Remarks Concerning Traffic Problems of Almaty

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Abstract

Traffic is the elixier of modern urban communities. Those communities additionally to the benefits of traffic may also experience some of its drawbacks. The kind of and extent to which these drawbacks can be experienced depends on the actual traffic behavior of individuals. We presuppose that imposing on the traffic the right regulations can make a big difference and change traffic behavior. That in turn can impact the quality of life of city inhabitants. We thus look into some of the traffic problems of Almaty, try to quantify their extent and compare some of these with the related extents of comparable cities. We finally suggest measures for dealing with traffic problems of Almaty.

Keywords*: traffic, Almaty, problems, comparison, improvement*

1. Introduction

Traffic if understood in the broadest sense is a phenomenon of human life that, however, originates from the society of hunters and gatherers. Traffic becomes then more important when farming becomes the main occupation of humans and separation of labor kicks in. Traffic back then essentially is a means for bringing everyday things that cannot be produced by everyone to those in need of them. Traffic has an impact on technology and science already in ancient times. For example, considering the ratio of a circle's length and its radius is thought to have originated from the need to strengthen wooden wheels of cars with iron bands. Market places arise. The ongoing industrial revolution technologizes traffic. Transportation means and transportation infrastructures become an industry in which heavy energy transformations take place.

Traffic related pollution occurs and speed of transportation becomes an essential issue. Casualties of traffic are already a problem prior to vehicle motorization. Traffic as an aspect of culture includes aesthetics of design and the desire for individual mobility. Traffic too, as is the case in Almaty, may have dramatic impact on how human experience technology and themselves. If traffic is considered as a production factor then additionally to its power to enable, simplify, and boost industrialization also the retarding effect of traffic jams, traffic accidents, and cost implied by pollution come to mind.

Traffic in Almaty is specific in several respects. First, air pollution is a major problem due to pollutant removal out of the city because of natural ventilation limitations (Verkhoturov, 2009). Second, after the fall of the Soviet Union Kazakhstan and in particular Almaty experienced relatively long phase of economic prosperity that has changed the traffic circumstances at a speed that was faster than what politics was able to respond to. Third, Almaty experiences a significant annual increase of population and cars in use. Fourth, the tradition of following rules for a the good of the community is only weakly developed in Kazakhstan. These specific circumstances obviously have the potential of making inhabitants of Almaty suffer more from traffic related or traffic caused problems than necessary. The President of the Republic of Kazakhstan analyzed that “despite the overall adaptation of transport to market conditions, the position of transport system cannot be

considered optimal, and the level of development as enough" (Transport Strategy o RK till year 2015). The traffic caused problem, however, by no means are sufficiently addressed by air pollution, accidents and traffic jams. A related complete discussion is beyond the scope of this paper. To make understood how far reaching traffic caused problems are we mention the most well-known ones: water and soil pollution would have to be included that result from fuel or oil spills at gas stations, garages, and junkyards. Also the rubber particles originating from wearing tyers would have to be considered, as well as the wearing brake pads. The traffic caused by traffic, most notably the oil and fuel transport causes substantial damages. Furthermore traffic emits noise, whose health impairing effects have been discussed for example with regard to air-bound traffic. Finally, some of the traffic problems of Almaty are related to the continuing and partly uncontrolled growth of the number of city inhabitants. Many of these, of course, also will rely on cars for their livelihoods and thus increase traffic problems. There is another catch to it that one cannot miss out: the fast growth of the city has created a lot of housing construction. Since that construction has to be done 'cost effective' and quick gigantic sky scrapers are built. These, given the hot summers in Almaty and the fact that at least the upper floors do not receive any shadows from the street trees are likely to increase the energy consumption for cooling and, in particular among the elders with low income, increased mortality and reduced life expectancy. The recent city planning is directly responsible for that effect and responsible managers should be held accountable for it.

