Economic Value of Walkability

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Abstract

This paper describes ways to quantify the value of walking (the activity) and walkability (the quality of walking conditions, including safety, comfort and convenience). Walking and walkability provide a variety of benefits, including accessibility, transportation cost savings, public health, reduced external transportation costs, more efficient land use, community livability, economic development, and support for equity objectives. Current transportation planning practices tend to undervalue walking. More comprehensive analysis techniques, described in this paper, are likely to justify increased public support for walking and other nonmotorized modes of travel.

This paper summarizes a longer paper with the same title available at the Victoria Transport Policy Institute website (www.vtpi.org).

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"Efficiency - Equity - Clarity"

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Introduction

What is more important, driving or walking? Conventional transport evaluation practices suggest that automobile travel is far more important than walking, representing about fifteen times as many person-trips and fifty times as many person-miles as nonmotorized travel (NPTS, 1995). From a conventional planning perspective, walking (the activity) is a minor mode of travel, and walkability (the quality of walking conditions, including safety, comfort and convenience) deserves only modest public support.

The high value placed on driving and low value placed on walking results from the methods used to measure transport activity ("Measuring Transportation, VTPI, 2002). Travel surveys and traffic counts undervalue nonmotorized travel because they ignore or undercount short trips, non-work travel, travel by children, recreational travel and nonmotorized links. For example, most travel surveys classify trips as "auto" or "transit" that are actually "auto-walk," or "walk-bus-walk." The walking component is usually ignored even if it takes place on public right-of-way. Rietveld (2000) calculates that total nonmotorized trips are six times greater than what conventional surveys indicate. If, instead of asking, "What portion of trips *only* involve walking," we ask, "What portion of trips involve *some* walking," a significant portion of trips would be counted and walking would be recognized as a dominant and essential mode.

Consider another perspective. Would you rather lose your ability to drive or your ability to walk? Being able to drive, although useful, is far less important overall than the ability to walk. With a little planning, a physically-able non-driver can engage in most common activities, but being unable to walk affects nearly every aspect of life, creating barriers to many employment, recreation and social activities. Walking provides basic mobility and access, that is, it provides access to essential goods, services and activities ("Basic Access," VTPI, 2002). Walking is particularly important to disadvantaged people. Walking provides connections between other travel modes. Often, the best way to improve motorized modes is to improve walking conditions, for example, by making it easier to walk to transit stops or within airports.

Transportation planners have standard ways to evaluate the quality of motor vehicle conditions and the value of changes in traffic conditions. For example, widely used computer models such as the *Highway Design and Maintenance Model* (HDM 4 Information Center)and *MicroBENCOST* (TTI, 1997) calculate the monetized (measured in monetary units) value of vehicle operating cost savings, safety benefits and travel time

savings from roadway improvements. These make it relatively easy to justify roadway improvements based on projected economic benefits. Walkability is not as easily quantified and so tends to be undervalued in planning decisions. This:

- Shifts resources (money and land) away from walking facilities to roads and parking.
- Favors automobile-oriented land use patterns (wide roads, generous parking, low density, single-use) over pedestrian-oriented development.
- Undervalues traffic management practices that support walking, such as traffic calming.
- Undervalues pedestrian safety investments (STPP, 2002).

Walking provides greater benefits to society than conventional evaluation practices indicate. This can be particularly harmful because transport decisions often involve mutually exclusive tradeoffs between different types of accessibility. Wide roads, high traffic speeds and large parking facilities create barriers to walking. As a result, evaluation practices that undervalue walking tend to create automobile dependent communities.

To their credit, many transportation professionals support walking more than is justified by their own evaluation practices. They intuitively know that transport diversity in general, and walking in particular, are important to society and so favor walkability improvements. Although most travel surveys indicate that only about 5% of travel is by walking, many local transportation agencies devote 10-15% of their resources to walking facilities and services. However, this occurs despite, rather than as a result of, conventional transportation survey data and evaluation models.

This is a timely issue because there is growing interest in walking as a form of transport, and recognition of the benefits of transportation diversity ("Evaluating Transportation Options," VTPI, 2002). Better tools for evaluating walkability can help in countless transportation and land use planning decisions (Sælensminde, 2002).

