ECONOMIC ASSESSMENT OF THE TRANSIT SYSTEM IN MILWAUKEE

Date: March 5, 2004

MILWAUKEE COUNTY TRANSIT SYSTEM

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FINAL REPORT

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EXECUTIVE SUMMARY

Economic impact assessment of any transit system facilitates a better understanding of transit authorities and general public of the transit system's impact on the regional economy. MCTS Transit System, as an integral part of the Milwaukee County's regional economy, generates various benefits. Every dollar of the transit system spent on providing transportation services creates additional jobs, additional earnings and output within the transit system itself and in other regional industries. In addition, it reduces some negative aspects of the use of personal vehicles, such as traffic congestion, delays and the related productivity losses, saves on parking costs, as well as it significantly enhances road safety and reduces harm to the environment. Moreover, increased transit use tends to discourage sprawl.

In 2003, MCTS provided over 56.9 million trips covering the 237 square miles of its service area. The agency generated over $633 million in economic value for the regional economy while its expenditures were estimated at $137.9 million in the same year. In other words, MCTS Transit System delivered $4.72 of economic value for each dollar spent on providing transit services.

Table E-1: Summary of Results

Category	Value ($ Millions)
MCTS Transit System Total Expenses in 2003	**$137.9**
MCTS Transit System Economic Impact in 2003	
Congestion Management Benefits	$65.0
Affordable Mobility Benefits	$256.3
Enterprise Benefits (Output)	$319.0
Total Benefits	**$651.4**
Economic Value Created per Dollar of MCTS Transit System Expense – Excluding Enterprise Benefits (dollars)	**$2.33**
Economic Value Created per Dollar of MCTS Transit System Expense – Including Enterprise Benefits (dollars)	**$4.72**

The benefits of transit in Milwaukee were estimated under three main categories:

- Congestion Management Benefits
- Affordable Mobility Benefits, and
- Enterprise Benefits

CONGESTION MANAGEMENT BENEFITS

The presence of transit encourages some travelers to switch to transit. As a result, travel times on roadways during peak periods improve; air pollution and car accidents (and their associated costs) are significantly reduced. To put it another way, in the absence of transit, new trips would be added to the roadway network, and thus additional vehicle miles traveled (VMT) would be generated. The congestion management benefits of transit are the cost savings of those additional VMT to the regional economy.

The analysis has revealed that, in year 2003, MCTS reduced congestion-related costs in the Milwaukee County region by ***$65 million***. In particular, vehicle ownership and operating cost savings have been estimated at $42.9 million and Travel time value savings totaled $13.4 million. The environmental and safety costs savings attributable to the transit system were estimated at $2.9 million and $5.8 million, respectively. Table E-2 provides a summary of congestion management benefits attributable to MCTS Transit System.

Table E-2: Congestion Management Benefits in the Milwaukee County in 2003

Transit Mode	Vehicle Ownership and Operating Cost Savings	Emission Cost Savings	Safety Cost Savings	Travel Time Value Savings	Total Social Cost Savings
Fixed-Route Bus	$39,823,757	$2,700,912	$5,397,195	$12,415,152	$60,337,016
Paratransit	$3,052,422	$207,020	$413,686	$951,600	$4,624,727
Total	$42,876,179	$2,907,932	$5,810,881	$13,366,751	**$64,961,743**

AFFORDABLE MOBILITY BENEFITS

As high as 37.3%[1] of MCTS Transit System passengers do not have access to a car, and thus depend heavily upon other available modes of transportation, such as taxis and public transit system. The absence of transit would lead about 14.7% of people[2] using MCTS's Fixed-Route Bus service to forego their trips. HLB estimates that some 40%[3] of those foregone trips would lead to unemployment. While vehicle operating costs and taxi fares are increasing from year to year, another part of passengers would spend a considerably higher portion of their income on transportation at the expense of food, health care, housing and other staples.

Transit system creates expenditure value and employment value, thus affordable mobility helps increase consumer savings. Affordable mobility also generates cross-sector benefits by reducing social service outlays on home health care and social services such as food stamps and unemployment compensation.

This study has found that, in fiscal year 2003, MCTS Transit System added a total estimated value of ***$267.4 million*** in affordable mobility benefits to the regional economy. The expenditure and employment values have been estimated at $194.7 million (72.8%) and $29.6

[1] Derived from May 2003 Wisconsin Department of Transportation survey.
[2] Derived from May 2003 Wisconsin Department of Transportation survey.
[3] This estimate is based on experience from other transit agencies.

million (11.1%), respectively. Cross-sector benefits amounted to $43.2 million (16.1%). Table E-3 below provides a summary of affordable mobility benefits attributable to MCTS.

Table E-3: Affordable Mobility Benefits in the Milwaukee County in 2003

Benefit Category	Expenditure Value	Employment Value	Cross-Sector Value	Total Benefits
Fixed-Route Bus	$184,190,690	$29,313,463	$41,900,031	$255,404,184
Paratransit	$10,518,827	$248,416	$1,253,067	$12,020,310
Total	$194,709,517	$29,561,879	$43,153,097	**$267,424,494**

ENTERPRISE BENEFITS

In addition to the non-market benefits, reported above, MCTS's services generate economic activities measured in terms of output, employment and labor income (earnings). These economic activities, traditionally called economic impacts, can be further divided in three sub-categories: direct impacts (direct expenses by the transit agency), indirect impacts (purchases by local firms who are the direct suppliers to the transit agency), and induced impacts (re-spending of income from the direct and indirect impacts).

In year 2003, MCTS Transit System generated about ***$319 million*** in output value. Direct impacts (that is, MCTS's total expenses) amounted to $137.9 million or 43.2% of the total output value. Induced impacts accounted for $122.6 million (38.4%), while indirect impacts accounted for only $58.5 million (18.3%). MCTS also created 2,026 jobs (FTE) and generated about $74.3 million in earnings. Table E-4 provides a summary of enterprise benefits attributable to MCTS.

Table E-4: Enterprise Benefits in Milwaukee County in 2003

Category of Benefit	Direct Impact	Indirect Impact	Induced Impact	Total Benefits
Output ($000's)	$137,900,000	$58,516,762	$122,631,988	$319,048,750
Earnings ($000's)	$55,200,000	$6,776,877	$12,275,583	$74,252,460
Employment (FTEs)	1,329	176	522	2,026
Output/FTE	$103,762	$332,982	$235,056	$157,442
Earnings/FTE	$41,535	$38,563	$23,529	$36,642

1. INTRODUCTION

The purpose of this study is to assess the economic impact of the Milwaukee County Transit System on the region's economy.

In 2003, the agency provided over 55.8 million Fixed-Route Bus trips and 1.1 million Paratransit trips. MCTS operates a fixed-route bus service and a Transit Plus transportation service for individuals with disabilities unable to ride transit system's buses (referred to as Paratransit service throughout the report).

In order to calculate the economic impact of MCTS Transit System on the regional economy, three transit benefits categories have been identified and presented in this report as follows: congestion management benefits, affordable mobility benefits, and enterprise benefits. These categories have been further subdivided to narrow the economic value generated in the areas affected for the reader.

1.1 Background

In general, transit system benefits the regional economy in many ways. First, transit serves to manage traffic congestion in urban areas, especially during peak periods. The use of transit contributes to reduce personal vehicle trips thus directly saving resources, which are more productively spent elsewhere in the economy. Moreover, fewer personal vehicle trips result in the reduction of roadway congestion that benefits all travelers. This also yields resource savings and their redirection to better and more efficient uses.

Transit also provides low cost travel opportunities to many lower income households. Individuals with access to transit can enjoy the benefits of social interaction, entertainment and education, which in turn influence their contribution to the economy. Also, low cost mobility extends the opportunities for employment to individuals who may otherwise be unemployed. In the end, low cost mobility reduces the need for costly social services, thus resulting in a direct reduction in welfare and social service budgets.

In addition, for many residents living near transit stops provides an array of benefits. These benefits arise from lower transportation expenses, changing development patterns and other non-use benefits. As a consequence, the presence of transit stops can increase the value of properties located nearby. In other words, there is a direct benefit of transit on household income for properties located near transit stops. This benefit is the equivalent of a direct income supplement for thousands of households located in the proximity of transit.

Taken together, all these characteristics of transit make a positive contribution to the regional economy. More specifically the benefits of transit fall into four main categories that can be defined as follows:

- **Congestion Management Benefits** – Congestion management benefits are the savings in vehicle ownership and operating costs, time, accidents and environmental emissions due to less congestion and fewer miles traveled by personal vehicles due to the transit system. These savings in resources imply greater disposable household

income for other purposes. The two principal benefits are the reduction in travel by personal vehicles, and, travel in less congested conditions by vehicles remaining on the roadway.

- **Affordable Mobility Benefits** – These are the benefits from providing low cost mobility to lower income households. The benefits include income from employment made possible by transit, the economic value of affordable mobility, and budget savings for welfare and social services due to the presence of transit.

- **Enterprise Benefits** – This benefit category refers to the regional economic activity, measured in terms of output, earnings, and employment that may be attributed to the operation of a transit system. It includes the supply of services and the downstream uses due to transit, and, the re-spending of income in the regional economy. Enterprise benefits are composed of direct impacts, indirect impacts, and induced impacts.

