The Kabul City is also spent for the reconstruction and construction of Kabul City roads. The municipality tries to complete the city roads network master plan. Nowadays about 100 kilometer of roads have been constructed by the Kabul municipality and NGOs. The roads that have been constructed in Kabul City are listed in table 4.3 and have been shown in map 4.1.

No.	Name of the street	Start point	End	Length in km	Planned width (m)	Applied in the field (m)
1	Airport Road	Masod Intersection	Kabul Airport	2.80	50	18
2	Road on the western part of Kabul Airport	Kabul Airport	Saray-e-Shamali	8.20	70	70
3	Pul-e-Charkhi Road	Banaye	Tangi Pul-e-Charkhi	14	70	25
4	Qala-e-Zamankhan	Arzan qeemat	Banaye	9	60	60
5	Bagrami Road	Arzan qeemat	Nasaji Fabric	9	60	60
6	Rahman Mina Road				60	25
7	Company Road	Kota-e-Sangi	Company	6	60	60
8	Darulaman Road	Dehmazang	Darulaman	5.5	60	60
9	Barchi Road	Pul-e-Sokhta	Ring Road	7	40	40
10	Deh Afghanan Road	Deh Afghanan	Baraki	3.20	60	60
11	Baraki Road	Bagh-e-Zanana	Tahyemaskan	4.30	60	33
12	Tahyemaskan Road	Tahyemaskan	Saray-e-Shamali		60	25
13	Charahi Shahid Road	Charahi Shahid	Baghebala	6	60	60
14	Parwan Se Road	Parwan Se	Labejar	2.30	40	40
15	Taimani Road	Parwan Dowom	Hotel Gul-e-sorkh	1.30	30	30
16	Golaye-e-Hesa-e-Awal Road	Golaye-e-Hesa-e-Awal	Serahi Khwajaboghra	3	40	40
17	Lesae-Mraiam Road	Khest Hokhtif	Serahi Khwajaboghra	2.80	40	40
18	Kolola poshta Road	Tahyemaskan	Sabeqa-e-Kololaposhta	2	40	40
19	Kolola poshta Road	Sabeqa-e-Kololaposhta	Charrahi Ansari		30	9
20	Taimani Road	Loy Saranwali	Qala-e-Najarha	5.20	20	10
21	Kota-e-Sangi Darulaman	Kota-e-Sangi	Darulaman	4.50	60	7

Table 4.3: New constructed roads in Kabul City based on city road network master plan (1978). Source: Kabul municipality 2009



Streets

20 m	—	Residential streets
25 m	—	Residential streets
30 m	—	Arterial highways of local importance
40 m	—	Arterial highways of local importance
45 m	—	Arterial highways of local importance
50 m	—	Controlled traffic arterial highways of city-wide importance
60 m	—	Controlled traffic arterial highways of city-wide importance
70 m	—	Continuous traffic arterial highways of city-wide importance

○	Controlled intersection with signal control (with traffic-light regulation)
⊙	Intersection of controlled traffic arterial highways with one level traffic interchange
⊕	Intersection of continuous and controlled traffic arterial highways with partial traffic interchange
⊗	Intersection of continuous traffic arterial highways with complete traffic interchange

Planning streets (1978)

20 m	- - -	Residential streets
25 m	- - -	Residential streets
30 m	- - -	Arterial highways of local importance
40 m	- - -	Arterial highways of local importance
45 m	- - -	Arterial highways of local importance
50 m	- - -	Controlled traffic arterial highways of city-wide importance
60 m	- - -	Controlled traffic arterial highways of city-wide importance
70 m	- - -	Continuous traffic arterial highways of city-wide importance
140 m	- - -	Municipal expressway

Map 4.1: planning roads and applied roads in Kabul City (Source: Kabul municipality 2008, Cartography by Vorbeck, Institute of Geography of University of Giessen 2009).

4. 1. 1 Road Users-Administrative Point of View

Roads are heavily crowded in Kabul City during the work days. Normally roads are used by motorized and non motorized vehicles and are fringed by parks where the traffic conditions permit. But in Kabul City most of the roads especially in the city center, near the markets and bazaars are used by hawkers, traders, small mobile shops, pedestrians and car parks. Hence most of the roads in the city center and near to the bazaars are crowded (DITTMANN and BUSCHE 2006). Also some of the city roads are blocked for security reasons (see chapter 5. 4). These roads are the main roads and have significant roles in the city transport network. Blocking these roads disrupts the traffic flow by leading the vehicles to secondary roads which have no sufficient capacity.

4. 1. 2 Hawkers and small Mobile Shops as Road Users

Large parts of the roads that cross through the city center, market and bazaar areas are occupied by the other road users as mentioned above (photo 4.3). Such conditions disorder the traffic flow and increase the reaching time by creating traffic congestion. This is not a new phenomenon in Kabul City roads. For decades, hawkers, traders and small mobile shops are known to create obstacles in the city traffic flow “One of the curiosities of the trolleybus routes in Kabul was driving trolleybus through the Market Square. Overhead wiring was led right above merchants and customers, but the trolleybus itself was running outside the Market. Trolleys and overheads really suffered from these conditions” (ZRAVY 1979)²⁵. For instance the road in front of the *Pul-e-Kheshti* Mosque has six lanes (50m width according to the master plan 1978) but only one of them is used by vehicles. Such conditions can be seen in many city center roads, near the market and bazaar areas.

²⁵ http://www.spvd.cz/?p=svet/af/kabul_en.html&m=menu_svet.html



Photo 4.3: Hawkers and small mobile shops that occupied the roads in front of the Pul-e-Kheshti Mosque (Source: Photo: NOORI 2008).

4. 1. 3 The abuse of Roads as parking places

Many of the heavy traffic roads cross through the trading centers. Roads are greatly used as parking especially in central business district (CBD) because of the lack of parking places. For instance *Jada-e-Maiwand* road has ten lanes (40m width), four lanes of it used as parking (on the both side of the road, photo 4.4). About 85623 vehicles come to the city center every day (appendix 1). It is uncertain how many of them need a parking. But according to the collected data (appendix 1) one can at least estimate that more than 1500 vehicles need a parking in the city center (table 4.4).



Photo 4.4: Parking on the road side causes traffic congestion in city center main road (Jaada-e-Maiwand). Source: (photo: NOORI 2009).

Parking place in the city centre	Parking place on roads	Number of parking cars
Northern side of Kabul River (city center)	X	190
Southern side of Kabul River (city center)	X	74
Mina Market		170
Jada-e-Asmayee		159
Jada-e-Maiwand	X	382
Jada-e-Nader Pashtun	X	56
Cinema Pamir		102
Municipality parking place		13
Sarai-e-Pakhtafroshe		112
Total		1258

Table 4.4: Number of parking cars in specific parking places and road sides in the city center (Source: field work 12.01.2010).

Parking conditions can be categorized into two categories in the city center:

- Temporary parking (buses and taxis for boarding and alighting passengers, 5 - 30 minutes)
- Short term parking
- Long term parking

According to the collected data, about 450000²⁶ city trips are carried out by buses during the day (appendix 1). Since there are not enough places for bus terminal and bus stops, almost all of the busses stop on the main roads. The same applies for taxis. About 26761 city trips are done by taxis every day (Appendix 2). There are no specific places for taxi parking as well, so taxies use roads to park temporarily. Consequently using roads as bus and taxi terminals as the collected data shows, is one of the main factors of traffic congestion and traffic disturbance in the city center.

It is difficult to get exact data about private vehicles parking habits. But some information can be used in this regard. For instance *Mina* Parking in the city center has a capacity of 170 passenger cars (see chapter 4: technical transport infrastructure, parking place). The park is always full except Fridays. 20 percent of cars park for a short time (Appendix 3 interview 9). Collected data shows that the number of parking vehicles (short and long term parking cars) is 1258 (table 4.4).

4.2 Roads in Unplanned Areas

Roads in unplanned areas are in poor condition. The unplanned areas roads can be divided into two parts: foothills and flat areas streets. The streets in the foothills are actually water channels during the rainy season (photo 4.5). Most of these roads are not usable for vehicles and are used by pedestrians while goods are transported on animals' backs. Roads in unplanned flat areas are three to five meters wide. Although the roads are not vehicular,

²⁶ Coming buses to the city center (4500) X capacity of each bus (50) = 225000 trips X return trips from the city center 2 = 450000

narrow and unpaved, vehicles use them. There is neither public transportation nor a public private collaboration (except taxis) transport system. Passenger transferring is done in an informal way. Most of the goods transportation is done by private vehicles, auto rickshaws, animals, handcarts and bicycles. Roads in unplanned areas are extremely dusty during the dry seasons and muddy during the rainy season.



Photo 4.5: Water channels function as roads in unplanned foothills areas (Khairkhana Mountain). Source: (photo: NOORI 2008).

4.3 Bridges and Underground Passages

The topography of the Kabul basin (mountains and rivers, chapter 2) divides the road network into six parts connected by passes and bridges. Some of these bridges are footbridges. Vehicular bridges which are used by non motorized vehicles and pedestrian have a significant role in the city road network connectivity that is divided by rivers and mountains.

As it was mentioned in chapter two, the *Asmaye* and *Sher Darwaza* mountains divide Kabul City in North East and South West parts. Each part is divided by rivers that cross the city. This physical isolation in the road network (see map 2.5) is explained as follow:

➤ South West Kabul:

The road network in the South West part of Kabul City is physically divided by two rivers and connected by many bridges. These two rivers divide the road network of the south west part into three sections (north, middle and south sections). The north and middle sections are connected by more bridges than the eastern and middle sections. The most important bridges which have significant roles in uniting the road network between the north and middle sections are *Pul-e-Sokhta*, *Pul-e-Sorkh* and *Pul-e-Lesa-e-Hbibya*. These bridges are used by pedestrians, non motorized and motorized vehicles. There are many other bridges that are used only by pedestrians and non motorized vehicles such as handcarts bicycles and animal carts. The southern section is connected with the middle section only by two vehicular and foot bridges. This is due to the unplanned development of the housing and road network in this section. The road network in the South West part of Kabul City is connected by 15 bridges that are mostly footbridges and five of them are vehicular bridges (table 4.5).

➤ North East Kabul:

The physical isolation in the road network of the north east part of Kabul City is the same as in the south west part of Kabul City. The north and middle sections are connected by 10 bridges; most of them are located in the city center (see map 2.5) and have significant roles in the city road networks connection. The bridges in the city center (*Pul-e-Arten*, *Pul-e-Shah-e-Doshamshera*, *Pul-e-Bagh-e-Omomi*, *Pul-e-Kheshti* and *Pul-e-Mahmod Khan* bridges) are used by all kind of transportation means as well as pedestrians. All of these bridges are one way bridges except *Pul-e-Mahmod Khan* bridge. The southeast section of the north east part of Kabul City is located at the eastern fringe of the Kabul urban area. This section is made up of urban and rural parts. So the road network is not developed and connected only by two bridges in *Bagrrami* suburb (34°31'18.49" N and 69°17'16.4" E) and in *Arzanqimat* region (34°29'43.93" N and 69°16'37.97") to the middle section. The eastern section is also connected to the northern section only by *pul-e-Charkhi* bridge

(34°32`57.99” N and 69°21`34.80” E). All together there are 13 bridges (table 4.6) that connect the road network of North East part of Kabul City.

