Application of Cost Benefit Analysis to Low Carbon Technology in Public Transportation: A Case of Bus Rapid Transit (BRT) Project in Almaty, Kazakhstan

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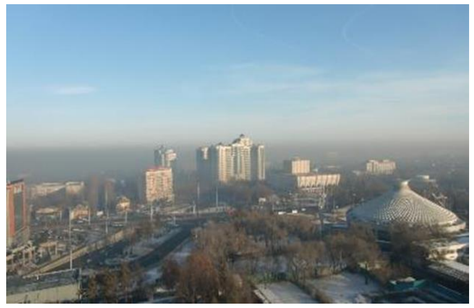
Almaty is the largest city of Kazakhstan with the population of 1.64 million of people. Despite loosing its capital status in 1997, the city remains to be financial of the country accounting for 20% in national economy.



Transport situation in Almaty can characterized as highly unstable. Constantly growing number of vehicles, fragile transport infrastructure together with unreliable, low quality public transport service has led to high congestion levels, severe air pollution and significant public health issues.

Bus Rapid Transit (BRT) Project.

BRT technology is a bus based form of public transportation that replicates service, quality and performance characteristics of a modern rail transit mode but at a lower cost. As literature shows BRT benefits include reduced travel times, enhanced mobility, lower levels of CO2 emissions and transport related pollutants.

Pilot project in Almaty is to be initiated in 2018. The BRT corridor will connect Almaty Orbita suburb with the city centre. The main characteristics of pilot BRT system are presented below:

Performance Characteristics	Almaty BRT Pilot Corridor (2018)	Baseline (2013)
Average speed (km/h)	22	11.43
Total travel time (min)	47	83
Maximum capacity (people per hour per direction)	10000	4600

Research Questions

“Will application of BRT in Almaty, Kazakhstan as a mean to resolve current transport problems result in social economic gain or loss?”

Methodology

CBA analysis is an economic instrument that enables to measure the impact of a certain project, programme or policy on social well-being:

- Identification of project boundaries;
- Identification of related to project costs and benefits;
- Appraisal of costs and benefits;
- Discounting costs and benefits flows;
- Sensitivity analysis

Results

Costs	Million USD	Benefits	Million USD
Infrastructure Costs	41.8	Net Travel Time Savings	80.12
Rolling Stock	19.98	CO2 Emissions Reduction	6.27
Operating Costs	18.98	Tailpipe pollutants reduction	4.18
Cost of Fuel	12.27	Fuel Cost Savings	4.51
Total Costs	93.03	Total Benefits	95.07
		Net Present Value	**2.04**

Significance	Variable	Worst case NPV (million USD)	Best Case NPV (million USD)
High	BRT Ridership figures	-26.51	30.51
High	Social Discount Factor	-15.26	28.68
Medium	Infrastructure Costs	-6.32	10.44
Medium	Cost of CO2	-3.89	2.04
Medium	Cost of Diesel	-0.23	4.54
Low	Cost of non-GHG pollutants	-2.05	2.04
Low	Cost of Petrol	1.14	2.94

Implementation of BRT project would result in social gain with travel time savings being the major benefit. What is more, the project will also have environmental benefits in terms of reduced CO2 emissions and travel related pollutants.

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