- **Neighborhood Development Benefits** – Proximity to transit has a positive effect on residential property values due to the increased availability of travel opportunities, and, the ability of others to access the residence by transit. This benefit category is not quantified in this report and therefore the overall estimated benefits are considered conservative.

HLB developed detailed methodologies[4] for calculating each of these benefits on behalf of the Federal Transit Administration (FTA). The methodologies are consistent with economic theory and yield practical estimates of regional economic benefits without reliance on onerous data requirements.

Table 1 on the next page summarizes the benefits of transit by category of benefit and type of recipient. The benefits of transit accrue to transportation user groups in different proportions depending upon their household income and other socio-economic characteristics (professional status, disability, etc.).

[4] Hickling Lewis Brod (1997) *The Benefits of Modern Transit*, prepared for the Federal Transit Administration; Hickling Lewis Brod (1999) *Method for Streamlined Strategic Corridor Travel Time Management*, sponsored by the Office of Budget and Policy.

Table 1: Benefits of Transit

CATEGORY OF BENEFIT	DISTRIBUTION OF BENEFITS		
	Transit Customer Benefits	**Highway User Benefits**	**Community and Neighborhood Benefits**
Congestion Management Benefits	*Value of travel time savings to transit users.* Economic value manifest in higher productivity and labor market access.	*Value of travel time savings to highway users*. Economic value manifest in higher productivity and labor market access.	*Value of improvements in region-wide reductions in vehicle ownership and operating costs and improvements in air quality and transportation safety.* Economic value manifest in the total resource value of above factors.
Affordable Mobility Benefits	*Value of transit to low-income users as an alternative to less affordable transportation.* Economic value manifest in greater personal income available for food, housing, health care and other staples.	*Value of cross-sector benefits and burdens on home-based social services*. Economic value manifest in reduced financial burdens on social services (food stamps, home care and unemployment compensation.	*Value of reduced pockets of structural unemployment and improved welfare-to-work mobility.* Economic value manifest in reduced financial burdens on social services.
Enterprise Benefits	*Value of direct, indirect and induced impacts of transit system on the regional economy*. Increase in output, employment and earnings across all industrial sectors attributable to the transit system.	*Value of direct, indirect and induced impacts of transit system on the regional economy*. Increase in output, employment and earnings across all industrial sectors attributable to the transit system.	*Value of direct, indirect and induced impacts of transit system on the regional economy*. Increase in output, employment and earnings across all industrial sectors attributable to the transit system.
Neighborhood Development Benefits	*Value of transit-oriented development, including shorter trip lengths and lesser automobile dependence.* Economic value manifest in access to wider range of affordable lifestyle choices.	*Value of neighborhood economic development and amenity in relation to both residential and mixed land uses*. Economic value manifest in improved urban property values.	*Value of reduced automobile dependence and lower total vehicle miles traveled.* Economic value manifest in reduced highway infrastructure outlays and related maintenance expenditures and improved environmental conditions.

1.2 Plan of the Report

The report explains in detail the methodology used to estimate each of the above-mentioned categories of benefits and presents the final results. It is organized in five chapters. Chapter 2 discusses congestion management benefits and Chapter 3 focuses on affordable mobility benefits. Enterprise benefits are estimated in Chapter 4. Finally, Chapter 5 summarizes the results and presents the general conclusions of the study.

Note that, in this report, the benefits of transit are estimated for Fixed-Route Bus service and Paratransit separately in order to highlight the impact difference (both of nature and magnitude) between these two services.

2. CONGESTION MANAGEMENT BENEFITS

The problem of congested major roads is a serious impediment to an efficient use of time and money. It affects riders through a variety of costs such as delays, stress, increased vehicle operating costs, and time costs. It is also one of the sources of pollution, increasing environmental costs.

Availability of public transit can shift travel from personal vehicles to public transit and thus provide considerable benefits of congestion reduction. Reduced congestion in turn generates significant savings to travelers. In addition, transit is an effective and safe[5] congestion relief mechanism that benefits both users of the transit system and other travelers.

1.1. Methodology for estimating Congestion Management Benefits

Given the presence of MCTS Transit System in the Milwaukee County, the methodology adopted for estimating congestion management benefits allows for the estimation of the social costs associated with the absence of a transit system. In other words, the methodology developed by HLB evaluates the incremental costs associated with individuals switching from transit to automobiles. The calculation of congestion management benefits is performed in three steps:

- *Step one* determines the number of trips to be diverted from transit to other transportation modes (solo driving, carpooling[6] and taxi) in the absence of transit system, based on the purpose of passenger trips in the region studied and on the percent of trips to be diverted from currently provided transit service in the hypothetical situation of non-availability of transit system.

- *Step two* translates trips into vehicle miles traveled (VMT) based on the average trip length of each transit service (fixed-route bus and paratransit).

- *Step three* evaluates the costs associated with the VMT generated in the absence of transit and discussed above: (1) vehicle ownership and operating cost based on the speed-flow ratio, travel demand, and vehicle characteristics; (2) travel time cost, based on the non-productive time spent on roadways, which depends on the speed-flow ratio and travel demand; (3) safety cost, based on fatalities, injuries, and property damage for both peak and off-peak periods; (4) environmental cost, based on the speed-flow ratio, travel demand, vehicle characteristics, and motion stroke resulting from the increase in travel demand.

1.2. Estimation of Congestion Management Benefits

The absence of transit leads to additional trips on the roadway network, and as a result, more VMT are generated. The congestion management benefits are the cost savings of these additional VMT to the regional economy.

[5] In 1999, 61% of total occupants killed during traffic accidents in Virginia were car passengers, while bus riders accounted for 0.1% of fatalities only (*Traffic Safety Facts: 1999*, Bureau of Transportation Statistics).

[6] Clearly, trips shifting to carpooling are not as negative as those shifting to solo driving. However, carpooling is included in the analysis because it leads to additional traffic on the roadways.

The estimation of congestion management benefits is based on the key inputs listed in Table 2. HLB used data pertaining to the Milwaukee County area provided by MCTS and data derived from the stated preference survey conducted in the state of Wisconsin in May of 2003. Other regional and state agencies served as sources of data used in computations of social costs associated with the absence of the MCTS Transit System. When local data was not available, HLB used national statistics. All cost estimates are in 2003 dollars.

Table 2: Key Inputs to Estimate Congestion Management Benefits

Variable	Data	Source
FIXED-ROUTE BUS		
% of MCTS Trips Foregone	14.7%	Derived from Wisconsin Department of Transportation Stated Preference Survey 2003.
% of Trips Diverted from Fixed-Route Bus to Solo-Driving	19.8%	Derived from Wisconsin Department of Transportation Stated Preference Survey 2003.
% of Trips Diverted from Fixed-Route Bus to Carpooling	27.5%	Derived from Wisconsin Department of Transportation Stated Preference Survey 2003.
% of Trips Diverted from Fixed-Route Bus to Taxi	12.0%	Derived from Wisconsin Department of Transportation Stated Preference Survey 2003.
Average Length of Fixed-Route Bus Trip in Miles	3.03	MCTS Transit System, 2003.
Fixed-Route Bus Ridership in 2003	47,952,308	MCTS Transit System, 2003 (Revenue passengers).
PARATRANSIT		
% of Paratransit Trips Foregone	10%	HLB estimate based on 1995 NPTS.
% of Trips Diverted from Paratransit to family member vehicle	22.5%	HLB estimate based on 1995 NPTS.
% of Trips Diverted from Paratransit to Taxi	67.5%	HLB estimate based on 1995 NPTS.
Average Length of Paratransit Trip in Miles	6.4	MCTS Transit System, 2003.
Paratransit Ridership in 2003	1,025,018	MCTS Transit System, 2003 (Revenue passengers).
OTHER INPUTS		
Vehicle Ownership and Operating Cost per Mile	$0.517	*Your Driving Costs*, American Automobile Association, 2003.[7]
Parking Fee per day	$6	*Average Parking assumption for the City of Milwaukee*
Environmental Cost per Mile	$0.0351	*Vehicle Operating Costs, Fuel Consumption, and Pavement Type and Condition Factors*, Texas Research and Development Foundation, Austin, Texas, Federal Highway Administration, June 1982. *Monetary Values of Air Pollution Emissions in Various U.S. Regions*, Wang M.Q. and D.J. Santini, Transportation Record 1475, January 1995.
Safety Cost per Mile	$0.0701	*The Costs of Highway Crashes*, The Urban Institute, Federal Highway Administration Research Report No. FHWA-RD-91-055, October 1991.[8]
Value of Travel Time per Hour	$5.16	2001 mean hourly wage estimate for all occupations in Milwaukee-Waukesha, WI PMSA (Bureau of Labor Statistics). The original estimate was converted to 2003 dollars by using the BLS Employment Cost Index for total compensation of all civilian workers.

[7] Assuming a mileage of 15,000 miles annually.
[8] Estimate for a 4-lane partial access control and an average annual daily traffic (AADT) between 0 and 6,000.

To provide with the logic employed when obtaining input values necessary to obtain social costs associated with the absence of MCTS transit system, the following table summarizes trip purpose distribution in Milwaukee County, representing essential information in order to derive the amount of foregone and diverted trips by trip purpose.

Table 3: Trips Purpose Distribution in Milwaukee County

What is the PURPOSE of your trip today?	MILWAUKEE COUNTY
Work	39.7%
Medical	8.7%
Education	21.6%
Shopping, Tourism, or Recreation	16.5%
Other	13.6%
Total	100.0%

Source: Wisconsin Department of Transportation Stated Preference Survey, May 2003.