Bridges	Used by vehicles	Foot bridges	Two way
<i>Pul-e-Sokhta</i>	x	x	x
<i>Pul-e-Surkh</i>	x	x	x
<i>Pul -e-moqabl Lesa e Hbibya</i>	x	x	x
<i>Pul-e-Doctor Mehdi</i>			x
<i>Pul-e-Jamhoryat</i>			x
<i>Pul-e-Hasan Gosala</i>			x
<i>Pul-e-Gozargah</i>	x		x
<i>Pul-e- Dehdana</i>	x		x

Table 4.5: Bridges in south west part of Kabul that connect north, middle and west sections (Source: field work 2008).

Bridges	Used by vehicles	Footbridges	One way	Two way
<i>Pul-e-Khishti</i>	x	x	x	
<i>Pul-e-Dehmazang</i>	x	x	x	
<i>Pul-e-Shahe Doshamshera</i>	x	x	x	
<i>Pul-e-Bagh e Omomi</i>	x	x	x	
<i>Pul-e-Mahmod Khan</i>	x	x		x
<i>Pul-e-Qala e Mahmud Khan</i>	x	x		x
<i>Pul-e-Saraz Shahzada</i>				
<i>Pul-e-moqabel e Ibn e Sina</i>		x		x
<i>Pul-e-Harten</i>	x	x	x	
<i>Pul-e-Charkhi</i>	x	x		x
<i>Pul-e-Makkorroryan</i>	x	x		x
<i>Pul-e-Yak Payasagi</i>		x		x
<i>Pl-e-Temorshahi</i>		x		x

Table 4.6: Bridges that connect the city road network (Source: AREZ and DITTMANN 2005).

Since 2006 the municipality has made efforts to solve the traffic congestion which is created by pedestrians using the intersections in the most congested places. The strategy was to build foot over bridges in the city center. The municipality built four foot over bridges in the city center, one on *Malek Asghar* intersection and the second on *Deh Afghanan* intersection and two more on Hotel Kabul Intersection. But this strategy did not work successfully because the bridges are too high and architecturally not fit for pedestrian, especially for the elderly and disabled people. So people still cross the roads and do not use the bridges. Consequently building foot over bridges was inefficient but remained as a visual intrusion.

After designing Kabul City network master plan the government launched some projects to improve the city road network. Hence the municipality built an underground passage for pedestrians in the city center on *Mohamad Jankhan Wat* intersection (1978-19 80). This is the only passage in Kabul City. The passage has four doors to the north, south, east and west directions. This passage also hosts a market as well as a pedestrian passage. Hawkers and traders use the passage as well. Although all the pedestrians do not use the passage and cross the intersections it still favors the traffic flow.

4.4 Foot paths

According to the city network master plan the foot paths are three to 6.5 m wide. In many crowded roads in the city center where the roads are 40 to 45 meter wide, the foot paths are six to 6.5 m wide (table 4.1).

But there are many difficulties that prevent the pedestrians to use the foot paths. One of them is that the foot paths are occupied by hawkers, traders and small mobile shops especially in the city center. So the pedestrians have to walk on the roads. Such conditions create problems for the vehicles and disorder the traffic flow. The government tried to solve these problems. Three authorities were involved: the Ministry of interior, the Kabul municipality and the Kabul traffic office. But it does not work and the roads are still overcrowded by the huge number of small businessmen.

Securing the governmental buildings also creates problems for the people who use foot paths. Most of the foot paths in the city center and nearby areas are blocked by huge concrete walls and barbed wire. Hence pedestrians have to walk on the roads.

4.5 Parking Places in the City Center

Parking places and its regulation play a significant role in the urban transportation system. Parking places can facilitate traffic flow.

Kabul city faces lack of parking space especially in the city center as the most congested area. Therefore the focus has been on the city center parking places.

The Kabul municipality delineated ten parking places in the city center that six of them have specific places and the remaining four are road side parking (table 4.6). All the specific parking places are in one story. Referring to the traffic congestion, road side parking is the most problematic issue for the regular traffic flow in the city center (photo 4.4). Recently the Kabul municipality made efforts to resolve the lack of parking places and to regulate parking. The effort is to build parking places both at the edges of Kabul City and in the city center. The plan is to build four parking places at the four entering doors of Kabul City (*Saray-e-Shamali, Pul-e-Charkhi, Company and Tank-e-logar*) and one at the city center at *Deh Afghanan* area.

Also the municipality leased all the parking places to the private sectors, because the municipality was not able to collect the revenue. So it means that the municipality lost the rule of controlling the parking place regulation. For instance Kabul municipality leased the “Mina” Market parking area to the private sector for 4200 Dollars per year. The parking place has a capacity of 170 passenger cars and it is full on working days. The long term parked cars (136 cars = 80 percent) pay one Dollar and short time parked cars (36 cars = 20 percent) pay 0.5 Dollar. The number of long term parked cars is 40800 and short time parked cars is 10200 per year (300 working days). That means the private sector earn 45900 Dollar per year which is not comparable with the money they pay for the municipality (Appendix 3, interview 9).

The municipality is responsible for providing parking places, but since the municipality leased the parking places to the private sector and has no rule on it, it prevents the Kabul traffic office to control parking cars especially on road sides. Leaseholders misuse such conditions and let the cars to make a second parking lane on road sides in the purpose of earning more money.

As the number of vehicles is increasing, (30 percent from 2006 until 2009, Appendix 2), the demand for parking space will rise as well. So the municipality should provide facility for the road side parking and expand the specific parking places.

4.6 Bus Terminals and Bus Stops

Kabul City has two clusters of city bus terminals. The first one is located in the north east part of Kabul City and the second one is located in the south west part of the Kabul City. Kabul city also has four provincial main bus stations which are located at the four entering gates of the city. But the study in this chapter will consider only planned and unplanned main bus terminals in Kabul City.

4.6.1 Planned main Bus Terminals

Planned clusters of bus terminals in the north east part of Kabul City consist of eight main terminals and 60 lines in different directions are drive off (see appendix 1, map 1). These terminals are 200m to one km far from each other and are not connected. According to the administrative affairs of Kabul transportation the location of the bus terminal was always altered during the last three decades in order to reduce traffic congestion. Technically they have no specific place for bus terminals therefore they use road sides as bus terminals (photo 3.3) except Cinema “Pamir” bus terminal which remained from the Trolley bus system.

The second cluster of bus terminals is located in the south west part of Kabul City in *Mirwais Maidan* area and consists of three bus terminals. About four lines are leave from these terminals. The terminals have no specific place and use the roads side for boarding and lighting passengers.

The Kabul municipality in cooperation with Millie Bus Company delineated 420 bus stops in Kabul City. Since the transportation system boarding and alighting passenger every where they want, the bus stops abandoned and converted to parking places or occupied by traders and small shops.

4. 6. 2 Unplanned Bus Terminals or “pick up areas”

There are many factors that cause apparition of the unplanned terminals (pick up areas). The sprawling of the city, low availability of public transportation, remoteness of bus terminals in the city center and the major active places such as universities, markets and bazaars, are the major factors that pave the way for the appearance of pick up areas. According to these variable factors, the pick-up areas should be classified as:

- Pick up areas on the borders between planned and unplanned residential areas
- Pick up areas in the city center
- Pick up areas adjacent to the major active places

Unplanned bus terminals on the edges of the planned boundaries of the city connect the transport network of the unplanned areas to the city planned road network. Since the public transportation (Millie Bus Company and private public cooperation unions) of Kabul City provide services only for planned areas, the unplanned areas face a lack of transportation. Therefore the informal transportation (paratransit) established unplanned bus terminals (pick up areas) in order to provide the needed facilities. Most of the unplanned terminals are located at the end of the formal public bus lines where the borders of unplanned areas begin (see appendix 1, map 1). These pick-up areas function as a transfer point between planned and unplanned areas.

In the case of the city center, the long distances between bus terminals result in the appearance of pick-up areas. As mentioned above there is no connection between bus terminals in the city center. People who want to get from one terminal to the other have to walk about one kilometer (*Cinema Pamir to Sedarat* 1 km). So the poor connection of bus lines especially between one terminal to another induces the use of pick-up areas (see map 3.2).

Some of the pick-up areas appear adjacent to the major active places because of the expanse of their functioning area. For instance vegetable and fruit bazaar is the unique market in Kabul City where beside the residents all small markets, individual shops and small mobile shops provide their selling material from. Pick up areas adjacent to

universities where students come from different parts of the city is other example. About 41892 students (CENTRAL STATISTICS OFFICE 2007, Page 39) come to the universities from all over the city. As there are one or two bus lines that pass these places, the demand for appearing pick-up areas emerge. So the pick-up areas behave as a main terminal that many lines drive off to all over the city.

5 Administrative Urban Transport Infrastructure (Traffic Management and Signage)

The basic aims of traffic management are to identify the problematic areas and set up an appropriated regulation in order to ensure a relatively free flow. On a global scale, tremendous progress have been made in transportation techniques and engineering in the last decade, implying the use of new and more flexible traffic devices, software systems, computer hardware, communication and surveillance technologies, and modern analysis methods²⁷. But in the case of Kabul city as a post war city the traffic regulation system is not up to date although efforts have been made by the government (Ministry of Interior) and international supporters in the last eight years. An efficient urban transportation system in Kabul City requires not only a strong organizational and technical transport infrastructure, but also a better administrative system.

5.1 Traffic Police-Tasks and Challenges-A historical perspective

In the period of *Abdur Rahman Khan* (1890), besides transferring the royal palace from old Kabul City (*Bala Hisar*) to the new royal palace in new Kabul (*Arg*), some other buildings were built for governmental purposes such as the *Bagh-e-Bala* palace, the *Chelseton* palace, the *Bagh-e-Babur* palace, the *Mhtaab Qala*, the *Bustaan Sarai* building, the *Qala-e-Fatoh* and the *Qala-e-Hashem Khan*. At that time new roads were built to connect these places to the nearby area of Kabul such as the Paghman valley and *Gulbagh* (see map 2.1). These narrow and bad conditioned roads were used by Kabul citizens as well as for transferring goods by animals (camel, horse, and donkey), which is still common.

²⁷<http://www.fhwa.dot.gov/tfhrc/safety/tms.htm> 20.07.2010

In the period of King *Hbibulah Khan* (1900 - 1918) road traffic slowly developed and for the first time two cars and a few couches, carriages and bicycles were imported from British India to Kabul, used only by the King and his relatives (SADID 1976b). After that the number of diesel cars increased in the country day by day and traffic regulations and managements were in place, traffic improved, not only in Kabul but also extended to other cities in Afghanistan (GENERAL TRAFFIC OFFICE OF AFGHANISTAN 2009).

Since the municipality of Kabul (*Baladia*) was responsible for the managing, maintaining and construction of roads consequently in 1926, traffic arrangements were included in the principles of the municipality. Moreover, regulations for the permission of cars as well as ticket purchasing were added to the traffic arrangement. In 1927, the municipality of Kabul introduced new regulations for traffic, including driver licenses and permissions from the *Baladia* and an annual tax for vehicles (including cars, carriages drawn by animals and palanquins). The subject of traffic took a significant role in the government because of the development of goods exchange with the neighboring countries and regions since 1929; hence the traffic office was placed under the supervision of the Department of Transportation which was controlled directly by prime ministry. In 1946 the traffic office was transferred again from the Department of Transportation to the municipality of Kabul. Both, the municipality of Kabul and the traffic office, decided to convert left hand driving to right hand driving and since 1950 the rule of right hand driving followed (General Traffic Office of Afghanistan 2009).