2. Air pollution

The air pollution in Almaty, as we have mentioned before mainly stems from motorized traffic. Any negative effects of air pollution in Almaty will be amplified because of a typically slow replacement of polluted air by clean air. That slow replacement is a consequence of two factors. First, natural air ventilation is quite weak. Second, the cold air that flows into the city from the mountains regularly creates a temperature inversion and prevents the dirty air from being taken away. It is well-known that the pollution of air at ground level has negative impact on the health status of the population. It was reported by the World Health Organization that 3 million people die each year from the effects of air pollution, which is three times the 1 million who die each year in automobile accidents (Fischlowitz-Roberts, 2002). If we apply this evidence particularly to Almaty, the number of died people from air pollution in year 2007 would be amounted to 795, in year 2008 – 519 people.

Approximately 80 % of the noxious gases and gas admixtures in Almaty are caused by vehicle emissions. To be more specific, 161.3 thousand tons out of the total annual 185 thousand tons of noxious air polluants originate from traffic (Round table of Kazecology, 2008). Polluted air among others may cause heart diseases and respiratory illnesses. The chronically good weather in summer may additionally worsen the conditions since the solar radiation is likely to contribute to high levels of near to ground-level ozone. Among the health issues originating from the high concentration of noxious chemical substances at ground level are: irritation of eyes, mucous membrane of nose and throat, exacerbation of pulmonary and different chronic diseases. Some of the cyclic hydrocarbons typically found in polluted urban air are known to be carcinogenic. Moreover, nitrogen products can cause premature mortality (Nitrogen, EPA), the highest concentration of harmful gases and substances caused by motorized traffic usually will be found in the height of one meter over ground level (round table of Kazecology, 2008). Hence, children breathe more toxic air than adults and their health thus is jeopardized even stronger than that of adults.

A technological progress appears to be ongoing that has resulted in modern motors to be substantially more fuel efficient and less air polluting. When considering any air pollution counter measures one should consider including technology prescriptions for cars such as employed in Western Europe and the US. Certainly these prescriptions would have to be enforced. Many of the local gas stations sell fuel of low quality, that has a higher than permitted level of noxious ingredients. The independent expertise center of oil products "Organic" analyzed the fuel sold at a number of gas stations, however, the full results of expertise are not publicly available and whether the examination of gas stations were useful is not known. They found that what was sold as 92 octane fuel in fact 84 octane fuel, they violate the requirements on the contain of gasoline and diesel oil, add components that increase the octane number of fuel but consequently lower the quality of these oil products, that have negative impact on the population's health (Bakhautdinova, 2007). Investments are needed to cover the expenses of oil products such as gas. Obviously a market could be created that would make the traffic participants pay for the gas quality checks. A number of related checks by a certified company would have to be made compulsory and the gas station would have to pay for each of these checks. A competition could emerge among certified gas quality analyzers. That competition could keep the analysis cost at an acceptable level. The gas stations, of course, would pass on the related cost to the customers. That anyway would happen in case state agencies would do the checkups, as they would have to be paid for their services from the state income, i.e., the taxes paid.In Kazakhstan oil product quality is assessed based on the ratio levels of 5 ingredients. In the EU 20 ingredients are used instead (Bakhautdinova, 2007).

