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www.vtpi.org
Info@vtpi.org
250-360-1560

Evaluating Non-Motorized Transportation Benefits and Costs

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Todd Litman
Victoria Transport Policy Institute



Abstract

This report describes methods for evaluating non-motorized transport (walking, cycling, and their variants) benefits and costs, including direct benefits to users from improved walking and cycling conditions, and various benefits to society from increased non-motorized travel activity, reduced automobile travel, and support for more compact land use development. It identifies various types of benefits and costs, and describes methods for measuring them. It discusses non-motorized transport demand and ways to increase non-motorized travel activity. This analysis indicates that non-motorized travel provides significant benefits, many of which are overlooked or undervalued in conventional transport economic evaluation.

This report updates and expands on the article,
"Bicycling and Transportation Demand Management,"
Transportation Research Record 1441, Transportation Research Board (www.trb.org), 1994, pp. 134-140.

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Executive Summary

Non-motorized transport (*NMT*, also called *active transport* and *human powered transport*) refers to walking, cycling, and variants such as wheelchair, scooter and handcart use. Non-motorized transport plays an important and unique role in an efficient transport system. It provides basic mobility, affordable transport, access to motorized modes, physical fitness and enjoyment. Improving non-motorized conditions benefits users directly, and by reducing automobile travel can benefit society overall, including benefits to motorists. By helping to create more accessible, multi-modal communities, non-motorized improvements can leverage additional motor vehicle travel reductions, so a mile of increased non-motorized transport reduces several motor-vehicle miles, particularly if NMT improvements are integrated with complementary transport and land use policies.

Table ES-1 (following page) summarizes various benefits and costs to consider when evaluating transport system changes that affect non-motorized transport. Different types of policies and projects have different sets of impacts, depending on whether they improve non-motorized travel conditions, increase NMT activity, reduce automobile travel, and affect land use development patterns. This report describes the types of impacts that should be considered for various types of policies and projects. It describes methods for quantifying and *monetizing* (measuring in monetary units) these impacts, and provides default values that can be used or adjusted to reflect specific conditions.

Conventional transport project evaluation methods tend to overlook and undervalue non-motorized transport. Conventional travel statistics imply that only a small portion of total travel is by non-motorized modes (typically about 5%), but this results, in part, from travel survey practices which overlook many short and non-motorized trips. NMT represents a relatively large portion of total trips and travel time (typically 10-20% in urban areas), and many of the trips it serves are high value, and would be costly to perform by motorized modes. More comprehensive evaluation considers these additional non-motorized transport impacts and benefits.

Some benefits are relatively easy to measure. Transport economists have developed monetized estimate of traffic congestion, road and parking, vehicle operation, crash damage, and pollution costs, which can be applied to non-motorized travel impacts, such as improved pedestrian safety and reduced automobile travel. Values used to evaluate traffic deaths and injuries can be used to evaluate the fitness and health benefits of active transport. Affordability can be quantified by measuring cost savings to lower income users. Other impacts may be more difficult to monetize, but at a minimum should be described. These include user enjoyment, option value, support for equity objectives, more compact and accessible land use development (smart growth), economic development, improved community livability, and additional environmental benefits such as habitat preservation.

There are many possible ways to improve and encourage non-motorized travel. Although most communities are implementing some of these strategies, few are implementing all that are justified. Most only affect a portion of total travel, so their impacts appear modest, they are seldom considered the most effective way of solving a particular problem. However, they provide multiple and synergistic benefits. When all Impacts are considered, many communities can justify much more support for walking and cycling.

Table ES-1 **Summary of Non-Motorized Transport Benefits and Costs**

Impact Category	Description
Improve NMT Conditions	*Benefits from improved walking and cycling conditions.*
User benefits	Increased user convenience, comfort, safety, accessibility and enjoyment
Option value	Benefits of having mobility options available in case they are ever needed
Equity objectives	Benefits to economically, socially or physically disadvantaged people
Increase NMT Activity	*Benefits from increased walking and cycling activity*
Fitness and health	Increased physical fitness and health
Reduced Vehicle Travel	*Benefits from reduced motor vehicle ownership and use*
Vehicle cost savings	Consumer savings from reduced vehicle ownership and use
Avoided chauffeuring	Reduced chauffeuring responsibilities due to improved travel options
Congestion reduction	Reduced traffic congestion from automobile travel on congested roadways
Reduced barrier effect	Improved non-motorized travel conditions due to reduced traffic speeds and volumes
Roadway cost savings	Reduced roadway construction, maintenance and operating costs.
Parking cost savings	Reduced parking problems and facility cost savings.
Energy conservation	Economic and environmental benefits from reduced energy consumption.
Pollution reductions	Economic and environmental benefits from reduced air, noise and water pollution.
Land Use Impacts	*Benefits from support for strategic land use objectives*
Pavement area	Can reduce road and parking facility land requirements
Development patterns	Helps create more accessible, compact, mixed, infill development (smart growth)
Economic Development	*Benefits from increased productivity and employment*
Increased productivity	Increased economic productivity by improving accessibility and reducing costs
Labor productivity	Improved access to education and employment, particularly by disadvantaged workers.
Shifts spending	Shifts spending from vehicles and fuel to goods with more regional economic value
Support specific industries	Support specific industries such as retail and tourism
Costs	*Costs of improving non-motorized conditions*
Facilities and programs	Costs of building non-motorized facilities and operating special programs
Vehicle traffic impacts	Incremental delays to motor vehicle traffic or parking
Equipment	Incremental costs to users of shoes and bicycles
Travel time	Incremental increases in travel time costs due to slower modes
Accident risk	Incremental increases in accident risk

This table summarizes various benefits and costs that should be considered when evaluating transport system changes that affect non-motorized transport.