In 1963 the Traffic Office was separated from the municipality of Kabul and joined with the General Directory of Police at the Ministry of Interior. For the first time, the Department of Traffic was established as the Central Traffic Office. During this time other regional traffic offices such as the Herat Traffic Office and the *Mazar-e-Sharif* Traffic Office were established as well. These regional offices were placed under the supervision and control of the Central Traffic Office (General Traffic Office of Afghanistan 2009).

In 1968 Afghanistan participated in the Geneva International Traffic Convention and accepted the International Traffic Law. In 1973 the Central Traffic Office was promoted to the General Traffic Office and was developed and improved professionally. For instance the Department of Traffic was established at the Police Academy and the graduated students were employed as professional employees. Since then the International Traffic Law has been followed (General Traffic Office of Afghanistan 2009).

Unfortunately during the civil war (1990 - 2000) additionally to destructions in all affairs, the Traffic Office (Kabul Traffic Office) faced multiple challenges.

5.2 The organization of the “Kabul Traffic Office”

5.2.1 Losing professional Employees and the Employment of Non-professionals

During the recent administrative reform process of the government of Afghanistan not all institutions got benefits. Some, like the Kabul Traffic Office lost their experts and professional employees. Before 2005 the Kabul Traffic Office had 750 professional employees that had graduated from the Police Academy with a Diploma. But unfortunately the reforming process decline the number of the professional employees at the Kabul Traffic Office and limited to 250 which means the Kabul Traffic Office lost 500 of its professional employees (Appendix 3, interview 10).

As mentioned in chapter 3, about 428615 (table 3.7) vehicles in Kabul City are existing and raising the question how these 250 professional traffic police officers can manage this amount of vehicles in the city. Is it possible for them to do both, administrative tasks and controls the vehicles on the roads, especially if there are neither traffic lights nor signs? In addition to that more than 100 customers daily go to the traffic office for different purposes (permission for vehicles, license, paying annual tax and vehicle registration). They sometimes have to wait for several days because of the lack of employees at the Traffic Office and the customer rush. An interviewed customer (*Najibulah*) who wanted to pay the annual tax and renew his car's revolve permission card (*Jawaz e sayr*). He said “today is my third day that I came here but unfortunately I was not able to get the revolving permission card for my car. You can see here is lot of rush of people and only few traffic police. They waste customers' time” (*Najibulah*, Appendix 3, interview 11). This situation is quite well illustrated in photo 5.1.

The Kabul Traffic Office received 800 soldiers and 250 agreement workers. *Sardar Mohamad* head of the Department of Planning of the Kabul Traffic Office says: “Most of

these soldiers are analphabets. They don't know how to check driving documents, how to control and manage roads traffic, how to deal with drivers, how and when charge the driver if he broke traffic rules and so on" (Appendix 3, interview 10). Drivers complain about corruption and that traffic police officers ask them for bribe and that people are suffering from them, when he was asked about corruption. He said that he agreed and added that an alphabetic soldier who does not know the rules and regulations cannot perform his job efficiently.

5. 2. 2 Administrative Challenges and Problems at the Kabul Traffic Office

The lack of professional employees at the Kabul Traffic Office creates lot of challenges in the administrative affairs in this organization. The employment of 250 non-professional agreement workers that are responsible for the administrative affairs such as permission for vehicles, registration of vehicles, taking annual tax, issuing license and revoke permission cards has not improved the administrative affairs of the Kabul Traffic Office. They are not well educated and have no experience with the new technologies. It means they are still working with analog systems which take a long time and which are very complicated (photos 5.1).



Photo 5.1: Analog issuing vehicles revoke permission card system at the Kabul Traffic Office (Source: photo: NOORI 2008).

5.3 Traffic Department at the Police Academy

The Police Academy was established in 1963 and had three departments: Department of Security, Criminal Affairs and Traffic. Each department had its own curricula and students graduated from the different fields mentioned above (M. BARAT, appendix 3 interview 12). After the Bonn Accord in 2002, Germany has lead responsibility for the Afghan National Police training program (DITTMANN 2004b, cited in AREZ 2005, p. 137) and academic reconstruction (DITTMANN et al. 2007). “Since reopening in August 2002, the Police Academy in Kabul [decided to merge these three departments and] has provided training, room and board and medical care in its own health centre for police cadets from every Afghan province. More than 4,850 cadets have already graduated from the Academy and another 1,350 are currently enrolled. In August 2005 the first police officers (Saran) were appointed after a three-year study course at the Police Academy and deployed at the advice of Germany as police commanders of the new generation in key positions within the police force, the border police force and the Interior Ministry” (FEDEERRAL MINISTRY OF THE INTERIOR, GERMANY 2007).

US Department of Defense News about war and terrorism has written in an article: “the new officers will be assigned to the different police divisions within the Afghan National Police. In the next few weeks they will head their new assignments as border police, traffic police, uniform police, highway police or the standby force” (BROWN 2005). All these four kinds of police officers study the same curricula (table 5.1) but with different tasks:

Major Subjects
1. Criminology
2. Sociology
3. Criminalistic in Police
4. Police Operation
5. Police Tactic
6. Police Law
7. Computer
8. Criminal Psychology
9. Technique of Weapon

10. Combat Tactic
11. Principles of Law
12. Constitutional Law
13. Civil Law
14. Detection and prosecution
15. Traffic
16. Penal Code
17. Military Training
Minor subjects
18. Logistic
19. Topography
20. Human Rights
21. Telecommunication
22. Fire quench
23. Language (English/German)

Table 5.1: Curricula of Police Academy for six Semesters (three years). (Source: interview with M. BARAT 2008, Appendix 3, interview 12).

There is only one subject on traffic which is taught 206 hours in six semesters (each hour is 50 minutes), although the traffic department had more subjects before and it graduated professional traffic police officers (Appendix 3, interview 10).

Within seven years (2002-2009), Afghan police was trained. The Federal German Ministry of the Interior commented on Afghanistan police training as follow:

In addition, more than 14,000 police officers have received advanced training. The following short-term training courses are listed here by way of example (FEDEERRAL MINISTRY OF THE INTERIOR, GERMANY 2007):

- training for the public order police,
- basic and advanced training courses for the “Quick Reaction Force“, a special task force of the Afghan border police,
- training of the border police reserve companies,
- training of flight passenger control staff at Kabul International Airport,

- basic training courses for police officers on active duty, carried out in co-operation with the military police of the German Armed Forces in the northern provinces,
- Tactical trainings/trainings for multipliers, i. e. teachers at the Police Academy.

Besides training Afghan National Police (ANF) Germany launched some construction and reconstruction projects as well. Below is the list which the federal Ministry of the Interior of Germany has mentioned in its report:

The following recent projects of the German Police Project Office are listed by way of example (FEDEERRAL MINISTRY OF THE INTERIOR, GERMANY 2007):

- Building an additional training facility for the senior police service at the Police Academy (€ 750,000),
- Building a training facility for the counter-narcotics police (€ 695,000),
- Building the traffic police headquarters in Kabul funded by Qatar (USD 1,000,000),
- Supplying the traffic police in the northern provinces with equipment (€ 50,000),
- Supplying Mazar-e Sharif Airport with aviation security equipment (€ 100,000),
- Supplying the Kabul Police Academy with a bus to replace the bus destroyed during an attack against police instructors and cadets on 17 June 2007 (€ 64,000).

It seems that lot of money has been spent for police training, but in the case of the traffic police it was only spent on the construction and reconstruction of the buildings and not on training and improving professional traffic police. Despite these promises it should be mentioned that only half of the building of the Kabul Traffic Office has been reconstructed to date.

Other challenges are the lack of academic staff at the Department of Traffic of the Police Academy and an outdated analog teaching system and preparation of teaching materials. The Traffic Department at the Police Academy in Kabul consists of eight members with

lower academic degrees. General *M. Barat* is the head of the department and has a diploma from the Traffic Department at the Police Academy. His scientific degree is Pohanyar²⁸. Sometimes they ask for experts and academic staff from the Kabul Polytechnique Institute and Kabul University for teaching at the Traffic Department but unfortunately they get negative answer from them, said General M. BARAT (Appendix 3, interview11). “According to German sources two major problems are present – a lack of infrastructure and a lack of professionalism. They say that the majority of the police officers lack adequate training and often even basic education” (KOHISTANI 2006). Under the German responsibility in both National Development Program and National Security Program 96 million Euros (12 million each year) (Federal Ministry of the Interior) have been spent only for training of the Afghan National Police since 2003. Although lots of money has been spent on the reconstruction and training of police within seven years (2002-2010), still no improvements and no developments have been made in the field of traffic. The Department of Traffic at the Police Academy as the only origin of graduating professional traffic is still suffering of the lack of scientific staffs.

The Traffic Department has no published materials or brochures except some posters which are drafted by hand. Of course there are materials and posters, but they are published by the General Traffic Office. For instance the book that is shown in photo 5.2 was written by AHMAD ALI AHMADYAR, the head of the General Traffic Office between 1989-1991 and republished by SHOKOR KHAIRKHWAWA, the head of the General Traffic Office in 2007(M. FHAIM head of the Department of Education of General Traffic Office, Appendix 3, interview 13). The book explains the traffic regulation for motorized and non motorized vehicles, pedestrian and animals which are used as transportation means and some rules of punishment for offenders according to the Afghanistan Traffic law. The author made effort that the book should be a good guide for those who want to make a driving license, so explaining traffic signs, pictograms and traffic lights.

²⁸ In Afghanistan there are 6 scientific degrees 1. pohyalai, 2. pohanyar, 3. pohanmal, 4. pohandoi, 5. pohanwal, 6. pohand, it begins with pohyalai and an academic member should write a book in 3 years then s/he is able to promote to the next step till pohand

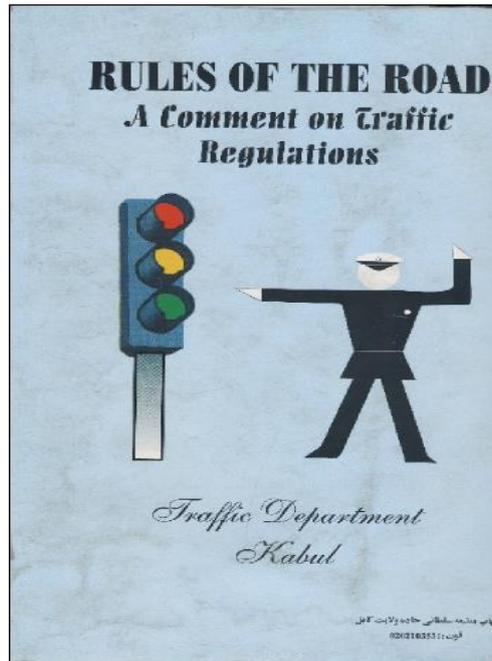


Photo 5.2: Traffic regulation book republished by the Kabul General Traffic Office (2007). Source: (photo: NOORI 2009).