3. Traffic accidents

Accidents are a major traffic concern. By analyzing the data of Road Police Committee [4] regarding road accidents in Almaty the percentage comparison for years 2007-2008 were made. The number of car accidents in 2008 was reduced by 5 % in comparison to 2007. In 2007 and 2008 the number of accidents recorded was 2709 and 2574, respectively. That 5% reduction certainly is a good thing. However, it is not necessarily the best figure for a assessing any ongoing changes regarding the traffic in Almaty. The traffic accident statistics shows a reduced growth rate for 2008 as compared to 2007 in terms of injured and killed people. But if we compare independently year 2007 and 2008, the average growth of road accidents in year 2007 was 17.63%, while for year 2008 was 18.55 %. Percentage growth in number of injured people for year 2007 was 17.37% and for 2008 18.36% respectively. However, the growth of died people in 2008 was lower than in year 2007 by 3.68%. The monthly growth in total by injures and mortal cases of road accidents for 2 years (2007-2008) vary: if we compare 6 month period growth in total road accidents in year 2008 was higher than in previous year by approximately 2.22 %, inversely the growth of accidents in 8 month period for year 2007 was greater than in 2008 by 3.85%. The number of killed people in road accidents in Almaty in year 2007 was 265 people, in 2008 – 173, injured people in year 2007 – 3040, in 2008 – 2824 injured people (official data of Road Police Committee, 2008). Comparing the Almaty figures with other cities of comparable size may be instructive. For example, Auckland in New Zealand has roughly the same population -1313200 (Auckland, 2009). Furthermore, Auckland has close to 600 vehicles per 1000 people. That makes it have the second-highest vehicle ownership rate in the world (Auckland, 2009). Its traffic statistics is impressive: in 2006 they registered 910 injury crashes with a death poll of in total 18 (Briefing notes, 2007). Using the official data regarding road accidents that is available on the website of Road Police Committee (http://www.roadpolice.kz/ru/statistics/inciden/year2007) and comparing to the data on Auckland (Briefing notes, 2007) it was calculated that the average annual number of road

accidents in Almaty is 2.5 times the one in Auckland. The number of people killed in traffic accidents in Almaty is 10 times the number of people killed in traffic accidents in Auckland. We imagine that Auckland was able to achieve better results (less accidents and trauma) because it participates in various programs to traffic improvement. The traffic accident statistics for Auckland is also more expressive and not only contains generic data (such as the number of injured and killed people). It rather includes more specific data such as age range, and casualty types. The traffic accident statistics prepared by the Road Police Committee does not contain these more specific data for Almaty. Other cities of the size of Almaty too perform worse than Auckland but perform much better than Almaty. For example, the Vienna traffic accident statistics shows that in 2007 the number of people killed in traffic accidents was 35 (Vienna City Municipality Department, 2008). The Zurich region also comparable to Almaty in terms of the inhabitants indicates that in 2007 and 2008 in traffic accidents there were killed 37 and 51 respectively (U. Zoelly, 2008). Similarly, in Munich the number of people killed in traffic accidents in 2008 was estimated by about 30 (M. Meier-Albang, 2008). These data very strongly suggest that if more attention would be paid to the number of people killed in Almaty in traffic accidents then that number could be reduced by more than 100 a year.

Ignorance and incompetence of drivers is known to be a key cause of accidents in Almaty. It is difficult to say whether or not the quality of teaching in driving schools is appropriate. However, not only drivers or pedestrians cause the road accidents. The number of car accidents is directly proportional to the road quality. According to the official statistics of the Committee of road police (2008), every 5th accident in the Republic of Kazakhstan occurs due to the imperfections of the road system (the road surface, the quality of road improvement works). If that assessment is true then some road accidents in Almaty are caused by the unsatisfactory quality of roads and streets. Fortunately this problem can be eliminated by technical means. Paying more attention to road maintenance and improvement can increase road quality. That in turn can be achieved by using higher quality materials and more experienced work force. We find it, however, questionable to attribute road conditions as causes to accidents. Obviously, if no one would use roads that are in poor conditions these roads wouldn't "cause" accidents. This issue thus might better be subsumed under not driving to the conditions and thus to driver ignorance and incompetence.

4. The current plan of development of traffic infrastructure

Key aspects of traffic in Almaty are car accidents, ecological, traffic related health problems, and the role of traffic for the further economical development.