This paper investigates the value of walking (the activity) and walkability (the quality of walking conditions, including factors such as the existence of walking facilities and the degree of walking safety, comfort and convenience). It identifies categories of economic benefits, describes how they can be measured, and the degree to which these are reflected in current transport and land use planning. This paper can only provide a general review of these issues – more analysis is needed to create practical tools that can be used by transport planners to quantify the full benefits of walkability.

Most analysis in this paper applies to any form of nonmotorized transportation, including cycling and skating, and particularly to wheelchair use. For simplicity I use the term "walking" and "walkability", but readers may wish to substitute "nonmotorized travel" and "nonmotorized travel conditions" to be more inclusive.

Categories of Economic Impacts

"Economics" refers to the allocation of valuable resources, including both market resources (money, labor and land) and nonmarket resources (safety, clean air, wildlife habitat, and even aesthetic value). "Economic impacts" refer to benefits and costs, that is, an increase or reduction in resource value. This section describes major categories of economic impacts associated with walking and how they can be evaluated. It indicates the types of benefits that tend to result from improved walkability and increased walking, and the types of costs that are likely to result from degraded walkability and reduced walking. Note that these benefit categories may overlap, so care may be needed to prevent double-counting if various impacts are summed.

Accessibility and Transportation Costs

Description

Accessibility (or just *Access*) refers to the ability to reach desired goods, services and activities ("Accessibility," VTPI, 2002). Walking is an important form of access, both by itself and in conjunction with other modes (transit, driving, air travel, etc.). Walkability affects *basic access*, that is, access to activities with high social value, such as essential services, education and employment. It is particularly important for people who are economically, physically or socially disadvantaged. Poor walking conditions can cause physical, economic and social isolation for vulnerable populations.

Although walking seems relatively unimportant when evaluated by distance traveled, it becomes more important when evaluated in terms of travel time. For example, a typical person may average one mile of walking and twenty miles of driving per day on public facilities. In terms of distance, driving is twenty times more important than walking. But since driving is about ten times faster than walking, this person spends half as much time walking as driving on public facilities, and a modest improvement in walking access (for example, a pedestrian shortcut between their home and local shops) can provide travel time savings that are comparable to a major roadway improvement.

Walkability affects consumer transport costs. Good walking conditions allow consumers to reduce their automobile expenses. McCann (2000) found that households in automobile-dependent communities devote more than 20% of household expenditures to surface transportation (more than $8,500 annually), while those in communities with more accessible land use and more multi-modal transportation systems spend less than 17% (less than $5,500 annually), representing savings of hundreds of dollars a year.

Evaluation Methods

Walking accessibility can be evaluated based on the quality of pedestrian conditions and the distribution of destinations, with special consideration to "basic access" (people's ability to reach destinations considered important to society, such as medical services, schools and work). The value of marginal changes in walking conditions can be

quantified based on changes in travel time costs; based on costs compared with other access options such as driving; and by using contingent valuation surveys to determine the value people place on improved pedestrian accessibility.

Health

Description

Physical Activity refers to physical exercise. Inadequate physical activity is a major contributor to health problems. Even modest increases in physical activity tend to reduce mortality rates. Health experts recommend at least 30 minutes of moderate exercise a day, at least 5 days a week, in intervals of ten-minutes or more (Surgeon General, 1999).

Diseases Associated With Physical Inactivity (Killingsworth and Lamming, 2001)

- Heart disease
- Hypertension
- Stroke
- Diabetes
- Obesity
- Osteoporosis
- Depression
- Some types of cancer

An increasing portion of the population, including many children, lack regular physical activity. Although there are many ways to be physically active, walking is one of the most common, and improved walkability is a practical way to increase physical activity. Walking tends to be particularly important for elderly, disabled and lower-income people who have few opportunities to participate in sports or formal exercise programs. Jackson and Kochtitzky (2001) argue that more balanced transportation systems can contribute to improved public health by accommodating and encouraging active transportation.

The health benefits of increased walking and improved walkability are potentially quite large. Cardiovascular diseases are the leading causes of premature death and disability in developed countries, causing ten times as many lost years of productive life as road crashes (Murray, 1996). Even modest reductions in these illnesses could provide even greater overall health benefits than large reductions in traffic crashes.

