





Leipzig, Germany

Social Cost-Benefit Analysis of Key Urban Mobility Policies in Athens

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National Technical University of Athens

Need for Prioritizing Urban Mobility & Safety Interventions



Background- The problem

- With environmental problems on the rise and social welfare at risk, urban centers must prioritize sustainable and efficient transportation solutions
- Choosing and implementing policies which offer the best value for money and impact positively society is a prerequisite for the effective promotion of urban sustainable mobility and safety
- Cost Benefit Analysis (CBA) is becoming a necessary economic appraisal tool used to evaluate public policies from a social welfare point of view.





European Context

- Urban mobility in Europe accounts for around 40% of CO₂ emissions
- ➤ Traffic congestion costs society around €270 billion per year
- Despite the several efforts that are being made to improve road safety, more than 20.000 people died in crashes in 2022, representing a reduction lower than the 50% target set by the EU
- Addressing the problems caused by urban mobility is crucial to achieving sustainable and livable cities in the future





Athens City

- Athens is the capital and largest city of Greece with a population exceeding 3,5 millions inhabitants in the Greater Athens area.
- Passenger car traffic is dominant in travellers' and Authorities' choices and public transport share is stagnating.
- Vulnerable road users account for more than 50% of all road fatalities.
- The current traffic and parking management system cannot face the continuously increasing congestion.
- > Alternative solutions are considered.





The Social Cost Benefit Analysis of Mobility & Safety Policies



Financial CBA

Financial Cost-Benefit Analysis (CBA) is carried out in order to:

- assess the consolidated investment profitability for the project owner and key stakeholders
- outline the cash flows which underpin the calculation of the socio-economic costs and benefits
- ➤ The financial CBA steps are:
- Step 1 Analysis of the amount and breakdown over the years of the total investment costs
- Step 2 Calculation of the total operating costs and revenues (if any)
- Step 3 Identification of the different sources of financing that cover the investment costs
- Step 4 Estimation of financial performance indicators
 - Financial net present value FNPV
 - Financial rate of return FRR





Social CBA

- Social Cost-Benefit Analysis (CBA) is a tool for evaluating the socio-economic impact of a public policy, including indirect impacts
- The following benefits (costs) must be considered in the social CBA to capture the impact on the society:
 - ➤ Travel time

- Noise emissions
- Vehicle Operating Costs
 Air pollution
- Road casualties

- GHG emissions
- Costs and benefits at different times should be discounted using the Social Discount Rate, which reflects the long-term opportunity cost of resources to society as a whole
- The public policy economic performance is measured using indicators such as:
 - Economic Internal Rate of Return ERR
 - Economic Net Present Value ENPV





Objective

The demonstration of the high usefulness of the social CBA for the promotion of key urban mobility and safety policies through their economic appraisal

The 4 Urban Mobility and Safety Policies for City of Athens

- City-wide Speed Limit 30km/h
- Congestion Charging Scheme
- Ridesharing Services
- Telematics Insurance Schemes



Common Methodology

Conduct Social CBA until 2030 to measure the socio-economic feasibility of each policy investigating different Scenarios with and without implementation of the examined policy

- Conduct stated preference survey to determine public acceptance of the examined urban mobility and safety policies
- Estimate investment and operational costs for each Scenario
- Estimate road user surplus, including travel time and Vehicle Operating Costs (i.e. fuel consumption, service etc.)
- Estimate externalities, including road safety and air pollution
- Monetize estimated costs and benefits for each Scenario
- Calculate Economic Internal Rate of Return (ERR) and Economic Net Present Value (ENPV) for each policy
- Conduct sensitivity analysis of ENPV as a function of critical parameters and assumptions



The 4 Mobility & Safety Policies

Speed Limit 30km/h The reduction of speed limit from 50km/h to 30km/h within the City of Athens borders

Congestion Charging Scheme

The introduction of a congestion charging scheme with an annual subscription for daily access of passenger cars in the city center varying for the various vehicle Euro classes

Ridesharing Services

The deployment of real-time, fee-based ridesharing services

Telematics Insurance Schemes

The provision of financial incentives and benefits by the Greek State to vehicle insurance policies using telematics for safer and eco-friendly driving





Social CBA Results (1/2)

- All the examined policies present a positive ENPV and an ERR higher than the Social Discount Rate (0.8%), indicating their feasibility over time
- The most important economic benefit arises due to the improvement of road safety through the reduction of fatalities on road crashes
- The economic performance was assessed for each policy separately and not comparatively since the study area and the analysis timeframe do not coincide in all examined policies

	Policy	Timeframe	ENPV (mil. €)	ERR (%)
1	Speed Limit 30km/h	2021-2030	34.8	64.5
2	Congestion Charging Scheme	2022-2030	392.6	>100
3	Ridesharing Services	2021-2030	370.2	24.0
4	Telematics Insurance Schemes	2023-2030	630.0	23.6

Social CBA Results (2/2)

Specifically

- In the case of the reduction of the speed limit to 30 km/h in the city center, the society benefits from a reduction in road casualties amount to €130 million over a 10-year period
- The introduction of ridesharing in Athens can reduce CO₂ emissions by up to 121,500 tons and save up to 48 mil. liters of fuel within a decade
- Implementing the congestion charging scheme a reduction of road casualties by 956 and transport emissions by 162 mil. CO₂ tons is estimated
- A premium discount of 20% in telematics insurance schemes can lead to decrease of road fatalities by 237, fuel consumption by 415 mil. litres and CO₂ emissions by 956 k tons

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Limitations

- Social CBA methodology depends on assumptions and estimates that can vary depending on policy implementation and context
- > Social CBA results do not include intangible benefits like quality of life or cultural heritage preservation
- > Stated preference survey responses may not accurately reflect the entire population's behavior and preferences
- > Analysis of policies should account for potential unintended consequences or trade-offs that may arise in response to changing circumstances, particularly in the long-term





Urban Mobility & Safety CBA Policy Implications



Policy Implications (1/2)

- Social CBA is an economic appraisal tool highly useful for Authorities to evaluate mobility and safety policies from a social welfare point of view, taking into account externalities
- The analysis demonstrated that the introduction of the urban mobility and safety policies under consideration in Athens has a significant positive impact on social welfare
- Even in extreme price changes of significant input variables, the ENPV remains positive ensuring the beneficial contribution to the social welfare at large



Policy Implications (2/2)

- Social CBA supports green and safe urban mobility policies to efficiently face society skepticism and inertia
- Social CBA can demonstrate societal benefits, increasing the acceptability of changes by city travelers and motivating Authorities and industries to implement greener and safer solutions
- The use of social CBA can support the adoption of sustainable urban mobility and safety policies and convince the society (citizens and politicians) to support large-scale interventions





Future Directions

- Improve data collection and estimations of both costs and benefits
- Guarantee scientific expertise for more accurate forecasting and cost-benefit analysis
- Make the social CBA a prerequisite for implementing sustainable urban mobility and safety policies in European cities, being a useful tool in making informed decisions
- Promote the collaboration between stakeholders and government levels to implement sustainable mobility and safety policies more effectively











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