First, the numbers of trips for each trip purpose were obtained. Following, the amounts of trips foregone have been obtained by multiplying the numbers of trips for each purpose by the percentage of trips of the corresponding purpose category to be foregone in the absence of transit system.

Table 4: Trips Foregone in Milwaukee County

If public transportation was not available in your town, you would:	Work Trips	Medical Trips	Education Trips	Shopping, Tourism & Recreation Trips
Not be able to work	14.2%			
Work at	4.5%			
Not seek medical assistance as often		17.5%[9]		
Receive home care		8.7%		
Not be able to attend school/college			10.1%	
Shop online or by catalog				11.0%

Source: Wisconsin Department of Transportation Stated Preference Survey, May 2003.

The amounts of trips diverted from fixed-route bus to one of the alternative modes of transportation (personal vehicle, carpooling, taxi) were similarly obtained by multiplying the numbers of trips for each trip purpose by the percentage of trips of the corresponding trip purpose category to be diverted in the hypothetical situation of the absence of transit system. For instance, number of *work* trips diverted from fixed-route bus to personal vehicle has been computed as follows:

Number of work trips diverted from fixed-route bus to personal vehicle =
*Percent of Trips for Work * Number of Trips * Percent of Work Trips to be diverted to Personal Vehicle in the Absence of Transit System*

[9] It has been estimated in previously that transit riders who would not seek medical assistance as often in the absence of transit system would make 2/3 of their current medical trips. Source: The Socio-Economic Benefits of Transit in Wisconsin, 2003.

Table 5 reveals the preferred modes of transportation of MCTS riders were the transit system not available.

Table 5: Trips Diverted from Fixed-Route Bus by Trip Purpose in Milwaukee County

MEANS OF TRANSPORTATION in the absence of Transit	Work trips	Medical trips	Education trips	Shopping, tourism & recreation trips
Drive your personal vehicle	33.1%	17.6%	13.8%	19.5%
Ride with family or friends	29.3%	25%	46.6%	32.9%
Use a taxi-cab (other than shared-ride taxi)	10.8%	38.2%	6.0%	14.6%

Source: Wisconsin Department of Transportation Stated Preference Survey, May 2003.

Thus computed numbers of trips diverted have been summed over trip purposes. The resulting amount of diverted trips has been multiplied by the average length in miles of a fixed-route bus trip to estimate the number of additional VMT generated. Finally, the number of additional VMT has been multiplied by the cost per mile of each cost category. In case of travel time savings, the result has subsequently been divided by the average speed.

Figure 1 on the next page shows the derivation of total passenger trips (in 2003) for fixed-route bus service that would be shifted to alternative transportation modes were the service not offered. The input values for paratransit trips were for the most part HLB estimates based on previous studies or national statistics. The amounts of paratransit trips foregone and diverted were derived in the similar fashion as fixed-route bus trips, except for differentiating between paratransit trips' purposes.

Table 6 summarizes the additional trips and associated VMT generated in the absence of MCTS Transit System for each transit mode. The analysis shows that a total of 22,743,634 trips or 82.9 million VMT would be generated in the absence of transit in the Milwaukee County region. Fixed-route bus service accounts for a very large majority of trips (96%) and VMT (93%).

Figure 1: Additional VMT Generated in the Absence of Fixed-Route Bus

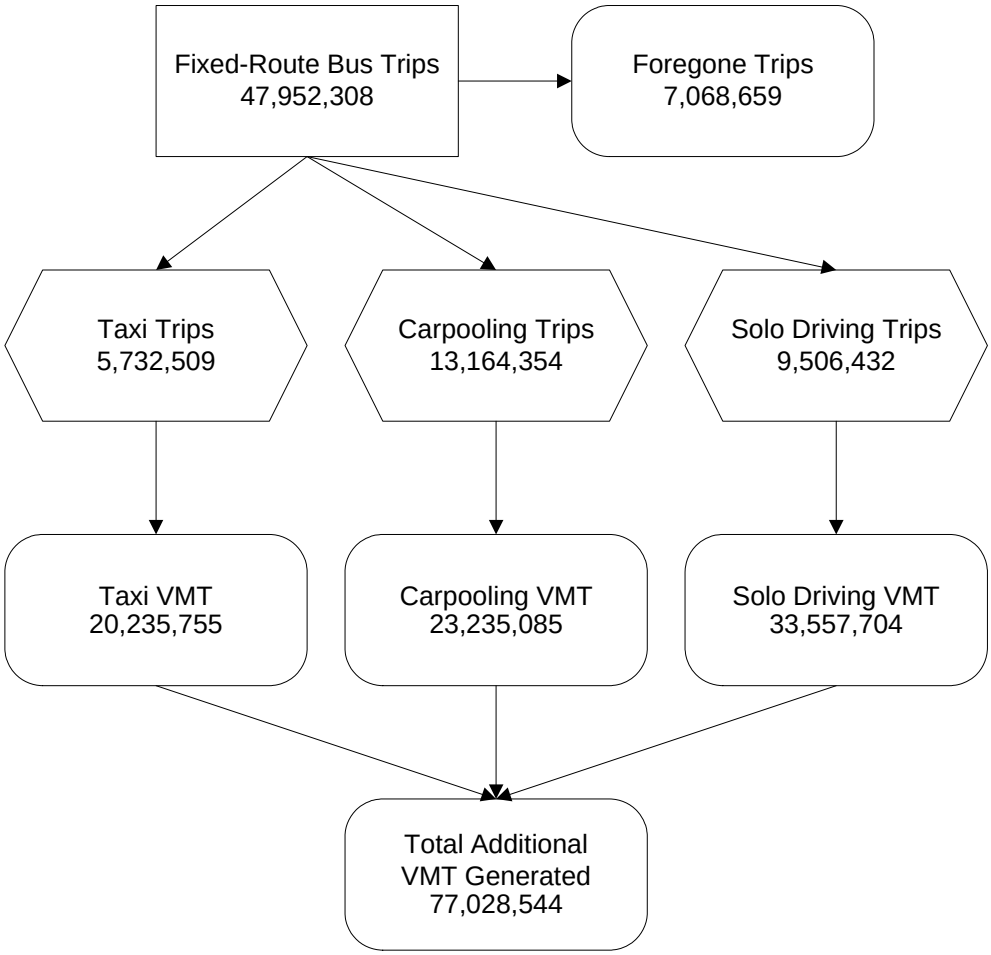


Table 6: Additional Trips and VMT Generated in the Absence of Transit

Transit Mode	Additional Trips	Additional VMT
Fixed-Route Bus	21,821,117	77,028,544
Paratransit	922,516	5,904,104
Total	**22,743,634**	**82,932,648**

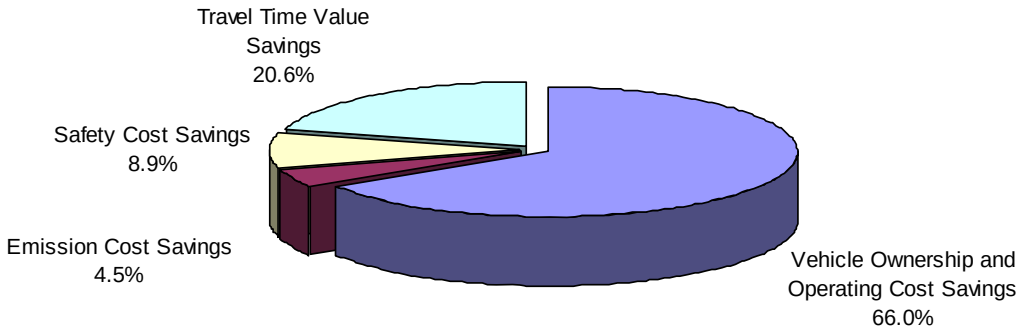
Table 7 below shows total congestion management benefits resulting from the presence of transit services in the region, broken down by cost saving category and transit service.

Table 7: Total Congestion Management Benefits

Transit Mode	Vehicle Ownership and Operating Cost Savings	Emission Cost Savings	Safety Cost Savings	Travel Time Value Savings	Total Social Cost Savings
Fixed-Route Bus	$39,823,757	$2,700,912	$5,397,195	$12,415,152	$60,337,016
Paratransit	$3,052,422	$207,020	$413,686	$951,600	$4,624,727
Total	$42,876,179	$2,907,932	$5,810,881	$13,366,751	**$64,961,743**

Total congestion management benefits amounted to nearly $65 million in 2003 and were allocated as follows: 66% for vehicle ownership and operating cost savings, 4.5% for emission cost savings, 8.9% for safety cost savings and 20.6% for travel time value savings. Figure 2 shows the composition of social cost savings.

Figure 2: Composition of Congestion Management Benefits



3. AFFORDABLE MOBILITY BENEFITS

"Mobility benefits result from increased opportunities for personal mobility than would otherwise occur"[10]. People travel for a variety of purposes such as professional, social, and medical. People enjoy economic benefits from having access to medical services, schools and work place, financial savings from having access to more distant locations of whole sale stores, etc. In other words, economic value people obtain from mobility is the value they derive from satisfying their journey purposes, not from the journey itself. An individual's travel objectives are obtained only at a price, which includes the direct cost paid plus the time cost and the physical effort and inconvenience. The net value people obtain from mobility is equivalent to the derived value as defined above minus their cost for the journey.