Walking has a relatively high crash fatality rate per mile of travel, but this is offset by reduced risk to other road users and by the fact that pedestrians tend to travel less overall than motorists (for example, a walking trip to a local store often substitutes for a longer car trip to a more distant shopping center). International research suggests that shifts to nonmotorized transport increases road safety overall ("Safety Evaluation," VTPI, 2002). For example, the Netherlands has a high level of nonmotorized transport, yet the per capita traffic death rate, and the cyclist death rate per million km ridden, is much lower than in more automobile dependent countries (Pucher and Dijkstra, 2000).

Evaluation Methods

Public surveys can be used to determine the degree that people in an area rely on walking for exercise, and the degree to which improved walkability is likely to increase physical activity by otherwise sedentary people. More research is needed to determine to what degree improved walkability increases physical activity and health.

Reduced Transportation Externalities

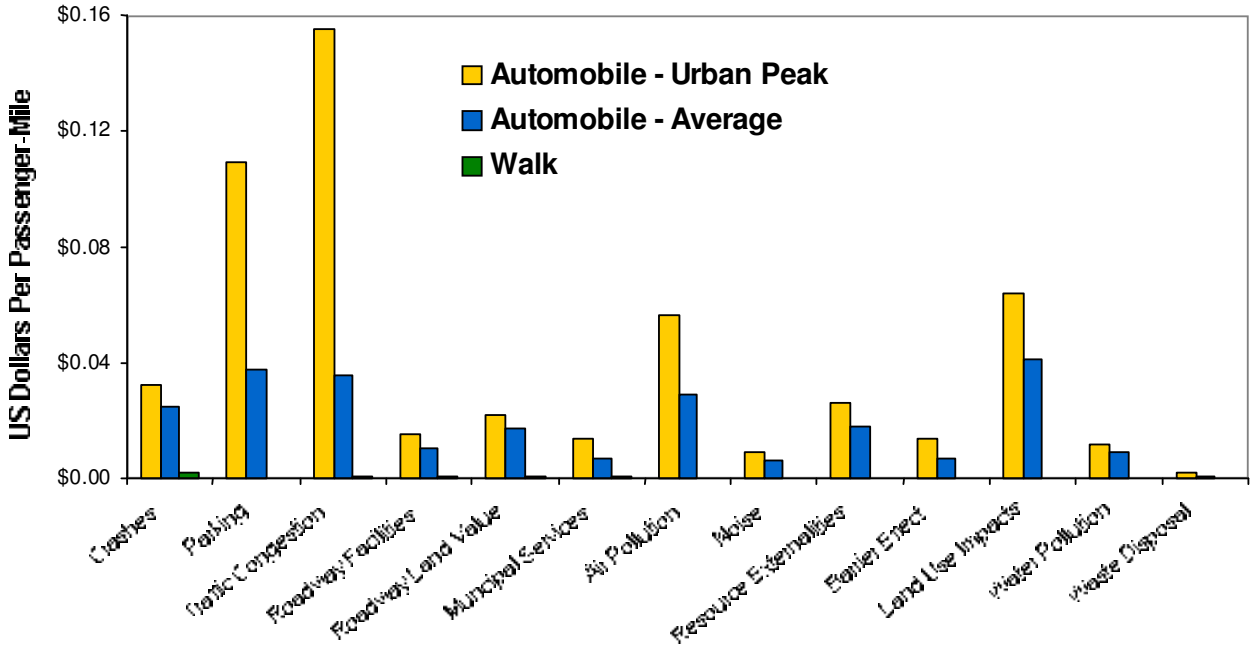
Description

Automobile use imposes various external costs, including public costs for road and parking facilities, traffic congestion, crash risk, and various environmental impacts (McCubbin and Delucchi, 1996: *ExternE*, 2002). Other modes also impose external costs, but generally at a lower rate per trip. Walkability improvements that reduce automobile travel can reduce these external costs (Litman, 2000).

Evaluation Methods

A variety of methods are used to calculate the external cost savings that result when travel shifts from driving to other modes. Figure 1 illustrates one comparison of the estimated external costs of driving and walking. Shifting travel from driving to walking can help reduce a variety of external costs, providing savings averaging approximately 25¢ per vehicle-mile reduced, and 50¢ per vehicle-mile reduced under urban-peak conditions.

Figure 1 **Estimated External Costs of Automobile Travel and Walking** (Litman, 2002)



This figure compares the estimated external costs of automobile and pedestrian travel. Shifting from driving to walking provides savings averaging approximately 25¢ per vehicle-mile reduced, and 50¢ per vehicle-mile reduced under urban-peak conditions.