5.4 Traffic Signage and Road Arrangement

The signage system in Kabul city was not developed and still little work has been done. Until 1990 only few intersections and roads in the city center and *Shar-e-Naw* area were designed with traffic lights and signs, but after that the signage system was completely destroyed by civil war (1991-1995). In 2008 the Kabul Traffic Office made efforts to reinstall the traffic lights and signs. Nowadays only 40 intersections are designed with traffic lights, so some of the crowded intersections in the city center and adjacent to the major active places are arranged by two or three traffic police men. According to the lack of professional staff at Kabul Traffic Office most of the intersections are controlled neither by traffic police nor traffic lights.

The Kabul Traffic Office blocked some of the main roads because of security reasons (terrorist and opposition attacks). Roads blocking results pressure on other roads which have no sufficient capacity.

The main road which connects Pashtunistan Intersection to the Ahmadshah Masod Intersection and cross presidential palace (*Arg*) and USA Embassy is completely blocked. Travelers who want to go to the middle and east section of the north east part of Kabul City

from the north section of north east part of Kabul City have to either cross the city center or Ahmadshah Masoud Intersection or Kabul City north ring road which is far away and take long time (map 5.1). To solve this problem the Kabul Traffic Office made a decision to convert many roads to one way road in the city center. This action causes another problem rather than being a solution.

The Kabul Traffic Office in the case of road arrangement is not dependent. A commission in the Ministry of Interior which consists of members from the Ministry of Transport, Ministry of Interior, Kabul Traffic Office, Kabul Municipality and National Security Office makes the final decision for road arrangement (Appendix 3, interview 10). It is not clear if they make the decisions based on some accumulated data or these are experimental decisions or they consider only security reasons.



Map 5.1: Blocked and one way roads in the north east part of Kabul City. Source: Institute of Geography of Uni. Giessen, information: field research (NOORI 2009).

6 Analyzing the Existing Transportation System and Demand

Beside the lack of technical implementation four groups of non-technical barriers are identified which impede the development of urban transportation system: 1) political 2) policy-related 3) economic and 4) social barriers (BROWN 2005). “There is in many cases a lack of political will to take the necessary and in most cases difficult actions required for successful implementation of transport-related projects” (BROWN 2005, p. 201). This unwillingness of the government paves the way for an informal transportation system which causes problems for the urban traffic. Also the lack of a transport development plan (policy-related), skilled individuals and educational program obstruct the transportation development processes. The non-technical barriers are mostly related to the organizational and administrative transportation infrastructure.

Because of the rapid growth in number of vehicles in the world, urban transportation faces many problems such as traffic congestion, air pollution, peak-hour crowding on public transportation, off-peak inadequacy of public transportation, accidents, parking and pedestrian difficulties. According to the city structure, transportation infrastructure, population number and economic situation different cities may experience these problems at different levels, so diverse approaches are used to meet the problems. In London the peak hour speed is 16 km/hr, however in Bangkok it is under 10 km/hr (LO et al. 1996). “In Tokyo the metro rail system employs ‘pushers’ to ensure that passengers are forced into train to allow the automatic doors to close” (PACIONE 2008, p. 268). Both developed and developing countries try to organize their transportation system by applying variable strategies and approaches such as transportation management (public transit upgrading, scheduling and bus priority, road pricing and restriction of cars and technical transportation infrastructure development) and mobility management.

6.1 Negative Effects of City Sprawling on the Transportation System

“The unplanned manner of urban expansion also makes it difficult to organize a cost-effective public transport service” (PECIONE 2008, p. 581). Although the low cost of

housing is a response to poverty and helps upgrade the economy of the Kabul citizens, the negative effects of unplanned housing (sprawling of the city) and rapid population growth can be seen at any level of the urban life especially in the transportation system. For instance the appearance of secondary markets (as a result of the sprawling of the city) on the borders between planned and unplanned areas cause disturbances in the regular transportation system. Acting as major activity centers, they attract a great number of visitors. But since they are not being served by the public transportation, people are induced to use informal means of transportation, thus disrupting the daily traffic by increasing the number of vehicles on roads. Still one undeniable advantage of this phenomenon is that it helps reduce the number of private trips to the city center, and thus alleviating traffic congestions. But in general, as most of the outlying business centers depend on the CBD for their supplies, trips to the city center for business purposes increase. The main negative effects which derive from the urban sprawling and rapid population growth that have been known as the major challenges for the urban transportation system are listed as follows:

Overloading of the public transportation system and decrease of its capacity causing:

- Increase of car ownership,
- Increase of informal transportation (paratransit) operation,
- Longer commute and Increase of average trip mileage.

Additionally disarrangement in the land use impedes the traffic flow. For instance Kabul City has only one vegetable market which is located in the north east part of the city. This market supplies vegetable and fruit for four million people. Roads leading to the market are always crowded. Another example is the school supplies markets which is located in the city center with the same crowded road conditions. Also the wood market in the south part of Kabul City faces the same problems (map 2.3).

6.2 Negative Effects of Multiple Ethno Linguistic Structure of the City

Moreover the multiple ethnic structure of the city implies that each part of the city belongs to a specific ethnic group (mostly in unplanned areas). Thus the transportation system is monopolized by each ethnic group in their region. Due to the informal monopolization

most of the unprofitable routes are covered neither by public nor by private transport. This phenomenon has breached to the commercial environment as well. For instance the wood is transferred from the south east and east part of the country where the Pashtuns are a majority. Thus the wood market has been built in their region. Also in Kabul City there is only one vegetable and fruit market where the Tajiks are a majority.

Besides, culturally women are not allowed to ride bicycle, motorcycle (fig. 6.1) and sit next to a man. This behavior results in using motorized vehicles especially public transit. Figures 6.2 and 6.3 illustrate that women are using more public transport than the men.

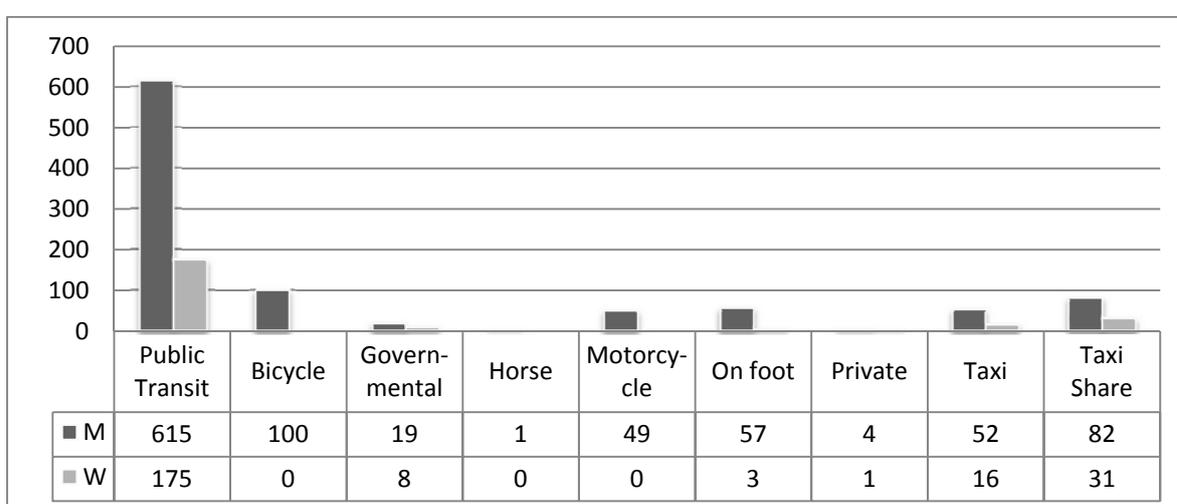


Figure 6.1: Module split in Kabul City (source: field research 2009, Appendix 3, Questionnaire).

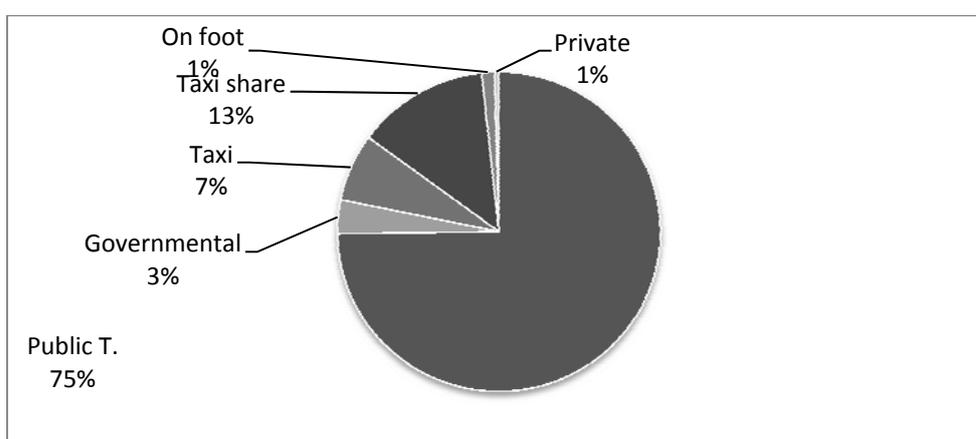


Figure 6.2: Module split using by women (Source: field research 2009, Appendix 3, Questionnaire).

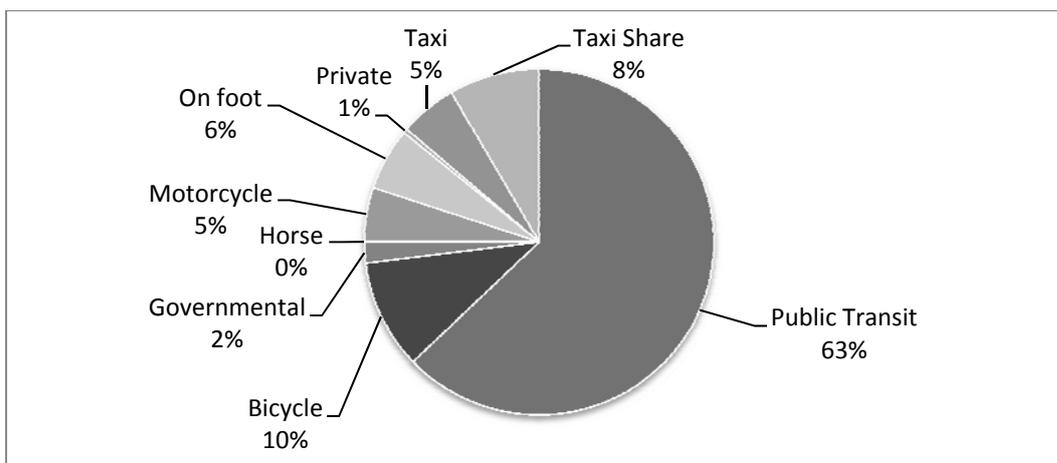


Figure 6.3: Module split using by men (Source: field research 2009, Appendix 3, Questionnaire).