3.1 Overview of Affordable Mobility Benefits

Public transit is an important travel mode for low- and middle-income families. Getting around costs these families a larger share of earnings than it costs higher income families. This is true of all modes including autos, transit and taxis. Furthermore, automobile dependency can be a financial burden especially to low-income people.

The provision of affordable mobility to low-income people creates economic value in three categories:

- **Expenditure Value** – In the absence of fixed-route and paratransit services, low-income transit customers would spend a considerably higher portion of their income on other means of transportation. Transit thus raises the standard of living of low-income households by enabling them to allocate a greater share of their income to expenditures on food, health services, housing, and other necessities. The monetary value of these expenditures adds dollar-for-dollar to the total value of the region's economy.

- **Employment Value** – Some transit customers would be unable to participate in the workforce in the absence of fixed-route and paratransit services. From the expenditure value perspective outlined above, the absence of fixed-route and paratransit services would deny low-income workers who use transit the opportunity to allocate their earned income in ways that raise their standard of living. For those who could not work, however, the absence of transit would deny them any earned income at all. The monetary value of employment income that would be lost by those for whom the loss of transit would mean the inability to work (or to work in higher wage-earning jobs) represents another direct benefit of transit to the regional economy.

- **Cross-Sector Value** – Transit helps relieve budgetary cost burdens in non-transportation sectors, particularly home health care, employment insurance, and nutrition. Each net dollar saving in the provision of home health care due to the presence of transit (i.e., the cost of transit minus the cost saving in home health care) represents an additional dollar

[10] Crain & Associates, *Using Public Transportation to Reduce the Economic, Social, and Human Costs of Personal Immobility*, Report 49 Transit Cooperative Research Program, Transportation Research Board (www.trb.org), 1999.

of economic value from the region's health program budgets – and similarly for employment insurance and nutrition budgets.

3.2 Methodology for Estimating Affordable Mobility Benefits

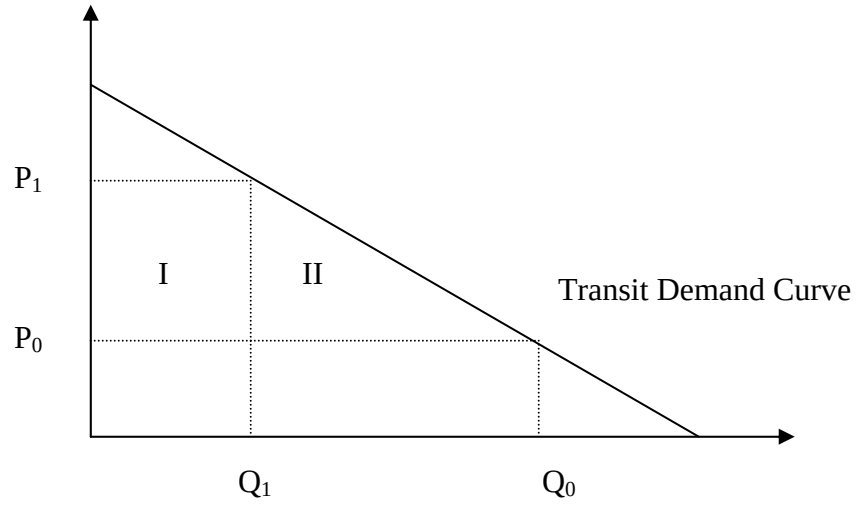
The calculation of affordable mobility benefits is based on data provided mainly by MCTS Transit System and on data derived from the stated preference survey conducted in Green Bay, Madison, Stevens Point, Neillsville, River Falls, and Milwaukee County, Wisconsin. Some of the data originates from the U.S. Department of Transportation; some were obtained from the U.S. Department of Agriculture and from the Wisconsin Department of Workforce Development. The data to calculate affordable mobility benefits includes transit operating data (ridership, average trip length and average fare) and economic data (e.g., minimum wage, unemployment compensation, and food stamp program cost).

3.2.1 Expenditure Value

The expenditure value can be measured as the cost increase that transit-dependent riders experience in the absence of transit system. To quantify the economic value of transit trips, two situations are considered: (1) transit services are available and benefit low-income riders; (2) transit services are not available, therefore some riders have to switch to other higher-cost transportation modes while others will forego their trips. The difference between the two situations is the expenditure value of affordable mobility.

Figure 3 illustrates the approach pursued to estimate the expenditure value for both fixed-route service and paratransit service. Initially, riders pay P_0 per transit trip and demand Q_0 of transit trips. When transit services are eliminated, some riders shift to more costly transportation modes while others have no choice but to forego their trips. P_1 is the new (weighted average) fare per trip using alternative transportation modes and Q_1 is the corresponding trip demand. The difference between Q_1 and Q_0 is the number of foregone trips. The expenditure value to be estimated is the area between P_1 and P_0 under the demand curve (that is, areas I and II).

Figure 3: The Concept of Consumer Surplus



It is clear from Figure 3 that low-income people are better off (in financial and mobility terms) in the presence of transit system ($P_0 < P_1$ and $Q_0 > Q_1$). Economists call the difference between the amount people actually pay for a product or a service and the amount they would pay for the next most costly alternative, "consumer surplus." Consumer surplus is a monetary quantity that equates to the expenditure value (EV) of the mobility afforded to people by the availability of transit. Formally, it can be expressed in the following way:

$$EV_{(\text{Fixed-Route})} = (P^f_1 - P^f_0) * Q^f_1 + \tfrac{1}{2} * [(P^f_1 - P^f_0) * (Q^f_0 - Q^f_1)]$$

$$EV_{(\text{Paratransit})} = (P^p_1 - P^p_0) * Q^p_1 + \tfrac{1}{2} * [(P^p_1 - P^p_0) * (Q^p_0 - Q^p_1)]$$

Where P^f_0 is the average fare paid by fixed-route bus passengers, P^p_0 is the average fare paid by paratransit passengers, Q^f_0 is the number of passenger trips for fixed-route bus service, Q^p_0 is the number of passenger trips for paratransit service. P^f_1 is the average fare that fixed-route bus passengers pay to use other transportation modes, P^p_1 is the average fare that paratransit passengers pay to use other transportation modes, Q^f_1 is the number of fixed-route bus passenger trips shifting to other modes, Q^p_1 is the number of paratransit passenger trips shifting to other modes.

3.2.2 Employment Value

The employment value of transit for low-income households is determined by calculating the number of lost jobs when transit passengers forego trips because of a reduction in transit services. The same data and assumptions made in the previous section are used. HLB estimates that the percentage of foregone work trips that would lead to unemployment is 40%.[11]

Based on demand elasticity theory, it is clear that a large number of foregone work trips will result in job losses because of the sharp increase in transportation cost for low-income individuals. It is very conservative to estimate that only 40% of MCTS riders who use transit services to reach their work destination will lose their jobs should transit be eliminated.[12] Indeed, we assume that some riders will walk or use bicycles to go to work and others will find a new job closer to their residence should transit be eliminated.

The number of foregone work trips and the number of lost jobs for each transit mode are estimated as follows:

*Number of foregone work trips = % of work trips * Number of trips * % of foregone work trips*

*Number of lost jobs = (% of foregone work trips leading to unemployment * Number of foregone work trips) / Average annual number of work trips per rider*

Once the number of lost jobs is known we can calculate the employment value based on the hourly wage rate:

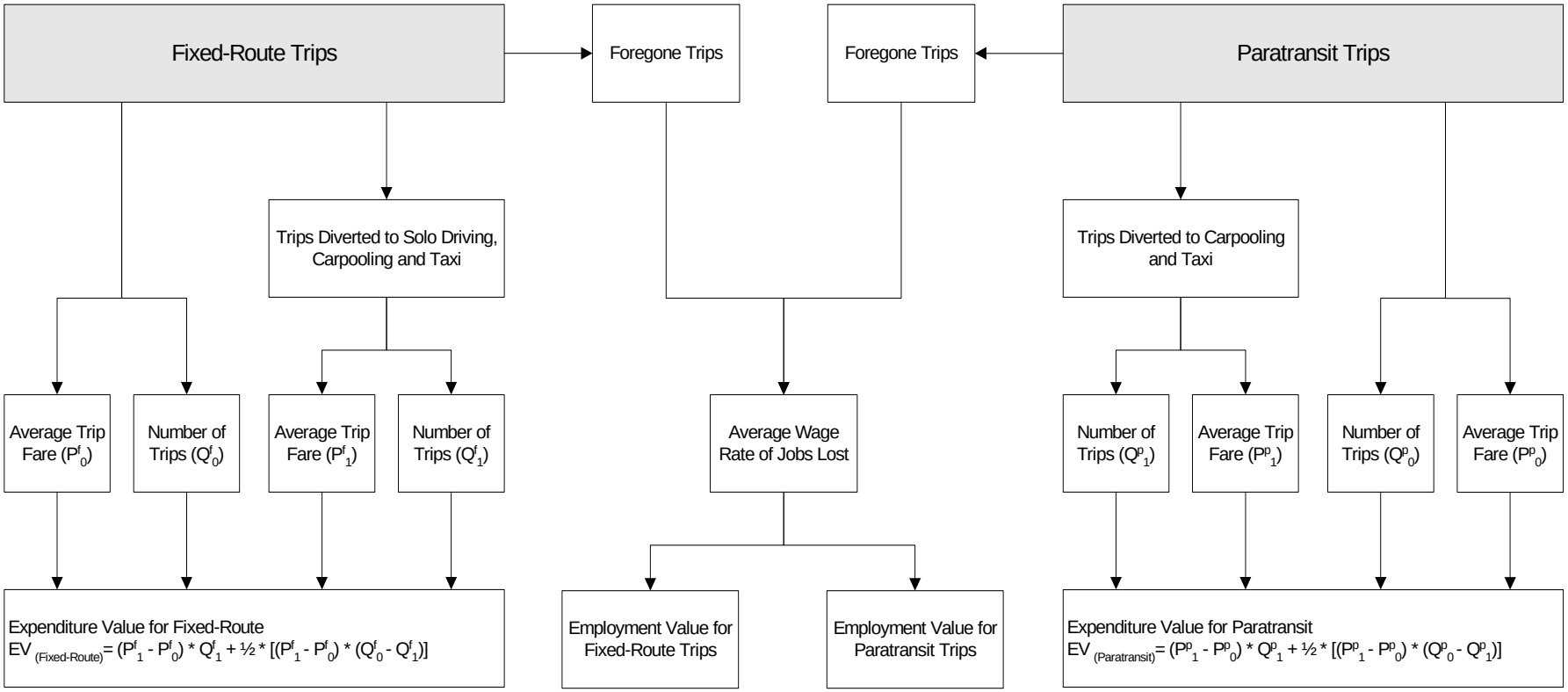
[11] This estimate is based on information provided by Cincinnati Works in 2000. Cincinnati Works is a local organization that helps chronically unemployed people (or low-income people) to get a job. Approximately 40% of their job offers are on bus lines.