Land Use Efficiency and Community Livability

Description

Low-density development with large amounts of land paved for roads and parking imposes various economic, social and environmental costs (Burchell, 1998), as summarized in Table 1. *Community Livability* refers to the environmental and social quality of an area as perceived by residents, employees, customers and visitors. Walkability improvements can help improve land use efficiency and community livability by reducing the amount of land required for transportation facilities, encouraging more clustered land use patterns, improving local environmental quality and increasing community interaction (Ewing, Pendall and Chen, 2002).

Table 1 **Costs of Sprawl** ("Land Use Evaluation," VTPI, 2002)

Economic	Social	Environmental
• Reduced accessibility and higher transportation costs. • Increased land devoted to roads and parking facilities. • Increased costs to provide public services. • Reduced economies of agglomeration. • Reduced economies of scale in transit and other alternative modes. • Threats to environmentally-sensitive businesses (e.g. farming and resorts).	• Reduced accessibility for people who are transport disadvantaged. • Reduced housing options. • Increased external transport costs (crashes, facility costs, etc.). • Degraded public realm. • Reduced neighborhood interaction and community cohesion. • Reduced opportunities to preserve cultural resources. • Reduced exercise by walking and cycling.	• Increased impervious surface. • Reduced greenspace and habitat. • Increased energy consumption and pollution emissions. • Aesthetic degradation. • Increased water pollution. • Increased "heat island" effects.

This table summarizes various costs of sprawl that can be reduced by Smart Growth.

Evaluation Methods

Evaluating these impacts requires:

1. An understanding of how transport in general, and walkability in particular, affect land use patterns (Carlson, Wormser and Ulberg, 1995). Compared with driving, walking requires far less space for travel and parking, does not require setbacks to mitigate traffic noise, and requires more clustered development for accessibility. As a result, walkable communities can devote less land to pavement and do not sprawl, reducing per capita land consumption.
2. An understanding of the economic impacts of different land use patterns, including the economic, social and environmental benefits from reduced impervious surface, and more clustered development ("Land Use Evaluation," VTPI, 2002).

3. An understanding of how walkability affects community livability, and how this affects property values and business activity in an area, which can be measured with techniques such as hedonic pricing and contingent valuation (Hanley and Spash, 1993; Litman, 2002).

Economic Development

Description

Economic Development refers to progress toward a community's economic goals, including increases in economic productivity, employment, business activity and investment ("TDM and Economic Development," VTPI, 2002). Walkability can affect economic development in several ways (LGC, 2001). Retail and employment centers are affected by walking conditions. Pedestrianized commercial districts ("Mainstreets") can be important for urban revitalization (Tyler, 1999; Bohl, 2002). They can help create a lively and friendly environment that attracts residents and visitors.

Walkability improvements can also support regional economic development by shifting consumer expenditures (an indirect benefit from the transport cost savings described earlier). Expenditures on automobiles, fuel and roadway facilities provide relatively little regional economic activity because these goods are capital intensive and mostly imported from other regions ("Economic Development Impacts of TDM," VTPI, 2002).

Evaluation Methods

Walkability can affect economic development in several ways, each of which can be considered in the evaluation process. Market surveys and property assessments can be used to identify how walkability factors affect commercial activity (such as retail sales), consumer satisfaction, competitiveness, employment, tax revenue, and property values in an affected area. Input-output tables can be used to determine how changes in consumer expenditures affect regional employment and business activity (Weisbrod, 2000).

Equity

Description

Equity refers to the distribution of resources and opportunities ("Equity Evaluation," VTPI, 2002). There are several specific types of equity affected by transportation decisions, including horizontal equity (people with equal needs and abilities should be treated equally), and vertical equity (people with greater needs or lesser abilities should receive a greater share of resources). Walkability can help achieve equity objectives, including a fair distribution of public resources for non-drivers, financial savings and improved opportunity for lower-income people, increased accessibility to people who are transportation disadvantaged, and improved basic access.

Evaluation Methods

Because there are different types of equity, a variety of factors should be considered when evaluating transportation equity impacts ("Equity Evaluation," VTPI, 2002). Equity benefits cannot be monetized, but most communities seem to place a high value on achieving equity objectives (Forkenbrock and Weisbrod, 2001).