6.3 Deficiencies of the organizational Urban Transportation Infrastructure

Kabul City as a post war city faces a lack of fleet operation modes (buses). Only a few buses are operating which is insufficient with regard to the expectations of the citizens of a State capital. “In the absence of organized public transport systems dependence on paratransit (cycle rickshaws and three-wheelers) increases” (TIWARI 2005, p. 151). As shown in table 3.11 only a few buses are imported to Afghanistan. Due to the higher prices of buses (20000-40000 US Dollar) and the low income of the inhabitants, people prefer to buy minibuses rather than big capacity buses. Besides, the insufficient operational capacity of the governmental and private-public transportation leads to an increase of individual transportation system (paratransit) as well as the number of car ownership (43.8 percent increase from 2006 until 2009 (see table 3.7), 60 cars per 1000 inhabitants in 2007). This increase is a cause rather than a solution to the transportation system’s problems. As shown in (fig. 6.4) the increase of car ownership has been allowed by the rising of incomes. Besides, in the case of Kabul City many other factors are involved, such as the lack of fleet operation means and their insufficient activity (more detail in chapter 3).

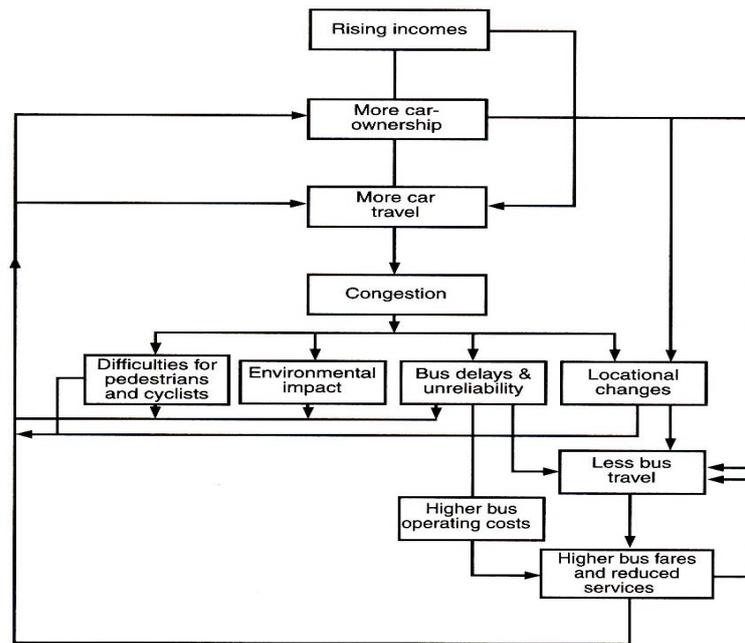


Fig. 6.4: Traffic collapse-mechanism (Source: PACIONE 2008).

As shown in fig. 6.4, more car trips indirectly implies less bus travels, which leads to a vicious circle resulting in traffic congestion. This mechanism functions vice versa as well. The mutual relation between these transportation means can be seen in the morning peak hours in Kabul City. The number of buses decreases while the number of cars is high between 08:00-09:00. On the other hand the number of buses increases when the number of cars declines between 09:00-10:00 (fig. 6.5).

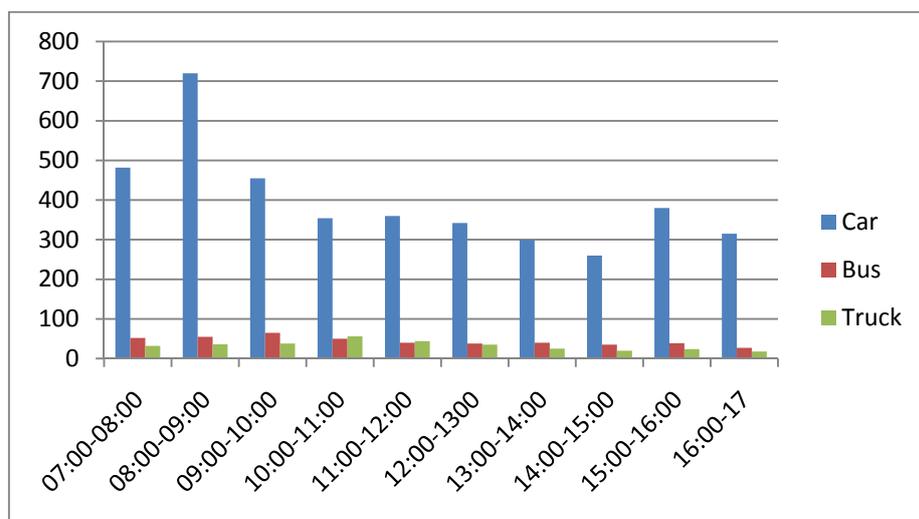


Fig. 6.5: Traffic circulation (peak and off peak) in Kabul City (Source: field work 2007, Appendix 2, table 1-7).

The major factors that lead to decrease the operational capacity of the governmental bus company (Millie Bus) are listed as follows:

Organizational problems

- Leasing governmental buses to the drivers (half ownership system)
- Renting public buses (Millie Bus) to the governmental institutions (ministries and departments) as charter buses

Technical problems

- Lack of professional drivers²⁹ (150 buses have no drivers)
- Lack of equipped technical workshops and engineers
- Lack of big capacity buses (more than 32 seats)

Administrative problems

As mentioned earlier the authorities of public transportation have less control on the public transit (governmental and public private collaboration). For instance the bus lines are designed as a radial system or star model (Appendix 1, map 1) although the city has a raster transportation road network. Moreover the unprofitable routes are not covered by public-private transportation. In these routes the Millie Bus operates reluctantly since the buses have been leased to the drivers. Besides, there are some other problems to be considered:

- No subsidy system, although the Millie Bus company obtains fuel from the government at lower cost than on the free market.
- Lack of operational schedule
- Poor maintenance of buses³⁰
- Traditional revenue collecting system and ticket purchasing³¹
- Analog system of dispatching buses for operation
- Lack of information for the passengers through brochures and bus lines maps

Operational deficiencies

- Low availability of buses (coefficient of availability 0.7)

²⁹ Most of the professional bus drivers quit the governmental job and joined to the free markets or NGOs. (Ministry of Transportation, 1st Issue 2007, p. 23)

³⁰ Since almost all the Millie Bus drivers are young and have less experience of bus maintenance and driving, most of the new buses (six years old) are damaged due to the poor maintenance and accidents (field work, 2009).

³¹ Each bus has a conductor for collecting the fare, so there is no ticket purchasing system

- Run and off operation system (The buses wait at the bus terminals until all the seats are taken).

The private sector department of the Ministry of Transportation is responsible for issuing licenses and determining the operational lines for the bus companies (see table 3.7). But the bus companies are self administered and determine themselves the lines they will operate on (profitable lines). There is no control whether the bus companies operate properly or not. Also its management system is not up-to-date and does not work properly, and is not adapted to the present needs of the city. Following are the challenges that the private sector department faces.

- Lack of control on private registered bus companies
- Lack of operational schedule for private registered bus companies
- Lack of professional administrative staff
- Lack of cooperation with Millie Bus company
- Lack of efforts to encourage informal transport (parataransit) to join the system

The deficiencies pointed out cause the following challenges:

- Decline of bus ridership
- Increase in use of private and IPT modes (fig. 6.5)
- Increase in traffic congestion
- Further decline in bus speeds and increase of trip duration (travel time)

6.4 Deficiencies of Technical Urban Transportation Infrastructure

60 percent of the asphalted roads covering only 30 percent of the city transportation network are destroyed. There are many factors in the destruction of roads such as lack of maintenance, the poor quality of material and overloaded or heavy vehicles. Lack of geomorphologic knowledge of the area is another reason behind the destruction of roads. For instance, roads in *Taimani* and *Chaman-e-Babarak* (from Parwan-e-Se until Lab-e-Jar and from *Tahya-e-Maskan* until *Sabeqa-e-Kolola Poshta*) are located in a swamp area. This area swells (moisture expansion) during the rainy season and shrinks in the dry

season. Hence most of the new constructed roads (2008) were destroyed due to this natural process after a year (field research 2009).

As for the road junctions all of the existing intersections are at one level or at-grade³² (see map 4.1). Some of the junctions because of their at-grade situation cause traffic jam. Intersections at the edges of the city where the provincial highways with heavy traffic (table 6.1) join the city transportation network disrupt the traffic.

Station 09.04.2009	Motor cycle	Tractor	Passenger cars	Mini buses	Buses	Small Trucks	Big Trucks	Military Vehicles	Total
Kotal Khairkhana	761	95	15093	8064	443	1224	1080	20	26780
Pul-e- Charkhi	39	17	2940	1363	26	817	603	38	5843

Table 6.1: Number of daily traffic on provincial roads, which join to the city network (Source: Ministry of Public Works 2010).

Moreover, the poor condition of the footpaths compels the pedestrians to walk on the road. Most of the pavement of the footpaths is destroyed in the city center and the footpaths out of the city center are not paved at all and not used by the pedestrians especially in winter. Also many foot paths become narrow due to the construction of defensive walls around the governmental buildings. Therefore most of the time pedestrian walk on the roads.

Another factor of the traffic disruption (traffic jam and increasing mileage of trip) arises from the topographical situation of Kabul, being separated in the middle by central mountains. The two parts of the city are connected only by two main roads (see map 2.5), which is insufficient with regard to the existing 428615 vehicles (see table 3.7) and number of vehicle trips (fig. 6.5).

Also the connection of the transportation network on both sides of the central mountains separated by the rivers is not well planned. As seen on the map (see map 2.5), most of the bridges were built at a small distance from one another in the city center but toward the outskirts the number of bridges decreases, therefore increasing the mileage of trips and the number of vehicles on the routes connected by the bridges. Besides, most of the vehicular bridges are not wide enough.

³² An at-grade intersection is a junction at which two or more transport axes cross at the same level.

The lack of parking places, bus terminals and bus stops also sets major problems. The problem of double parking on road sides is the consequence of the lack of parking places. On the other hand parking places encourage private car trips and decrease the public transportation demand (fig. 6.6), thus causing traffic congestion (SHAHIN, 2001). But in Kabul City where the public transportation is not able to meet the demands if the private car trips decline, there is a risk of overloaded public transit. Besides, the occupancy of road sides by IPT and buses as parking places, bus terminals and bus stops is another challenge to the normal traffic circulation. In addition the long distance between bus terminals in the city center with no public transit connection is troublesome for the citizens (see map 3.2). The city center as the most congested area badly suffers from these phenomena.