[12] The analysis focuses on the percentage of trips (not the percentage of riders), because we recognize that few riders may account for a large number of trips.

*Employment value = Number of lost jobs * Average annual salary of low-income riders*

The structure and logic diagram below (Figure 4) illustrates the methodology used by HLB to estimate the expenditure value and the employment value of transit for MCTS in 2003.

Figure 4: Estimating Expenditure and Employment Values (Structure and Logic Diagram)



3.2.3 Cross-Sector Value

Studies have shown that budget cuts in low cost mobility programs create pressure on other, non-transportation safety-net entitlement programs.[13] Cross-sector benefits are defined to be "economies achievable in another sector of the economy as a result of expenditure in the transport sector."[14] Cross-sector fiscal benefits occur when mobility diminishes peoples' claim on publicly subsidized assistance for "mobility surrogates" such as health-care services. Transit, like any other public expenditure, must be considered in relation to governments' fiscal capacity. However, if in pursuit of deficit-reduction goals, a reduction in budgetary outlays for low cost mobility leads to a rise in entitlements and other budgetary expenditures on mobility surrogates, the fiscal framework is worsened rather than improved.

Cross-sector benefits arise in two areas mainly:

- **Home Care**

Examining the cost differentials between institutional and in-home care illustrates the existence of cross-sector benefits. Any transition delay between these care provisions results in benefits. However, it must be recognized that the variables influencing the decision to move from in-home care to institutional care are very complex and often are not mobility dependent. The level of personal mobility may be a contributing factor but "the provision of Accessible Public Transportation (APT) services does not or would not affect either the decision to move, or the timing" thereof.[15]

Facility visits also result in economies that are difficult to quantify in that they are somewhat intangible. For instance, it is intuitive that surgeries performed in-hospital will be of greater quality then those performed in-home due to higher accessibility to premium quality equipment and possibly greater assistant staff availability. As well facility visits are of shorter duration thereby facilitating a greater number of patients to be seen, resulting in a reduction per person and/or visitor in the cost of providing such services. The Center for Logistics and Transportation at Cranfield University (CCLT) in England asserts "if individuals are able to conduct their own personal business, shopping and social activities, their calls on in-home services will be significantly less, particularly on home help, podiatry, health visitors and doctors."

- **Social Service**

Other cross-sector fiscal benefits arise from provision of transit to low-income groups by increasing accessibility of employment for these groups. Kain (1992) examined the spatial mismatch hypothesis in the context of housing policies. One of the interesting characteristics he discovered was the unique composition of employment in the Core Business District (CBD). Residents in and immediately surrounding the CBD are generally low-income and/or minority communities. However, although these groups are within close proximity of the CBD, the majority of employees found therein are white, high-income earners brought in from the suburbs. "The radial highway and transit systems in most large metropolitan areas make the CBD more

[13] Hickling Lewis Brod (1997) "The Low Cost Mobility Benefits of Transit," *The Benefits of Modern Transit*, prepared for the Federal Transit Administration, p. 3-26.
[14] Melanie Carr, Tim Lund, Philip Oxley and Jennifer Alexander (1993) *Cross-sector Benefits of Accessible Public Transport*, Environment Resource Center, Crowthorne, Berkshire, p. 1.
[15] Ibid., p.12.

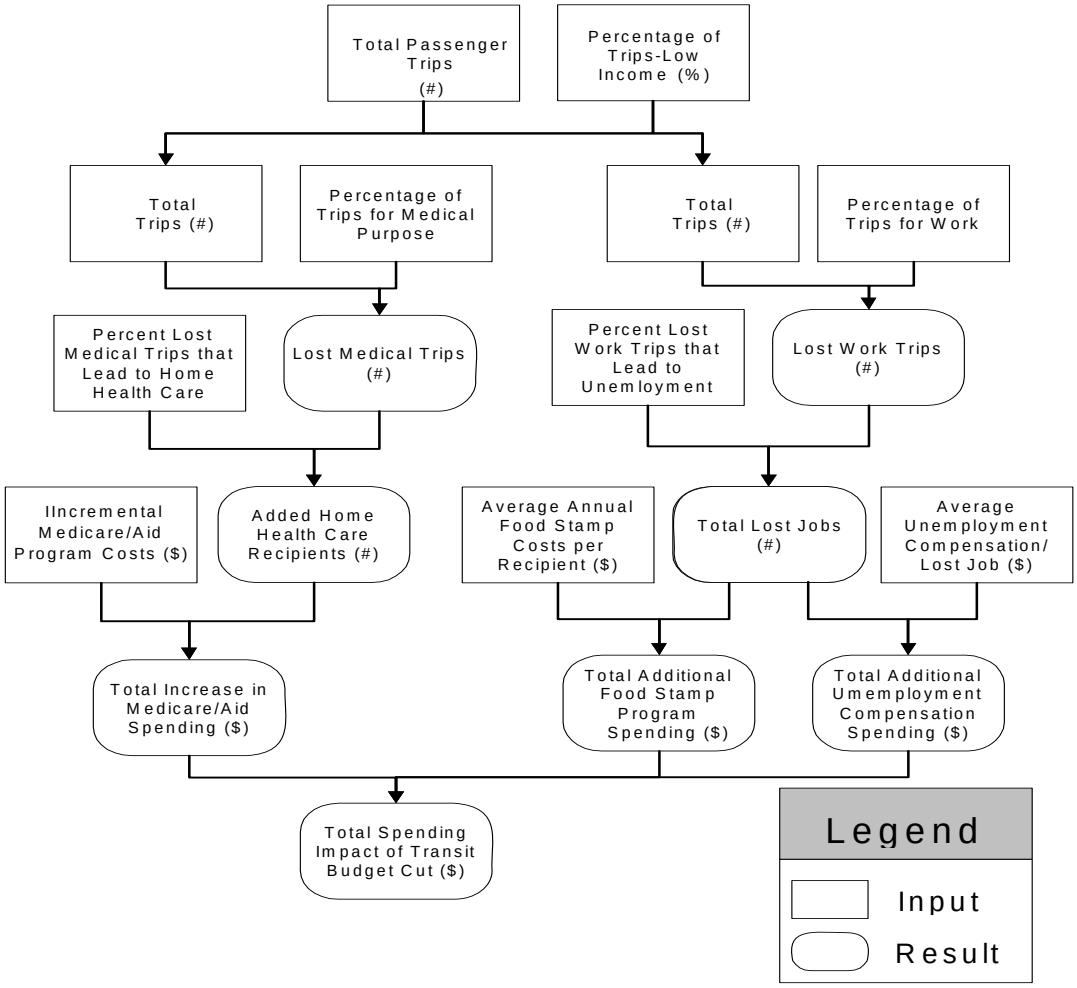
accessible than many other parts of the central city to white suburban areas."[16] Kain asserts that if additional employment centers were made accessible by bus to the inner city, it would likely result in an increase in the percentage of jobs held by inner city residents in those areas. Consequently, this would decrease unemployment and social service expenditures.

The cross-sector benefits of transit can be defined as the additional costs generated in other sectors of the economy due to the absence of transit services. The analysis reveals the expected benefits of a budgetary reduction in transit provision on the three most mobility vulnerable programs: Medicare/Medicaid, Food Stamps, and Unemployment Compensation. For instance, as of November 2003, 5.9% of Wisconsin's population participated in the Food Stamp Program.[17] For every dollar saved with a reduction in transit service, the resultant costs in other sectors are calculated. The net increase in costs is viewed as the budget savings associated with transit.