Summary of Economic Impacts

Table 2 summarizes the categories of economic benefits described above that should be considered when evaluating walking. In most situations, several impacts should be considered, with results added to determine total benefits. For example, a particular sidewalk improvement may increase community livability (and therefore property values), improve accessibility, support equity objectives, provide consumer cost savings, benefit the local economy (increasing employment, tax revenue and property values), improve aerobic fitness for some residents, reduce vehicle traffic impacts, and support more efficient land use. The projects full value is the sum of these individual benefits.

Table 2 **Walkability Economic Impacts**

	Description	Criteria	Measuring Techniques
Accessibility and savings	Ability to reach goods, services and activities. Consumer transportation cost savings.	Degree that walking provides mobility options, particularly for people who are transportation disadvantaged.	Travel modeling, analysis of travel options, consumer expenditure surveys.
Health	Amount of active transportation and net impacts on public health.	Degree that walking provides physical exercise to people who are otherwise sedentary.	Travel and health surveys to determine the number of people who benefit from walking exercise.
External costs	Reductions in transportation costs for facilities, congestion, crashes, and environmental impacts.	Degree that walking substitutes for vehicle travel and reduces negative impacts.	Determine to what degree walking reduces motor vehicle travel, and the economic savings that result.
Efficient land use	More efficient land use associated with more pedestrian-oriented land use patterns.	Degree that walking helps reduce the need for roadway and parking facilities, and helps create more clustered land use.	Identify the full economic, social and environmental benefits of more pedestrian-oriented land use.
Livability	The quality of the local environment and community interactions.	Degree that walking improves the local environment. Reduced vehicle traffic and speeds.	Property values, business activities, consumer preference surveys.
Economic development	Effects on commercial activity, and shifts in consumer expenditures toward more locally produced goods.	Degree to which walking makes commercial areas more attractive and reduces consumer expenditures on vehicles and fuel.	Market surveys and property assessments. Input-output table analysis.
Equity	Distribution of resources and opportunities.	Degree that walkability helps provide basic mobility and	Various indicators of horizontal and vertical

		benefits disadvantaged people.	equity.

This table summarizes various categories of impacts to consider when evaluating walking.

Planning Applications

The value of walkability can be incorporated into transport planning decisions in various ways, reflecting various perspectives and assumptions. Three of these are described below.

Proportional Share

One approach that many people consider fair and efficient, is to allocate transport resources based on each mode's share of total travel. For example, a mode which represents 2% of travel should receive about 2% of transport resources, and a mode which represents 20% of travel should receive 20% of resources. As discussed earlier, conventional travel surveys undercount walking. Although only about 5% of trips are made completely by walking, three to six times as many urban trips involve at least one walking link, and 20-40% of travel time is spent walking or waiting. By this measure, a major share of transport resources should be devoted to walking.

Local governments devote a relatively large portion of funds to walking facilities, perhaps 5-15% of roadway budgets, and somewhat more if recreational trail expenditures are also included. However, local governments spend only about a quarter of total transport funds and other levels of government provide far less support for walking. One study calculates that pedestrian projects receive 0.7% of total federal transport funds, and no state spends more than 2.7% of federal transportation funds on nonmotorized transport, although pedestrians represent about 13% of traffic fatalities (STPP, 2002).

As a result, nonmotorized transportation receives a fair slice of the smallest of the three transport budget pies, and very little from the other two. The table below illustrates the estimated portion of transport expenditures devoted to walking, using upper-bound values (actual numbers are probably smaller). By this estimate, walking receives somewhat less than its proportion of trips as measured by conventional travel studies, and far less than indicated by more comprehensive counts.

Table 3 **U.S. Roadway Expenditures** (2000, Billions) (BTS, 2001, Table HF-10)

	Total Roadway Expenditures	**Estimated Portion Devoted To Walking**	**Walking Expenditures**
Federal	$30.8	2.5%	$0.8
State	$66.4	1%	$0.7
Local	$31.3	10%	$3.1
Totals	*$128.5*	*3.5%*	*$4.6*

This table shows the estimated portion of roadway expenditures devoted to walking. About 10% of the federal transportation budget is devoted to "Enhancements," of which about half is spent on Bike/Ped projects. Assuming half of this is devoted to walking, this represents 2.5%.