The development of traffic infrastructure, as one of the indicator of socio-economical development is discussed in Almaty city General Plan 2020 (AGP, 2006) according to which the construction of three metro lines will substantially improve the Almaty traffic infrastructure, in particular road junctions are being constructed for extending the car flow capacity. For the years 2005 to 2020 in Almaty 51 road junction projects are planned to be constructed, whose investment costs vary from 1.5 up to 15 billion tenge with the traffic capacity from 13 thousands cars to 230 000 (*KZ-Today*, 2008). Unfortunately the economic crisis is likely to at least delay these and similar projects. The detailed related implementation plan as outlined in the AGP 2020 will aid achieving results. However, in order to achieve the objectives of transport strategy and AGP 2020 huge investments are needed. For year 2006 only 1.5% (Transport Strategy of RK till year 2015) of Kazakhstan's gross domestic product (GDP) is devoted to transport in Kazakhstan. That

sort of limited funding is not going to speed up Kazakhstan's economical development. According to the valuation of international experts the cost of road accidents annual grabs 2.2% of GDP, i.e., about USD 1.7 billion (Transport Strategy of RK till year 2015). As it was said by the akim (the head of the city) of Almaty Akmetzhan Esimov (*KZ-Today*, 2008) "the world experience has shown that the stated requirements for ecological control and transition to the new standards, as for example the implementation of EURO-2 standards" that can be the prospective for long term goals. The transition to EURO standards means the improved ecological situation because the vehicle emissions will be controlled, the possible amount of noxious admixtures derived from automobiles will be decreased, and hence, the cars will be cleaner in comparison with years without the implementation of international ecological standards. In addition, the technical conditions of automobiles will be regulated accordingly. However, the transition will not bring valuable results without proper implementation and control. The governmental policy considers the fact of transport's negative impact on ecology, therefore, the ecological requirements are going to be restricted, for example, the import of automobiles that do not meet the established ecological standards will be ceased stage by stage; however, the issue of time arises - when or how fast the multiple tasks are going to be brought in and the allocation of budget have to be adjusted properly.

5. Recommendations

We make recommendations addressing the traffic problems of Almaty in three different ways. Given that traffic is so deeply involved with many aspects of our culture one cannot expect that any individual measure alone is capable of satisfactorily solve the traffic related problems in Almaty. We therefore recommend a wide spectrum of measures that could be used. Any system of measures can only become effective if the related progress is constantly monitored and measures are adapted when needed. The measures recommended here mainly target the individual involved in traffic. The goal is to make that individual aware of the costs of traffic as well as liable for those negative traffic related consequences caused individually. It is moreover the guiding concern underlying the measures suggested here that a cost related traffic regulation system is introduced that gives maximum freedom to each one individual human being and at the same time has a chance of efficiently reducing traffic caused health or other risks.

Motorized traffic reduction

- Substantially improve quality of public transport and in particular substantially extend and upgrade the tramway network and continue building the metro. Introduce bulk transport lanes that during peak traffic times only may be used by bulk transport vehicles such as buses.
- Build an automated commodity supply underground network with supply interfaces outside the city so that any trucks with supplies would not have to go into Almaty and that based on RFID technology automates the delivery to pick up points in the city. These at the same time serve as drop of points for supply related waste. As soon as that system becomes operational the amount of trucks permitted on the roads of Almaty will be reduced substantially.
- Effectively limit the increase of city population by aiding rural areas in Kazakhstan in economic development. Limit the increase of cars in the city by requiring evidence for parking being available for each newly introduced car. After that has been implemented evidence for car park availability will be required for any car in the city. Failure to give evidence that car parking is available for any car will result in that car to be excluded from use within Almaty.

- Introduce a city entrance poll for motorized traffic and a substantial city parking fee. The city entrance poll is supposed to be indirect proportional to the number of individuals being transported in a vehicle.
- Enforce the new traffic rules by a qualified and reliable police force and additionally start using staff authorized for dealing with minor traffic rule violations (such as wrong parking, ignoring traffic signs, and jeopardizing pedestrians or push bikers) and related ticketing.
- Introduce debt obligations for any household owning a car or using cars for doing business. These debt obligations are supposed to be a variable cost measure for dealing with traffic caused environment degredation. Any household covered by this rule has to set aside a maximum of 10 % of their average taxed income to assure liquidity in case the debt would be charged. The debt management period initially will be one year and a sticker is issued prior to begin of the management period that gives evidence that the money was set aside. Only cars are allowed on the streets that display that sticker. Cars without sticker will be confiscated.
- Introduce a high quality, cheap, public bike rental sytem in the city of Almaty and dedicate lanes to push bikers on all major roads in Almaty.
- Implement a substantial push bike road network and implement with it free of charge push bike parking.
- Support the emergence of produce shopping assistance providers who gather produce shopping orders as originating in the main residential city quarters, do the purchase and provide the goods for a charge.
- Support the emergence of individual collective work transport.