Cross-sector benefits are calculated for a fixed-route bus service and paratransit service separately. Figure 5 provides a graphical illustration of the methodology used by HLB, identifying all of the model inputs and the relationships between these inputs. The starting point assumes a level of passenger trips by low-income individuals eliminated due to a lack of transit provision. These trips must be translated into trips by purpose to estimate fiscal benefits. The percentage of lost medical trips leading to home health care and the percentage of lost work trips leading to unemployment generate estimates of the number of added home health care visits and the number of lost jobs respectively. The incremental Medicare-Medicaid program cost for each added home health care visit is multiplied by the number of added visits to obtain the monetary value of these trips.[18] Likewise, the additional Food Stamp cost and Unemployment Compensation per lost job are multiplied by the number of lost jobs to obtain the monetary value of job loss.

[16] Kain, John F. (1992) *Housing Policy Debate – The Spatial Mismatch Hypothesis: Three Decades Later*, Fannie Mae, Office of Housing Policy Research, p. 397.
[17] Wisconsin Department of Health and Family Services, http://www.dhfs.state.wi.us/
[18] In converting passenger trips into lost medical visits we account for the data, which reports one-way trips only. Dividing the number of trips for medical purpose by a factor of 2 provides for the number of medical visits.

Figure 5: Estimating Cross-Sector Benefits (Structure and Logic Diagram)



3.3 Estimation of Affordable Mobility Benefits

To estimate affordable mobility benefits HLB used regional data from MCTS Transit System, data derived from the Wisconsin stated preference survey pertaining to Milwaukee County; some of the data were retrieved from the available data sources of National Travel Household Survey, Bureau of Transportation Statistics, Wisconsin Department of Workforce Development, and from the Food and Nutrition Service and the Center for Medicare & Medical Services, U.S. Department of Agriculture.

3.3.1 Expenditure Value Estimation

The expenditure value of transit trips is based on the weighted average fare of alternative modes (solo driving, carpooling, and taxi). The weighted average fare is obtained by multiplying the average fare of each alternative mode by the corresponding percentage of new trips generated as

a result of unavailable transit system. The average fare of each alternative mode is the average trip length increased by 0.5 miles of estimated distance to access the fixed-route bus service, [19] multiplied by the cost per mile of each mode of transportation. Parking cost of $3.0 was added to the average cost of carpooling and solo-driving trips.

In 2003, the average fare of a fixed-route bus trip was $0.735. A reduction in transit service will result in foregone trips and trips shifted to alternative transportation modes: personal/family vehicle, carpooling, and taxi. The weighted average fare of a trip diverted from a fixed-route bus is $5.3. Table 8 below shows in detail how the weighted average fare is calculated for each transit service.

Table 8: Calculation of Weighted Average Fares

Fare by Transportation Mode	Average Fare per Trip[20]	Weight Mode in Calculation of Weighted Average Fare
Fixed-Route Bus (P^f_0)	$0.735	–
Paratransit (P^p_0)	$3.0	–
Trips Diverted from Fixed-Route Bus		
Solo Driving	$4.83	33.47%
Carpooling[21]	$3.91	46.35%
Taxi	$10.56	20.18%
Weighted Average Fare (P^f_1)	**$5.56**	**100%**
Trips Diverted from Paratransit[22]		
Family Member Vehicle	$6.31	25%
Taxi	$16.30	75%
Weighted Average Fare (P^p_1)	**$13.80**	**100%**

The techniques to calculate the amounts of fixed-route and paratransit trips foregone and diverted were the MCTS transit system not offered are in detail explained in section 1.2. The percent of foregone and diverted trips amount to 74% of total ridership in 2003. The remaining 26% of total trips correspond to 'other' modes of transportation, such as riding a bicycle and walking.

[19] Paratransit service is assumed to be door-to-door transit service, and thus the average paratransit trip length is not increased by additional miles to access the service.
[20] Assuming a vehicle ownership and operating cost of $0.517 per mile for the case of solo driving and carpooling; assuming "flagfall" rate of $3.50 and per mile rate of $2.00 for the case of taxi.
[21] Assuming vehicle occupancy of two.
[22] In general people with disabilities are not likely to carpool vehicle, hence the absence of carpooling as an alternative transportation mode for paratransit service riders.

Table 9: Allocation of Transit Trips to Alternative Transportation Modes

Transportation Mode	Ridership in 2003	Ridership Diverted to Alternative Modes (%)[23]	Ridership Diverted to Alternative Modes
FIXED-ROUTE BUS SERVICE			
Foregone Trips	47,952,308	14.7%	–
Solo Driving		19.8%	9,506,432
Carpooling		27.5%	13,164,354
Taxi		12.0%	5,732,509
Total Trips Diverted (Q^f_1)		**28,403,294**	
PARATRANSIT			
Foregone Trips	1,025,018	10%	–
Family Member Vehicle		22.5%	230,629
Taxi		67.5%	691,887
Total Trips Diverted (Q^p_1)		**922,516**	

Based on the intermediary results displayed in Tables 8 and 9, we can compute the expenditure value of Fixed-Route Bus trips and Paratransit trips in 2003, as follows:

$$\mathbf{EV_{(Fixed\text{-}Route)} = (\$5.56 - \$0.735) * 28{,}403{,}294 + \tfrac{1}{2}\,[(\$5.56 - \$0.735) * (47{,}952{,}308 - 28{,}403{,}294)]}$$

$$\mathbf{= \$184{,}190{,}690}$$

$$\mathbf{EV_{(Paratransit)} = (\$13.8 - \$3.0) * 922{,}516 + \tfrac{1}{2}\,[(\$13.8 - \$3.0) * (1{,}025{,}018 - 922{,}516)]}$$

$$\mathbf{= \$10{,}518{,}827}$$

The total expenditure value of transit benefits in 2003 in the area served by MCTS is $194,709,517. Fixed-route transit accounts for 94.5% while paratransit's share is only 5.5%.

3.3.2 Employment Value Estimation

This section uses ridership data along with the work related trips. The percentage of work trips out of total ridership and the percentage of foregone trips out of work trips were previously reported in Tables 3 and 4, respectively. Work trips account for 39.7% of Fixed-Route Bus trips in Milwaukee County; similarly, 29.4% of Paratransit trips are taken to work.[24] The Wisconsin stated preference survey results suggest that 18.7% of work trips in Milwaukee County would be foregone in the absence of MCTS transit service. The minimum wage for non-opportunity employees is $5.15 per hour.[25]

[23] As percent of total ridership in 2003.
[24] U.S. Department of Transportation, Bureau of Transportation Statistics, *Freedom to Travel* (National Survey of People with Disabilities).
[25] Wisconsin Department of Workforce Development.

Based on this information, the expenditure value for both transit services in 2003 is obtained as follows:

- **Fixed-Route Bus Service**

  *Number of foregone work trips = 39.7% * 18.7% * 47,952,308 = 3,557,459*

  *Number of lost jobs = (40% * 3,557,459) / 500 = 2,846*

  *Employment value = 2,846 * ($5.15 * 40 * 50) = $29,313,463*

- **Paratransit**

  *Number of foregone work trips = 29.4% * 10% * 1,025,018 = 30,148*

  *Number of lost jobs = (40% * 30,148) / 500 = 24*

  *Employment value = 24 * ($5.15 * 40 * 50) = $248,416*

The employment values as well as intermediary results by transit mode are summarized in Table 10 below.

Table 10: Employment Value

Transit Mode	Ridership in 2003	Foregone Trips for Work	Foregone Trips Leading to Unemployment	Lost Jobs	Employment Value Loss[26]
Fixed-Route Bus	47,952,308	3,557,459	1,422,984	2,846	$29,313,463
Paratransit	1,025,018	30,148	12,059	24	$248,416
Total	48,977,326	3,587,607	1,435,043	2,870	**$29,561,879**

Table 10 shows that MCTS services provided an additional $29.6 million in employment value benefits. In other words, the estimations show that a total of 2,870 jobs would have been lost in the absence of transit in the region in 2003.

3.3.3 Cross-Sector Value Estimation

In the absence of transit, the associated cross-sector impacts on mobility vulnerable sectors are presented below. Unemployment compensation and food stamp benefits are the savings to the social service sector as low-income people can use transit for work purpose. Home care benefits are the savings to the health sector as recipients use transit to get to health care facilities instead of receiving home health care. The analysis is presented by benefit category and by type of transit service.

[26] Thus computed employment value loss represents its lower limit since 'only' the minimum wage is assumed for the jobs lost.

The three categories of cross-sector benefits identified in Section 3.2.3 have been estimated in the following way:

*Additional unemployment compensation = Number of lost jobs * Average unemployment compensation per recipient*

*Additional food stamp cost= Number of lost jobs * Food stamp benefit per household*

*Incremental home health care cost =0.5 * % of lost medical trips leading to home health care * Lost medical trips * Incremental cost per home health care visit*

Table 11 summarizes all the inputs used to calculate cross-sector benefits.