This discrepancy between the portion of travel by walking and the portion of resources devoted to walking becomes far larger when other public resources devoted to transport are included, such as expenditures on parking facilities and traffic services, and the opportunity cost of public lands devoted to roadways. Including these, less than 2% of total public resources devoted to transport are allocated to walking.

There are many reasons to criticize the assumption that each mode should receive its proportional share of transport resources. It is backward looking, reflecting previous transport patterns rather than the transportation system society wants in the future. Some modes provide special social benefits, bear special costs, or reduce externalities. There are several reasons that walking might deserve *more* than a proportional share of transport resources:

- Walking provides basic mobility and serves trips with high social value (such as access to medical services, education, employment and other essential activities). A basic level of walkability can be considered essential.
- Certain walking facility improvements serve other modes (e.g., transit, airports, parking facilities, ferry terminals, etc.) and so should be included in other transportation budgets
- Walking is particularly important for people who are transportation disadvantaged. Walkability improvements provide equity benefits, and bear special costs associated with serving people with physical disabilities.
- Walking provides both transport and recreation and so deserves funding from both transport and recreation budgets. For example, it may be appropriate to devote 10% of a jurisdiction's transportation budget *and* 20% of its recreation budget to pedestrian facilities.

If we apply the principle that each mode should receive its proportional share of transportation resources, this suggests that walking should receive 10-20% of *total* transportation resources (not just municipal transport agency funds), five to ten times what is currently devoted to walking facilities and services, in addition to a significant share of recreational funding.

Cost Allocation

Transportation cost allocation evaluates policies and programs based on whether each user group pays its share of costs through user charges such as road tolls, fuel taxes and vehicle registration fees (FHWA, 1997). This reflects the principle of horizontal equity (consumers should pay for what they get and get what they pay for, unless a subsidy is specifically justified), and the principle of economic efficiency (prices should equal long-run marginal costs) ("Market Principles," VTPI, 2002).

Many people assume that because motorists pay special fees dedicated to transport, nonmotorized modes underpay their fair share of transport costs and so deserves little investment. This is not necessarily true. Although vehicle use fees provide most funding for major highways, local roads, parking facilities and traffic services are funded through general taxes that residents pay regardless of how they travel. An average household pays

several hundred dollars annually in general taxes for local transportation facilities and services. The example below illustrates this point.

Example

Two neighbors each pay $300 annually in local taxes that fund transport facilities and services. Mike drives 10,000 miles annually on local roads, while Frances walks 3,000 miles. The table below compares their tax payments and transportation costs.

Table 4 **Local Transportation Payments and Costs** (Litman, 1998)

	Mike	**Frances**
A. Annual local mileage	10,000	3,000
B. Household's general taxes used for road related services.	$300	$300
C. Motorist user fees spent on local road (0.2¢ per mile).	$24	$0
D. Total road system contribution (B + C)	$324	$300
E. Tax payment per mile of travel (B/A).	3.2¢	10¢
F. Roadway costs (cars = 5¢/ml, walking = 0.2¢/ml)	$500	$48
Net (D – F)	*Underpays $176*	*Overpays $252*

Non-drivers pay almost as much as motorists for local transportation facilities and services, but impose lower costs. As a result, they tend to overpay their share.

Although an *average* household pays its share of transport costs in taxes, individuals who drive more than average underpay, and those who drive less than average overpay their costs. As a result, taxpayers who drive less than average subsidize their neighbors who drive more than average. These subsidies can be significant, totaling hundreds of dollars annually for somebody who relies primarily on nonmotorized transport. These cross subsidies are two or three times greater when other external costs of automobile use are also considered, such as public resources devoted to parking facilities, uncompensated crash damages, and negative environmental impacts (Litman, 2002).

This suggests that applying cost allocation principles, motorists should pay significantly more than they currently do in user fees, and far more resources should be devoted to nonmotorized transport facilities or nondrivers should receive tax discounts.

Benefit-Cost Analysis

A third approach to evaluating transportation policies and programs, and the approach that is considered most appropriate for maximizing efficiency, is to use benefit-cost analysis (Litman, 2001). This approach focuses on the incremental costs and benefits of a change, for example, from improved pedestrian facilities or roadway traffic calming.

Benefit-cost analysis is applied to individual policies and projects, so it is difficult to make broad conclusions as to what effect its application would have on transportation decision making. However, for reasons described below, it is likely that rigorous application of benefit-cost analysis could increase the resources devoted to walking.