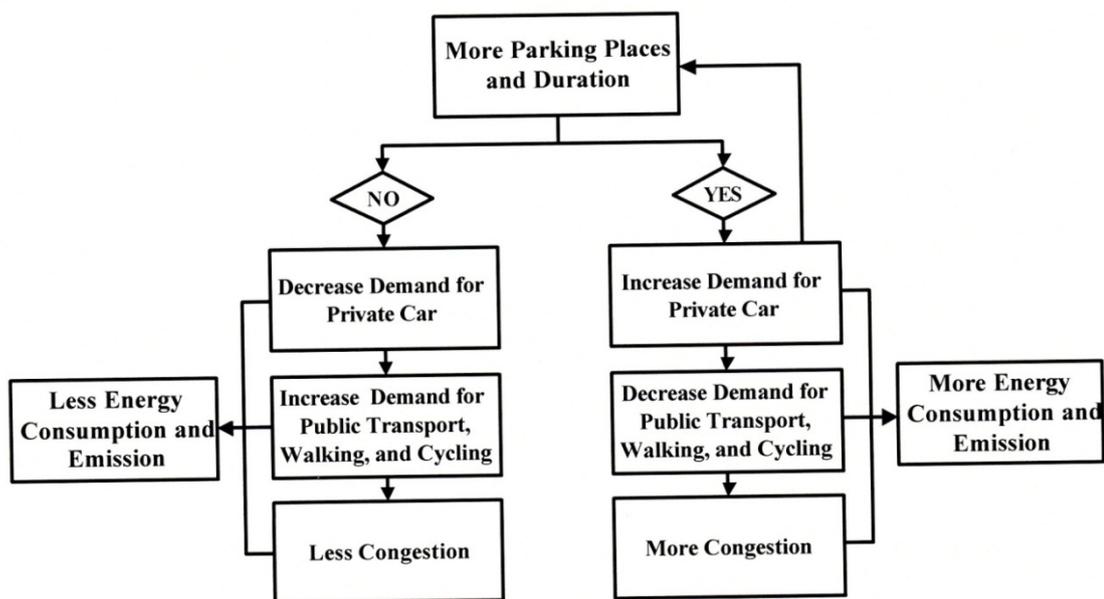


Fig. 6.6: Parking regulation and its effect on private car travel. Source: SHAHIN (2001, p. 30)

The deficiencies in technical urban transportation infrastructure cause the following problems:

- Traffic congestion
- Increase of reaching time
- Public space occupancy
- Increase of the mileage of the journey

6.5 Deficiencies of Administrative Urban Transport Infrastructure

An efficient public transport and traffic management plays an important role in the urban transportation. Of course its inefficiency has negative effects on the traffic circulation. Originally the base of an efficient transportation administration and traffic management is the knowledge and proficiency in this field that upgrade the whole transportation system. The Kabul City traffic circulation suffers from the ineffective transportation and traffic management which derive from the lack of professional staff. As mentioned in chapter five the Police Academy is the only Academic institution that trains professional traffic police, but it has neither qualified scholars nor an efficient educational curricula. Also most of the graduated students from the universities who have a more or less adequate knowledge in this field³³ have not been hired in the right positions because of the ineffective distribution of the Ministry of Labor and social affairs (KOHISTANI 2006).

Moreover, the heavy presence of hawkers, small mobile shops, pedestrians, and the occupancy of roads by parking cars and bus terminals aggravate the road condition. The commission (see chapter 5. 3), which is responsible for traffic management made efforts to manage and upgrade the state of the roads. They force them to leave the roads rather than provide facilities (place) for them to continue their business. But when the controller³⁴ is gone they appear again on the roads.

The lack of traffic signs, traffic sensors and lane separator lines as the technical part of the traffic management is another factor that disorders the traffic flow. Most of the intersections that are known as the major crash happening places have neither traffic lights nor signs. Almost all the roads have no separation line and no pedestrian crossing sign. All of the phenomena mentioned above result in one point: traffic congestion. Unless ameliorated, they will cause the following negative effects (fig. 6.7):

- Increase of the reaching time (travel time)
- Fuel consumption
- Air pollution

³³ Urban planning taught at the faculty of Engineering and Urban Geography and Transportation Geography at the faculty of Geosciences of Kabul University.

³⁴ As the commission consists of many institutions the controller can be a police officer, a traffic police or a member of Kabul municipality.

- Occupancy of public space
- Increase of accidents

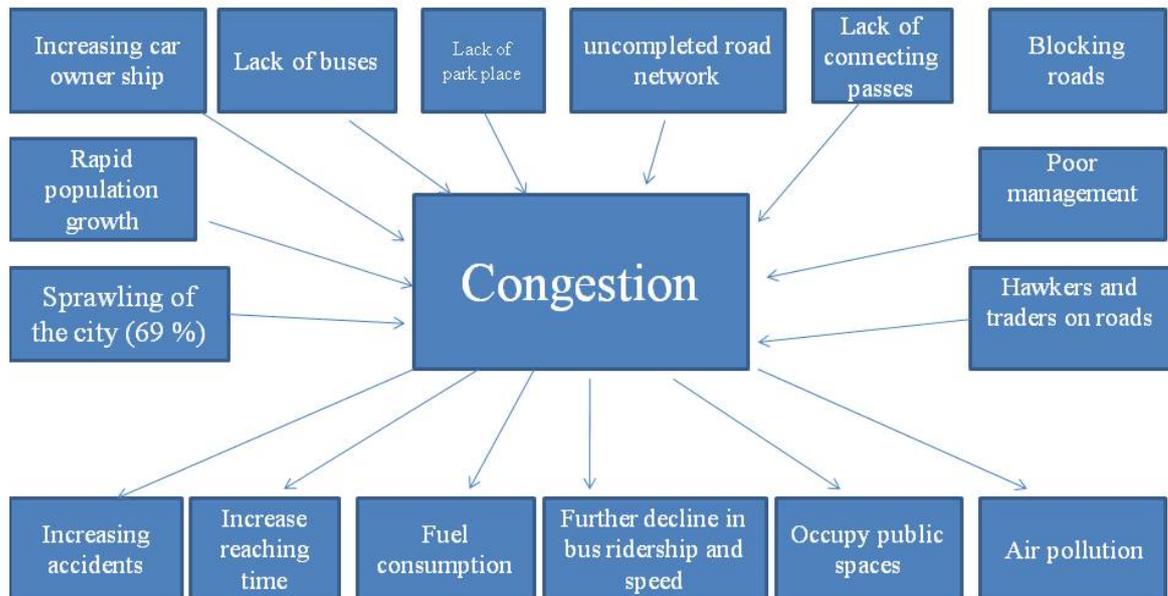


Fig. 6.7: The consequence of negative effects of transportation system (Source: own draft, NOORI 2010).

6.6 Forecasting Traffic Demands

Studying travel demand is one of the important issues for transport management. The components that quantify the transport demand are population growth, socio demographic factors, settlement patterns, economic opportunity, employment, spatial distribution of activities and social services³⁵ (NANTULYA et al. 2005). Because of the lack of data it

³⁵ Work, work related, attending school, other school activities, quick stop, shopping, visit friends, personal business, eat meal outside of home, entertainment, civic or religious, pick up or drop passengers, with another person with their activities, at home activities.

was difficult and not possible to do a comprehensive survey to forecast the transportation demand in Kabul City. But efforts are made to use the available data.

The field work which was done in the purpose of estimating the peak-hour shows that about 4,500 buses (bus operation) with the capacity of 50 passengers per bus, 70,000 passenger cars with the capacity 5 passengers and 2,000 trucks with the capacity of two passengers per truck come to the city center in a day (appendix 2, table 1-7). The data imply that the transportation means transfer 579000 passengers to the city center daily. If we include the return trips this number is doubled and reaches more than one million trips only to and from the city center per day. The survey in the city center (2009) implies that half of the travels are done in the purpose of work (table 6.2). According to the monthly income of Kabul inhabitants (table 2.3) it is clear that most of the inhabitants work and the number of trips expected to be higher than the estimated number. If a comprehensive survey is done through over the city the number of daily trips increases fivefold.

Travel reason	Number of interviewed people	Percentage
Work	600	49,4
Shoping	349	28,7
Study	158	13
Free time	106	8,8

Table 6.2: Travel Reasons in Kabul City (Source: field research 2009, appendix 3, Questionnaire).

As an efficient transportation system supports the economic growth and urban development process, it is important to improve the urban transportation infrastructures. To provide efficient transportation facilities with regard to the demand, there are some important approaches that the following chapter shows.

According to the estimated data, the daily trip per person in Hyderabad is 1.46 trips. In addition the number of daily trip per person per day in developed cities (German cities) is 3.4 trips (FOLLMER et al. 2008). Regarding the population growth in Kabul City (150000 people per year) it is predictable that the daily trips will increase. This means there is a significant need for mass transit system which is really in poor condition at the moment. If

the mass transit system is not improved it will lead to an increase in car ownerships and will aggravate the traffic problem even more.

7. **Conclusion**

Scientific research aims to solve problems and increase the welfare for human societies. The research on urban traffic collapse in Kabul City aims to contribute to this target. Kabul city as a post war city started the reconstruction of its transportation system from scratch and faces a lot of challenges. The goal of this research is to identify the problems, the origin where the problem emanates from as well as to use geographic knowledge and experience and certain other scientific approaches for solving the problems and improving the transportation system of Kabul City.

The steps which have been taken during the research process are based on a scientific strategy for developing cities. The strategy starts with studying the characteristics of the city (urban structure and functions), its population (social integration and economical status) and the current transportation system.

The strategy studies the characteristics of Kabul City regarding the establishment and development factors shaped by history. The second step analyzes the transportation system which has been divided into organizational, technical and administrative transport infrastructure. Moreover efforts are made to search for scenarios and approaches which are appropriate for the structure of Kabul City.

Of course the research process faced some problems as each scientific approach does. The lack of data and sources are the main difficulties. Referring to the population number different sources issued a variety of numbers which make the analyzing process difficult. Security challenges (terrorist attacks against governmental employees) and the sensitivity of the people during the field work did not give the opportunity to perform a comprehensive survey to find the transportation demand. Thus to estimate the transportation demand the survey has been done only in the city center.

The research that has been done about Kabul City characteristics realized that the city resembles the bipolar model (modern and ancient urban structure) with radial transportation routes. But there are some variations that make the city different from the ideal bipolar model. These variations are that the ancient city center (Islamic City model) developed beside the modern core of the city which illustrates the city as a semi-bipolar model. This is why the ancient center is still a place where the transportation routes are emanated. Beside this structure the topography of the city (existence of mountains and hills) is another reason that makes the city ill suited for a raster structure.

All the factors that are mentioned about the Kabul City structure illustrate that a radial transportation network is functioning best rather than the raster and the parallel system.

The results about the population and their income organizational, technical and administrative transportation infrastructure realized that the city is unable to develop a new transportation infrastructure such as rail and tram way thus the attention is focused on improving existing infrastructure which is not so costly. The results achieved by studying the organizational transport infrastructure of the city shows that the transportation system does not function properly. Because of the absence of public transit the city transportation system is monopolized by informal transport (paratranist) which is costly and a major element of traffic congestion. The unfulfilled road network master plan is another cause of traffic congestion beside the inefficient administration. Thus attention should focus on existing transport infrastructures such as public transit which is not as costly and helps reducing congestion.

Improving mass transit (bus operation) is used worldwide especially in developing cities to reduce traffic congestion and improve urban mobility and economy. This approach is also appropriate for the cities which are unable to pay the high capital cost of new construction regardless of their road network whether it is raster, radial or parallel. To improve public transit there are some approaches that mentioned as follows:

1. Technical infrastructure improvement

- Bus way and lane construction (direct and feeder lines): in Kabul City each bus is able to operate eight round trips per day based on official estimation. If the bus has a separate way a bus is able to operate 24 round trips with 50 km/h standard speed in the urban area and with one minute dwell time at each bus stop (20 bus stops)

during the day (16 hours) on 40 km single and return trip. This strategy increases the operational capacity of a bus threefold. Moreover the catchment area of feeder lines should be defined based on honeycomb model to make the transportation services accessible for each region.

- Bus terminals and stops: it avoids using roads as parking place. Also Kabul City has no a central main bus station it would be better to build a central bus station or the existing bus stations which are not connected by any bus line should be connected by a bus line.
- Increasing transportation modes capacity (big capacity buses): it avoids increasing the number of vehicles on road.
- Fulfilling the city road network master plan: this increases the capacity of the road network.