Table 11: Input Values to Estimate Cross-Sector Benefits

Model Input	Fixed-Route Bus Service	Paratransit
Ridership in 2003	47,952,308	1,025,018
% of Trips for Work	39.7%	29.4%
% of Foregone Work Trips in the Absence of Transit	18.7%	10%
% of Foregone Work Trips Leading to Unemployment	40%	40%
% of Trips for Medical Purpose	8.7%	24.95%[27]
% of Foregone Medical Trips in the Absence of Transit	14.6%	10%
% of Foregone Medical Trips Leading to Home Care	-	80%
% of Medical Trips Leading to Home Care	8.7%	-
Average Unemployment Compensation per Recipient[28]	$6,200	$6,200
Food Stamp Benefit per Household in Wisconsin[29]	$1,954	$1,954
Incremental Cost of Home Care[30]	$103.3	$103.3

The results of the cross-sector benefit analysis are presented below:

- **Fixed-Route Bus Service**

  *Additional unemployment compensation = 2,846 * $6,200 = $17,588,078*

  *Additional food stamp cost = 2,846 * $1,954 = $5,562,272*

  *Incremental home health care cost = 0.5 * 8.7% * 4,171,851 * $103.3 = $18,749,680*

[27] U.S. Department of Transportation, Bureau of Transportation Statistics, *Freedom to Travel* (National Survey of People with Disabilities).
[28] Assuming a compensation of 60% of minimum wage and a 40-hour work week.
[29] U.S. Department of Agriculture, Food and Nutrition Service, FY 2003.
[30] *Deflating Personal Health Care Expenditures. National Health Accounts: Definitions, sources, and Methods used in the NHE 2001.* Centers for Medicare & Medical Services. The original estimate was adjusted for inflation based on U.S. CPI of Medical care services.

- **Paratransit**

  *Additional unemployment compensation = 24 * $6,200 = $149,050*

  *Additional food stamp cost = 24 * $1,954 = $47,137*

  *Incremental home health care cost = 0.5 * 80% * 25.574 * $103.3 = $1,056,880*

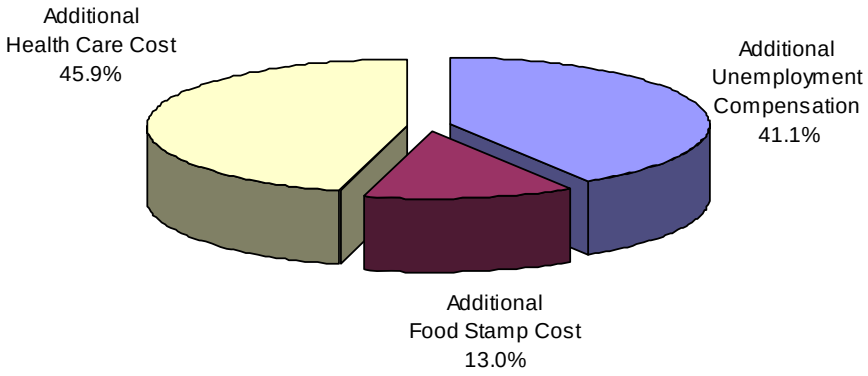
Table 12 below summarizes the cross-sector benefits.

Table 12: Cross-Sector Value

Transit Mode	Jobs Lost	Additional Unemployment Compensation	Additional Food Stamp Cost	Additional Health Care Cost	Cross-Sector Value Loss
Fixed-Route Bus	2,846	$17,588,078	$5,562,272	$18,749,680	$41,900,031
Paratransit	24	$149,050	$47,137	$1,056,880	$1,253,067
Total	2,870	$17,737,128	$5,609,410	$19,806,560	**$43,153,097**

The results are presented for Fixed-Route Bus and Paratransit services separately. The analysis reveals that if Fixed-Route Bus service is cut entirely, the associated increase in costs to other non-transportation sectors is almost $42 million. Likewise, the analysis reveals that if Paratransit service is cut entirely, the associated increase in costs to other non-transportation sectors is reaching $1.3. In total, transit in MCTS's service area saved up to $43.2 million of welfare and social service spending in 2003. About 41.1% of the benefits stemmed from reductions in unemployment compensation (see Figure 6 below).

Figure 6: Composition of Cross-Sector Benefits

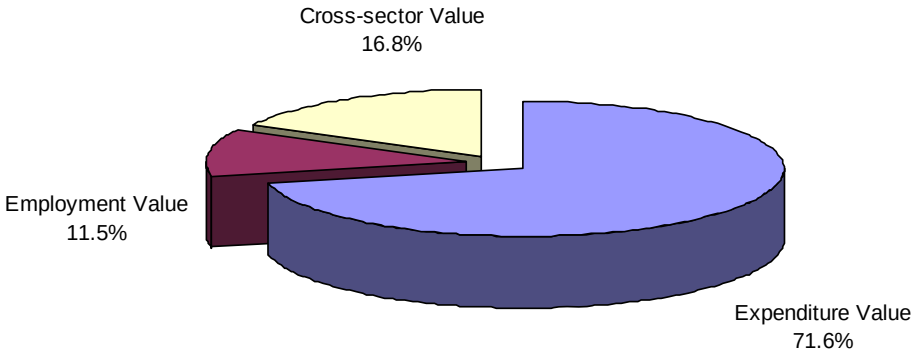


Finally, Table 13 and Figure 7 summarize the affordable mobility benefits of MCTS in 2003.

Table 13: Summary of Affordable Mobility Benefits

Benefit Category	Expenditure Value	Employment Value	Cross-Sector Value	Total Benefits
Fixed-Route Bus	$184,190,690	$29,313,463	$41,900,031	$255,404,184
Paratransit	$10,518,827	$248,416	$1,253,067	$12,020,310
Total	$194,709,517	$29,561,879	$43,153,097	**$267,424,494**

Figure 7: Composition of Affordable Mobility Benefits



4. ENTERPRISE BENEFITS

This chapter presents the methodology and results relating to the enterprise benefits (traditionally called economic impacts) portion of the study. Using conventional and accepted methods,[31] we seek to quantify the economic value of financial transactions associated with MCTS transit system in the Milwaukee County area. Enterprise benefits refer to the value of financial transactions, measured in terms of output, earnings, and employment, which may be attributed to the operation of a transit system. In this sense, enterprise benefits measure the contribution of a transit system to the local economy.[32]

The ongoing operation of a major facility such as the transit system administered by MCTS requires inputs, i.e., purchases of labor, materials, equipment, and services, which must be supplied by local (and non-local) producers. To the extent that these purchases result from new investment outside of the region, or are the result of improved productivity and/or increased levels of labor force utilization (employment), they will cause real growth in the local economy with benefits of greater employment, personal income, business profits, and local tax revenue.

4.1 Methodology for Estimating Enterprise Benefits

4.1.1 Enterprise Benefits and Multipliers

Enterprise benefits can be broken down into three types of impacts: direct, indirect, and induced.[33]

4.1.1.1 Direct Impacts

Direct impacts refer to those financial transactions (output, earnings, and employment) occurring as the result of direct spending by the operating agency. Direct spending results in the employment of workers, sales of locally produced goods and services, and generation of local tax revenue. The distinguishing feature of a direct effect is that it is an immediate consequence of MCTS's activities and expenditures. To calculate the direct benefits associated with the operation of the transit system, we use data from MCTS on output (as measured by total revenues or expenditures, including capital outlays), earnings, and employment of the transit system in 2003. Note that we subtract from total output the cost of inputs purchased outside the region. This is done in order to isolate the effect of the transit system on local business activity from that of business activity generated outside the region.

4.1.1.2 Indirect Impacts

Indirect impacts refer to off-site economic activities that are directly attributable to the operation of the transit system. These effects are the result of purchases by local firms who are the direct suppliers to the operating agency. These activities include services provided by restaurants and other retail establishments that exist solely due to operation of the transit system. The spending by these supplier firms for labor, goods and services necessary for the production of their product or

[31] Input-output models are widely used to conduct economic impact studies, including studies by the Bureau of Economic Analysis. Input-output models include IMPLAN, PC-IO, and RIMS II.

[32] Enterprise benefits are distinct from both individual "user" benefits of a transit system as well as "social" benefits, which may include the valuation of changes in factors affecting the "quality of life."

[33] This section draws heavily from Weisbrod, G. and B. (1997) "Measuring the Economic Impact of Projects and Programs," *Economic Development Research Group*.

service creates output from other firms further down the production chain, thus bringing about additional employment, income and tax activity.

4.1.1.3 Induced Impacts

Induced impacts represent the increase in output, employment, and earnings over and above the direct and indirect impacts, generated by successive rounds of spending (often referred to as re-spending). Induced impacts are changes in regional business output, employment, income, and tax revenue that are the result of personal (household) spending for goods and services – including employees of the operating agency and agencies directly tied to the operating agency, employees of direct supplier firms (direct impact), and employees of all other firms comprising the indirect impact. As with business purchasing, personal consumption creates additional economic output, leading to still more employment, income and tax flows. Indeed, "induced" effects are by far the largest component of enterprise benefits.

Total enterprise benefits are the sum of the direct, indirect and induced economic impacts. They measure the total change in economic output, employment, personal income, and local tax revenue that are generated by successive rounds of spending by businesses and households.[34]

4.1.1.4 Multipliers

The indirect and induced business impacts of a project or facility are often referred to as "multiplier effects," since they can make the overall economic impacts substantially larger than the direct effects alone. In reality, while indirect and induced impacts do always occur, the net impact on the total level of economic activity in an area may or may not be increased by multiplier effects. That outcome depends on the definition of the study area and the ability of the area to provide additional workers and capital resources, or attract them from elsewhere.

Multipliers can be expressed in terms of output or employment/jobs. An output multiplier is the total overall increase in dollars of business output (sales) for all industries, per dollar of additional final demand (purchases) of a given industry in that area. A job multiplier is the total overall increase in jobs for all industries, per new job created in a given industry.