- Economic evaluation seldom considers the full range of benefits from improved walkability and increased walking described in this paper. More comprehensive benefit-cost analysis is likely to identify greater benefits and so justify greater investments.
- Most standard transportation economic evaluation methods are designed to evaluate vehicle traffic or transit services. Walkability has generally been ignored or considered simply as a minor component of motor vehicle networks, for example, to access parking facilities or transit. Only recently have evaluation tools, such as pedestrian level of service rating, been developed and these are still not widely applied. Applying such tools is likely to support greater investment in walkability improvements.
- As described earlier, current transportation planning practices tend to undercount walking. Better counting of walking trips will tend to recognize more demand, and therefore greater potential benefits from walkability improvements.
- There is increasing recognition of the diminishing economic benefits from increased highway investments (Boarnet and Haughwout, 2000), the significant social costs of automobile dependency, and the large potential social benefits of a more diverse transportation system ("Evaluating Transportation Options," VTPI, 2002).
- There is increasing recognition of the value of smart growth land use management to achieve social objectives ("Smart Growth," VTPI, 2002). These strategies tend to place a high value on walkability.
- Current transportation funding is biased against nonmotorized modes. Only a small portion of total transport funds may be used for nonmotorized facilities, and financial match requirements are sometimes higher. More neutral investment policies would increase the amount of money available for walking.

This suggests that current planning and investment practices significantly undervalue walking, resulting in underinvestment in walkability. More comprehensive benefit-cost analysis could justify devoting more public resources to walkability improvements.

More comprehensive benefit-cost analysis requires better techniques to measure and predict travel impacts of improved walkability, and to evaluate the full economic impacts that result, including indirect and nonmarket impacts that are not usually quantified in transport planning such as environmental, economic development and equity impacts.

Conclusions

Conventional transport planning treats walking as a minor mode and recognize only modest benefits from improved walkability and increased walking. This reflects evaluation practices that undercount nonmotorized travel and undervalue walking benefits. Other perspectives indicate that walking is a critical component of the transport system, and walking conditions have major economic, social and environmental impacts. Improved walkability and increased walking can provide a variety of benefits, including accessibility, transport cost savings, improved public health, external cost reductions, more efficient land use, community livability, economic development, and support for

equity objectives. Various methods can be used to measure these benefits, although some, such as achieving equity objectives, are not easily quantified

Greater appreciation of walking could change planning priorities. Conventional planning practices suggest that the current share of public resources devoted to walking is fair and efficient, but this reflects undercounting of total walking activity, undervaluation of walking benefits, and undervaluation of motor vehicle external costs. More comprehensive evaluation indicates that walking deserves a greater share of transport resources. Recognizing a higher value to walking and walkability could have various effects on transportation and land use planning, such as those described below.

- *Increased Funding*. More comprehensive measurement of walking activity and the value of walkability could justify increased investments in walking improvements. For example, devoting transport funding to nonmotorized modes based on a proportionate share of trips could more than triple their funding over current practices.

- *Shifting Road Space.* Valuing walking could raise the acceptable design standards for sidewalks and paths, increase transport planners' willingness to devote roadway rights of way to walking facilities, and to shift existing vehicle traffic and parking lanes to create more sidewalk space. Many streets have no sidewalk at all, and many sidewalks have inadequate width, often because they are crowded by utility poles and street furniture.

- *Land Use Patterns.* A greater appreciation of the value of walkability could increase support for "smart growth" development policies that cluster common destinations within convenient walking distance of each other. For example, it would increase support for locating public schools and retail centers near residential neighborhoods, creating good pedestrian circulation within commercial area, and designing buildings to face the street, rather than being set behind large parking lots. It would justify parking management programs that reduce the amount of land devoted to parking facilities.

- *Vehicle Traffic Controls.* A greater understanding of the value of walkability could justify more traffic calming and speed control efforts in order to reduce the risk and discomfort that motor vehicle traffic imposes on walkers.

- *Mobility Management.* Improved walkability supports and is supported by *mobility management* (also called *transportation demand management*) strategies that increase transportation system efficient and reduce the total amount of vehicle travel that occurs in a community. These strategies including pricing reforms, improved transport options, commute trip reduction programs, transit and rideshare programs (VTPI, 2002).

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