Concerning the construction of bus ways and lanes, it needs a survey to identify where and which routes are fit for construction of such infrastructure. As shown in map 4.1 and table 4.3 the roads are wide enough (except roads No. 19, 20 and 21) to mark ways or lanes as well as direct and feeder lines for buses and paratransit.

Besides, technical infrastructure such as interjections, bridges and parking construction, bicycle ways, foot paths, traffic lights and road separation lines are the elements which improve the urban transportation in general. In Kabul City intersections which join the provincial roads to the city road network are always crowded and should be changed to interjections. For instance *Sarai-e-Shamali* intersection is one of them. Also the intersections should be designed with traffic lights and the roads should be separated by traffic line and defined by traffic signs.

2. Administrative (legislative) infrastructure improvements

- Bus priority at traffic lights: this policy needs new technology which helps the public transportation to be reliable.
- Bus priority when the bus is back from a bus stop after its dwell time into traffic

All these approaches make the fleet operational reliable.

- Improvement of revenue collection process: it supports the quality of operation and maintenance, especially the fleet operation which is performed by governmental public transportation.

- Commercialization of bus lines: the roads in the city as the realms of the city can be profitable. The bus lines should be leased to the private sector but under the control and supervision of the government. The government should control the quality and accessibility of the private companies which are operating on the bus line and defined the link between transportation and economic opportunities for the private sector.

Moreover to improve urban transportation in general the following strategies are suggested:

- Work schedule changes: in the case of Kabul City some ministries should change their work time from 08:00 in summer and 08:30 in winter until 16:00 in summer and 16:30 in winter to 06:00 in summer and 07:00 in winter until 14:00 in the summer and 15:00 in winter (if it is feasible). As mentioned fig. 2.8 about 85100 governmental employees transferred by more than 2500 buses from home to work and home, if the ministries change the work time there would be a reduction of a quite huge number of vehicles (2500 buses) during the morning and afternoon peak-hours. This strategy can be respected by universities and some markets as well.
- Integrated transportation and land use planning: this approach avoids sprawling of the city and also decentralizes the major active places which results in impeding traffic. For instance the wood market, vegetable and fruit markets should be decentralized.
- Parking regulation: in the case of Kabul City most of the parking spaces are leased to the private sectors in very low price although the revenue of these parking is quite high compared to the leasing price. Besides, most of the congested roads are dedicated for parking places. For instance *Jada-e-Maiwand*, *Pashtunistan Wat* and the road in front of the *Shar-e-Naw* pump benzene are the congested roads where the road side parking is allowed. To avoid congestion parking on these roads should be prevented. There are enough places in the city center to provide parking facilities especially the areas (in the city center) that have been destroyed during the civil war.
- Duty and tax: to control the car ownership high tax and duty is an effective policy which reduces the number of cars in the city and results in congestion reduction. This policy is used in many developing and developed cities, but usually requires

action on the regional or national level. Since the Kabul Traffic Office is responsible for charging vehicle taxes they should charge additional charges on the vehicles which are imported to the city.

- Improving traffic police quality and experts: it is clear that good educated experts and traffic police can control the traffic system best. Thus the curricula of the police academy as the unique origin for graduating traffic police should be improved, new subjects such as Urban Geography, Transportation Geography and Geographical Information System (GIS) can be added. These subjects are already taught in other academic institutions and do not need additional cost. Adding new subjects has more advantages. Besides improving traffic police it paves the way for the graduates to work in the free markets not only at the government. Also the Kabul Traffic department should be equipped with new technology beside the improvement of the education system of traffic academy. The new technology helps the registration process of vehicles by upgrading the controlling process. The intelligent transportation system (ITS) is used worldwide and helps reducing traffic congestion and develops traffic control.
- Hawker controlling: hawker controlling can also improve traffic flow. But the question is where they should go. This is the only origin of their income. There are two possibilities to solve this problem: First a specific place should be dedicated for them which is accessible in the city center (the areas that are destroyed during the civil war where still there is no any construction). Second they would be decentralized with dedicated places for them in a local scale.

3. Organizational transport infrastructure improvement

- Joining paratransit to the formal system: This gives an opportunity to the paratransit or in other words participation of private sector in the public transportation. It helps to organize the system in proper way and paves the way for a positive competition between governmental and private transportation systems which results in improved quality, reliability and accessibility. This policy prevents paratransit operation as well as avoids a mismatching transportation system.
- Bus scheduling³⁶

³⁶ Bus scheduling will not be possible unless the bus has a separate lane (bus way) especially in developing cities.

- Information: to inform the public through maps and media helps the people to use the public transportation in a proper way and prevent wasting time.

The approaches mentioned above can be used by the government, scientists who work in this field and other stakeholders.

As it mentioned earlier urban transportation is an interdisciplinary issue, thus more studies are needed from the economical and transportation engineering points of view. As the urban population increases rapidly it is necessary to study more about the transportation system in order to provide better services for the public and meet the demand. This goal can only be achieved by using strategies and approaches of scientific research.

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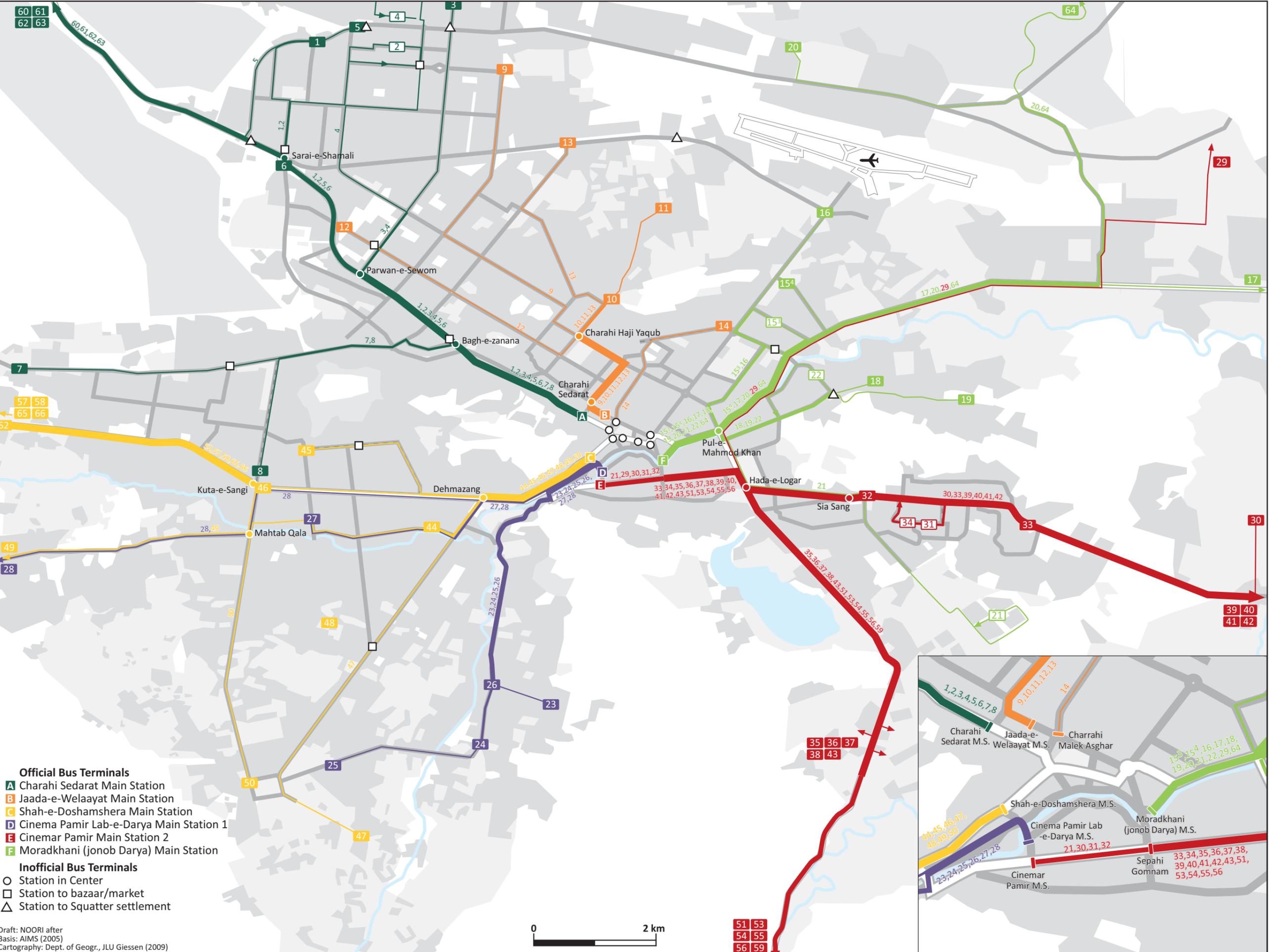
Appendix 1

Map 1: Bus Lines and Bus Terminals (planned and unplanned bus terminals) in Kabul City.

Source: Information Millie Bus company 2008, Based on AIMS map (Kabul City Map 2005). Cartography: Institute of Geography, Uni. Giessen

Kabul city bus lines

- Municipal lines**
- 1 Hesa-e-Awal
- 2 Hesa-e-Dowom
- 3 Hesa-e-Sewom
- 4 Qla-e-Najarha
- 5 Poroja-e-Pannjom
- 6 Deh-e-Kepak
- 7 Qargha
- 8 Mirwais Maidan
- 9 Poroja-e-Taimani Golaye Park
- 10 Qala-e-Fathulah
- 11 Char Qala-e-Wazerabad
- 12 Kolola Poshta Tahya-e-Maskan
- 13 Sarak-e-40 metra-e-Taimani
- 14 Wazir Akbarkhan
- 15³ Microraion-e-Sewon
- 15⁴ Microraion-e-Charom
- 16 Maidan-e-Hawayi
- 17 Tangi Pul-e-Charchi
- 18 Qala-e-Zamankhan
- 19 Dehkhodaydad
- 20 Qasaba-e-Khanasazi
- 21 Sharak-e-Khorasan
- 22 Microraion-e-Awal
- 23 Chehlseton
- 24 Noh Borja-e-Chehlseton
- 25 Dehdana Chehlseton
- 26 Waselabad
- 27 Char Qala-e-Saray Ghazni
- 28 Dasht-e-Brchi
- 29 Sharak-e-Omid e Sabz
- 30 Proja-e-Rahman Baba
- 31 Sar-e-Tapa-e-Rahman Mena
- 32 Masjid-e-Etefaq
- 33 Karta-e-Naw e Nasaji
- 34 Rahman Mena
- 35 Qala-e-Hshmatkhan
- 36 Qala-e-Ahmadkhan
- 37 Qala-e-Hasankhan Shewaki
- 38 Syahbini Welayati
- 39 Qarya-e-Butkhak
- 40 Qarya-e-Hosainkhel
- 41 Qarya-e-Shina
- 42 Qarya-e-Kamari
- 43 Noh Borja-e-Shewaki
- 44 Karta-e-Sewom
- 45 Pohanton
- 46 Mirwais Maidan
- 47 Dehdana-e-Sharif
- 48 Dwazda Emam
- 49 Barchi
- 50 Mirza Abdulqader
- 51 Reshkhoh
- 52 Company
- Provincial lines**
- 53 Woloswali Charasyab
- 54 Mamoza
- 55 Wakh Jan
- 56 Welayat-e-Logar
- 57 Welayat-e-Maidan Wardak
- 58 Kota-e-Ashro
- 59 Woloswali Charasiab
- 60 Woloswali Qarabagh
- 61 Woloswali Mirbachakot
- 62 Woloswali Gul dara
- 63 Hada-e-Shamali
- 64 Padshah Sahab Paymunar
- 65 Paghman
- 66 Paghmn Caster