Accident number and impact reduction

- Reduce speed limit on general city streets to 30 km/h and introduce a general speed limit of 100 km/h on dedicated roads such as highways. Exceeding the permitted speed by more than 30 km/h automatically leads to loosing the driver's license for one year. Repeated disqualification from driving due to speeding within a period of 4 years automatically leads to permanent loss of the driver's license. Driving without license in case of permanent loss of driver's license will be punished with one year of imprisonment.
- Drivers found to be intoxicated from alcohol or similar will automatically loose their driver's licence for a period of two years. In case of repeated intoxicated driving the disqualification from driving will be permanent.
- Start an ongoing mass media campaign on traffic related risks and appropriate behavior and a related mass media campaign that addresses the generally poor living conditions in Kazakhstan and the reduced life expectancy of Kazakhstanis
- Consider injuring a human individual in a traffic accident as a case of deliberate personal injury and be punished as such. Traffic accident caused permanent disability will be compensated for by the responsible individual on the base of a lump sum payment and a life-long disablement pension.
- Introduce a new driver's license and a transition plan that gives anyone driver the chance to continue driving but ensures that every driver has appropriate education. Drivers who fail to renew their license within 2 years from introduction of the schema will automatically be disqualified from driving. Driving without license in case one

fails to renew the driver's license will be punished with a permanent disqualification from driving.

- Start changing road crossings from a traffic light driven operating scheme towards a roundabout driven scheme. Systematically improve road quality and introduce a city authority responsibility for traffic accidents caused by poor road conditions. Using spikes in case road pavement is not covered with ice or snow will be illegal and be punished.
- Substantially increase the number of zebra strips so that crossing streets becomes less difficult and time consuming for pedestrians. Introduce the rule that drivers have to give way to pedestrians who are close to zebra strips and appear to be willing to cross the road.
- In order to provide the security for people, the location of gasoline stations should be optimized – the gasoline stations near schools and the ones located on main streets with significant transport flow that create further negative consequences (traffic jams, unsecured service-danger of fire) must be removed. In further, the placement of gasoline stations should be chosen based mainly on the factor of safety, not on the factor – as close to customers as possible. The role of government to this issue will be to develop the normative laws or legal contracts with companies/owners of these stations in order to provide the safety for people.

Pollution reduction

- Introduce a clean air act that includes a right of Kazakh citizens for clean air and follows the EU or US regulations regarding technical measures implemented in cars for reducing air pollution (such as enforced catalyzers). Introduce an average fleet fuel consumption limit per car for the cars as on the street for each manufacturer.
- Effectively monitor and manage the quality of fuel as on sale at the gas stations of each supplier.
- Start paying a decommissioning premium once in two years for anyone city inhabitant decommissioning their privately owned motorized vehicle.
- Tramways are ecologically superior public transport that can replace the buses; in particular the Otto or Diesel powered ones. The tramway track net should be extended and its quality increased. Higher quality tramway trains should be purchased too. Moreover, bring in metropolitan can have the significant positive impact to the process of solving the traffic problem.

6. Outlook

It would be interesting to assess and compare the impact of the measures suggested above. That could, for example, be done by formulating a linear program regarding the negative consequences of the traffic in Almaty. The objective function in such model would have to quantify the negative impact of traffic. In the model the target would be to minimize the objective function value, i.e., the negative impact of traffic. A number of strategies for coping with the negative traffic consequences should be defined and the change of the objective function value be observed as a consequence of implementing these strategies. Those strategies would be considered as the best ones that within given cost and time limit would result in the largest reduction of negative traffic consequences.

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