Appendix 2 (Tables)

Data of Identifying Peak-hours in Kabul City in Seven Stations (7.10.2007)

- **Table 1:** *Dehmazang Station*
- **Table 2:** *Pul-e-Artel Station*
- **Table 3:** *Charahi-e-Malek Asghar Station*
- **Table 4:** *Payan-e-Chawk Station*
- **Table 5:** *Jada-e-Welayat Station*
- **Table 6:** *Pul-e-Mahmod Khan Station*
- **Table 7:** *Charahi-e-Sedarat Station*

Table 1: Dehmazang Station

Hours	Cars	Buses	Trucks
07:00-08:00	1607	56	46
08:00-09:00	2156	149	86
09:00-10:00	2148	82	35
10:00-11:00	1690	98	37
11:00-12:00	1510	52	23
12:00-1300	1443	44	35
13:00-14:00	1750	52	38
14:00-15:00	1815	85	30
15:00-16:00	1590	83	77
16:00-17:00	1320	46	38

Table 2: Pul-e-Artel Station

Hours	Cars	Buses	Trucks
07:00-08:00	482	52	32
08:00-09:00	720	55	36
09:00-10:00	455	65	38
10:00-11:00	354	50	56
11:00-12:00	360	40	44
12:00-13:00	342	38	35
13:00-14:00	300	40	25
14:00-15:00	260	35	20
15:00-16:00	380	39	24
16:00-17:00	315	27	18

Table 3: Charahi-e-Malek Asghar Station

Hours	Cars	Buses	Trucks
07:00-08:00	483	10	3
08:00-09:00	815	32	8
09:00-10:00	690	13	12
10:00-11:00	854	11	5
11:00-12:00	676	9	7
12:00-13:00	650	6	4
13:00-14:00	645	12	5
14:00-15:00	954	27	22
15:00-16:00	816	63	16
16:00-17:00	525	26	9

Table 4: Payan-e-Chawk Station

Hours	Cars	Buses	Trucks
07:00-08:00	987	52	44
08:00-09:00	1678	122	76
09:00-10:00	1556	140	31
10:00-11:00	1380	132	54
11:00-12:00	1469	104	55
12:00-13:00	1236	109	60
13:00-14:00	1367	102	37
14:00-15:00	1672	94	30
15:00-16:00	1125	78	26
16:00-17:00	830	42	24

Table 5: Jada-e-Welayat Station

Hours	Cars	Buses	Trucks
07:00-08:00	932	195	72
08:00-09:00	1153	225	91
09:00-10:00	1280	125	23
10:00-11:00	1387	103	77
11:00-12:00	1027	82	39
12:00-13:00	961	95	34
13:00-14:00	1011	48	56
14:00-15:00	1201	96	23
15:00-16:00	1237	115	47
16:00-17:00	665	70	44

Table 6: Pul-e-Mahmod Khan Station

Hours	Cars	Buses	Trucks
07:00-08:00	790	44	32
08:00-09:00	1463	152	56
09:00-10:00	1756	59	17
10:00-11:00	1585	43	48
11:00-12:00	1463	41	12
12:00-13:00	1172	37	32
13:00-14:00	1537	128	14
14:00-15:00	1427	134	56
15:00-16:00	1122	112	34
16:00-17:00	1134	102	33

Table 7: Charahi-e-Sedarat Station

Hours	Cars	Buses	Trucks
07:00-08:00	794	47	23
08:00-09:00	6650	193	44
09:00-10:00	856	95	69
10:00-11:00	1096	102	54
11:00-12:00	2005	87	12
12:00-13:00	1149	79	41

Table 8: Existing vehicles in Kabul City

Transportation Modes	2006	2007	2008	2009
Pv. Car	167182	184937	202607	240484
Taxis	26661	26661	26677	26761
Trucks	43850	46417	48091	53947
Buses	20299	21134	21755	23560
Motorcycles	12746	13319	13637	14660
Gov. Vehicles	27382	27968	38150	42897
Temporary No. Palte	11123	11349	12131	12131
Gov. & NGOs Vehicles	5425	5589	5947	6367
UN	5179	5454	5651	5977
CD		1439	1607	1831

Appendix 3 (Questionnaire and Interviews)

- **Questionnaire:** Modal Split, Transportation Cost, Travel Reason and Monthly Income
- **Interview 1:** Millie Bus Lines (Municipal and Provincial)
- **Interview 2:** Operational Capacity of Millie Bus company
- **Interview 3:** Governmental Vehicles and Renting Charter Buses
- **Interview 4:** Existing Paratranist (IPT)
- **Interview 5:** Prices of Second Hand Vehicles in the Free Market
- **Interview 6:** Non-motorized Transportation Means (Bicycle)
- **Interview 7:** Vehicle Registration at Kabul Traffic Office
- **Interview 8:** Roads Construction
- **Interview 9:** Parking Management in Kabul City Bus Operation
- **Interview 10:** Traffic Management in Kabul City
- **Interview 11:** Kabul Traffic Office and their task
- **Interview 12:** Educational System of Traffic Police
- **Interview 13:** Traffic Regulation and Publishing
- **Interview 14:** Number of private bus companies and taxi unions
- **Interview 15:** Data of Coming Vehicles to the City

Questionnaire (in Dari) to identify Modal Split, Transportation Cost, Travel Reason and Monthly Income.

پرسشنامه

مرد
زن
توسط کدام وسیله به شهر آمدید؟
تاکسی بائیسکل بس شهری مینی بس پیاده تاکسی شریکی موتور سائیکل
غیره
آیا معمولاً از این نوع واسطه نقلیه استفاده می کنید؟
بله نخیر
واسطه نقلیه را که معمولاً استفاده می کنید کدام ها هستند؟
تاکسی بائیسکل بس شهری مینی بس پیاده تاکسی شریکی موتور سائیکل
غیره
ماهانه چقدر عاید دارید؟
کمتر از 5000 افغانی
 10000- 5000
 بیشتر از 10000
برای چه اینجا آمده اید؟
کار کردن خریداری تفریح تحصیل
مصارف روزانه ترانسپورت شما چند افغانی میشود؟
کمتر از 50 100-50 بیشتر از 100

Place: city center

Interviewee: 1150

Date: 22-28 Dec. 2009

Translation of Questionnaire:

Questions:

1. Male/Female
2. How did you come to down town? By:
Taxi
Bicycle
Bus
Minibus
On foot
Taxi Share
Motorcycle

Other

3. Is this the usual mode of transportation you are taking? Yes/No

3a. If no, what is the usual mode you are taking?

Taxi

Bicycle

Bus

Minibus

On foot

Taxi Share

Motorcycle

Other

4. How much money do you earn per month (in AFG.)?

0 >5000

5000 10000

More than 10000

5. Are you here for?

Working

shoping

Free time

schooll /study

6. How much money du spend for transportation per day (in AFG.)?

0>50

100

More than 100

Results:

Modal Split in Kabul City

Usual Mode	Male	Female	Total	Percentage
Bicycle	100		100	10,21
Bus	282	91	373	28,80
Gov.	19	8	27	1,94
Hors	1		1	0,10
Minibus	333	84	417	34,01
Motorcycle	49		49	5,01
On foot	57	3	60	5,82
Private	4	1	5	0,41
Taxi	52	16	68	5,31
Taxi Share	82	31	113	8,38

Transportation cost per person

Daily Transport Cost in AFG.	Monthly Transport Cost in AFG.	Interviewee People
>50	750	761
50-100	1500	378
<100	3000	76

Travel reasons

Travel reasons	Number of interviewee people	Percentage
Work	600	49,4
Shopping	349	28,7
Study	158	13
Free time	106	8,8

Monthly income of the workforce employees

Monthly Salary in Afg.	Number of interviewee people	Percentage
3000 - 5000	709	58,35
5000 - 10000	358	31,68
more than 10000	120	9,87
Total	1187	100,00

List of Interview

Interview No.	Interviewee	Organization	Position of Interviewee	Date and Place of Interview	Duration of Interview
1	Abulwahed Zia Ghaznawi	Millie Bus company	Vice dean of the Department of Revenue, Millie Bus company	09.10.2007 (Kabul)	ca. 30 minutes
2	Ghulam Faroq	Ministry of Transportation	Director of the Department of Planning, Ministry of Transportation	29.12.2009 (Kabul)	ca. 20 minutes
3	Ghulam Rabani	Ministry of Labor and Social Affairs	Director of the Department of Transportation, Ministry of Labor and Social Affairs	19.01.2009 (Kabul)	ca. 10 minutes
4	Nehmatullah Hashemi	Central Statistics Office	Director of the Department of Transportation, Central Statistics Office	18.01.2009 (Kabul)	ca. 10 minutes
5	10 Paratransit (IPT) Drivers	Private	IPT Drivers	13.01.2009 (Kabul)	ca. 5 min. with each interviewee
6	Jawed Panjsheri	Private	Vehicles Seller	08.10.2007 (Kabul)	ca. 5 minutes
7	Sha Agha Bagramwal	Private	Shopkeeper	08.10.2007 (Kabul)	ca. 5 minutes
8	Faiz Mohamad	Kabul Municipality	Director of the Department of Road Construction, Kabul Municipality	27.04.2008 (Kabul)	ca. 30 minutes
9	Mohamad Haron	Private	Parking Chairman	15.01.2009 (Kabul)	ca. 10 minutes
10	Sardar Mohamad	Kabul Traffic Office	Head of the Department of Planning, Kabul Traffic Office	04.01.2007 (Kabul)	ca. 30 minutes
11	Najibulah	Private	Customer	04.01.2007 (Kabul)	ca. 20 minutes
12	Mohamad Barat	Kabul Police Academy	Head of the Department of Traffic, Kabul Police Academy	23.04.2008 (Kabul)	ca. 20 minutes
13	Mohamad Fahim	General Traffic Office	Director of the Department of Education, General Traffic Office of Afghanistan	24.04.2008 (Kabul)	ca. 10 minutes
14		Private Transportation Sector	Head of the Department of Private Transportation Sector of Ministry of Transportation	09.10.2007	ca. 20 minutes
15	Mohamad Zarif Taniwal	Faculty of Geosciences	Head of the Department of Geography, Faculty of Geosciences	03.01.2010	ca. 20 minutes

ERKLÄRUNG

„Ich erkläre: Ich habe die vorgelegte Dissertation selbständig und ohne unerlaubte fremde Hilfe und nur mit den Hilfen angefertigt, die ich in der Dissertation angegeben habe.

Alle Textstellen, die wörtlich oder sinngemäß aus veröffentlichten Schriften entnommen sind, und alle Angaben, die auf mündlichen Auskünften beruhen, sind als solche kenntlich gemacht.

Bei den von mir durchgeführten und in der Dissertation erwähnten Untersuchungen habe ich die Grundsätze guter wissenschaftlicher Praxis, wie sie in der „Satzung der Justus-Liebig-Universität Gießen zur Sicherung guter wissenschaftlicher Praxis“ niedergelegt sind, eingehalten.“