4.1.1.5 HLB's Approach

When measuring enterprise benefits, careful attention is given to isolating the effect of the transit system on local business activity from that of business activity generated outside the region. For example, expenditures by MCTS generate output, earnings, and employment activity both in and outside of the Milwaukee County (MCTS service area). Only enterprise benefits that affect local business activity (activity within Milwaukee County) are relevant in this study. Therefore, the benefits studied here are adjusted and contain only the local value-added component of output, earnings, and employment generated from the transit system.

[34] The term "multiplier effect" describes the phenomenon whereby the change in total economic activity resulting from a change in direct spending is greater than the direct spending alone – that is, it is a measure of all indirect and induced effects. The ratio of total effect (e.g., total business output) to the direct effect (direct spending) is termed an "impact multiplier". The higher the multiplier is, the greater the total economic response to the new direct spending will be. Multipliers can also be expressed in terms of employment and income. An employment multiplier is the total overall increase in employment for all industries per new job created by direct expenditures alone.

To measure enterprise benefits, HLB used the IMPLAN© model which is an economic impact assessment modeling system (structured as an input-output model) originally developed by the U.S. Forest Service (and now maintained by the Minnesota IMPLAN Group, Inc.). [35] The model data files include transaction information (intra-regional and import/export) for 531 different industrial sectors (generally 3 or 4-digit Standard Industrial Classification code breakdown), and data on 21 different economic variables, including employment, output, employee compensation, etc. These data files are available for individual state, county and custom zip code levels. The current year available is 2001.

In conducting the analysis, three series of adjustments are made to help ensure that all impact estimates would be truly incremental and specific to Milwaukee County, namely:

1. The model is adjusted to reduce the potential impact of spending in sectors with unemployment rates at or below the Non-Accelerating Inflationary Rate of Unemployment (NAIRU); adding employment or output to sectors of the local economy where the unemployment rate lies below the NAIRU benchmark is indeed more likely to cause inflation than economic growth.

2. Since the numbers are expressed in 2001 dollars, we adjust them for inflation using the U.S. Consumer Price Index (CPI) between the years 2001 and 2003.

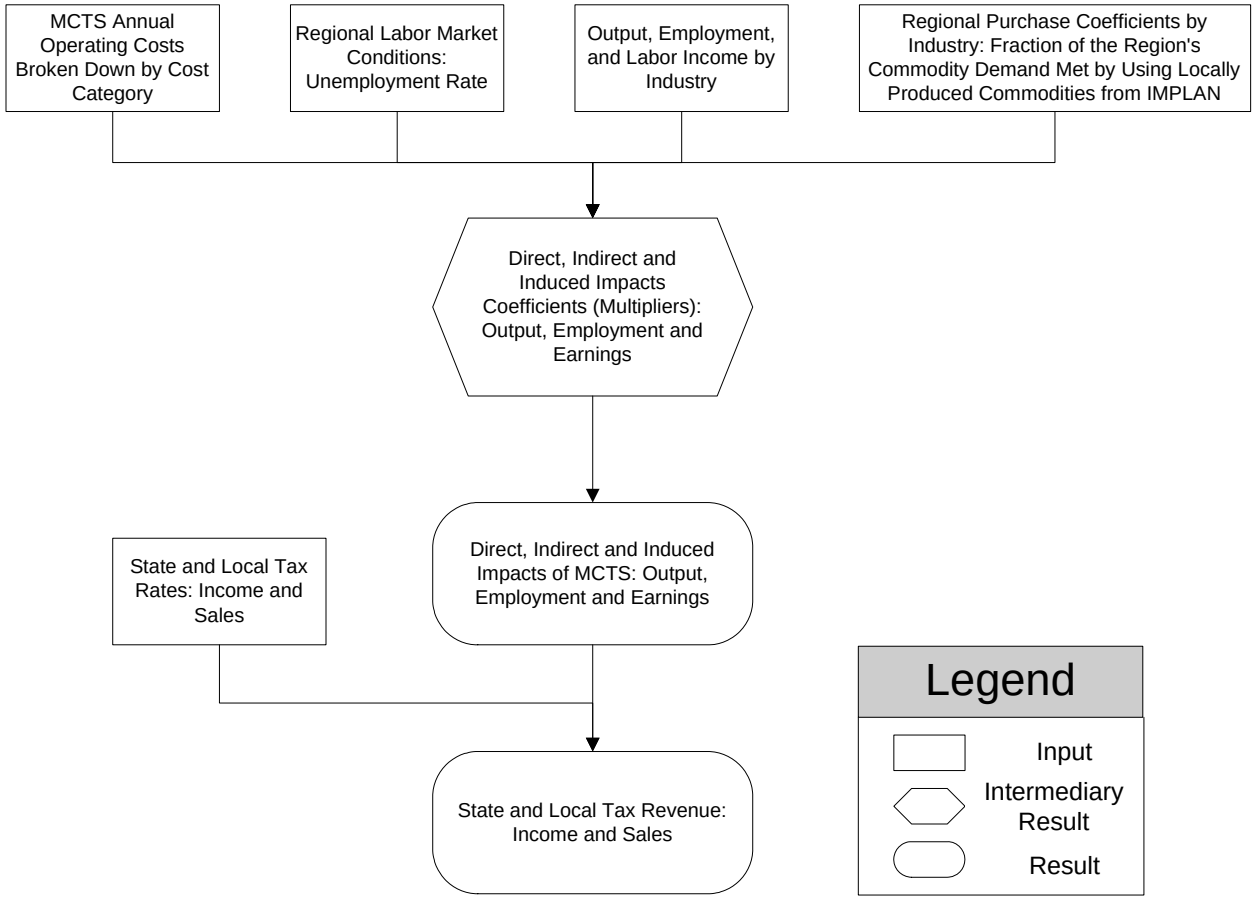
3. Multipliers used for estimating indirect and induced effects have been modified with Regional Purchase Coefficients (RPC)[36] to ensure that imports would not be counted. Only municipal and selected suburban benefits are measured and reported.

Figure 8 on the next page is a simplified representation of the methodology used by HLB to measure total enterprise benefits.

[35] An input-output ("I/O") approach was followed in this study, drawing on an extensive body of research and experience with successful applications to transportation project analysis. An I/O model calculates impact multipliers, which are then used to compute direct, indirect, and induced effects – output, employment, personal income, and local tax revenue generated per dollar of direct spending for labor, goods, and services.

[36] RPCs are ratios indicating what fraction of total demand for goods and services within a region (both by business and household) is satisfied from within the region; all remaining demand is satisfied by imports, which provide no direct economic benefit to the region. In other words, they filter-out economic leakages from the region.

Figure 8: Estimating Enterprise Benefits (Structure and Logic Diagram)



4.2 Estimation of Enterprise Benefits

The results are presented for each impact category: direct, indirect and induced. Enterprise benefits have been calculated for the Milwaukee County region. Indirect and induced benefits stem not only from Milwaukee County (where MCTS operates), but also the surrounding counties because of the spillover effects.

4.2.1 Estimation of Direct Impacts

In 2003 MCTS had 1,329 full time employees and its total operating expenses (operations, maintenance and general administration) amounted to $137.9 million. Total labor income (salaries and wages) was about $55.2 million in the same year. Direct impacts correspond to these direct expenditure categories. Table 14 on the next page summarizes the direct impacts.

Table 14: Direct Impacts

Direct Enterprise Impacts	Output	Earnings	Employment (FTE)
Total Direct Enterprise Impacts	$137,900,000	$55,200,000	1,329

4.2.2 Estimation of Indirect Impacts

MCTS generated a total indirect output of about $58.5 million in 2003. Indirect earnings for the same year amounted to $6.8 million. MCTS also created 176 jobs (as measured by full time employees). These results are reported in Table 15 below.

Table 15: Indirect Impacts

Indirect Enterprise Impacts	Output	Earnings	Employment (FTE)
Total Indirect Enterprise Impacts	$58,516,762	$6,776,877	176

4.2.3 Estimation of Induced Impacts

The induced impact measured in terms of output of MCTS on the Milwaukee County topped $122.6 million in 2003. This impact is net of the cost of inputs purchased outside the region. The induced impact measured in terms of earnings of MCTS on the Milwaukee County is about $12.3 million in the same year. The induced impact measured in terms of employment of MCTS on the Milwaukee County is 522 jobs (FTE). Table 16 summarizes the induced impact results.

Table 16: Induced Impacts

Induced Enterprise Impacts	Output	Earnings	Employment (FTE)
Total Induced Enterprise Impacts	$122,631,988	$12,275,583	522

4.2.4 Total Enterprise Benefits

Total enterprise benefits measured in terms of output of MCTS on the Milwaukee County in 2003 are estimated at $319 million. Note that this benefit is net of the cost of inputs purchased outside the county. The majority of these benefits occurred in the transit sector itself and the manufacturing sector of the economy (43% and 28% respectively).

Total enterprise benefits measured in terms of earnings of MCTS on the Milwaukee County in 2003 are estimated at $74.3 million. The majority of these benefits occurred in the transit sector itself and the manufacturing sector of the economy (74.4% and 11% respectively).

Total enterprise benefits measured in terms of employment of MCTS on the Milwaukee County region in 2003 represent 2,015 jobs (FTE). Similarly to earnings, the majority of these benefits occur in the transit sector and the manufacturing sector of the economy (66% and 15% respectively).

Tables 17 and 18 below summarize total enterprise benefits by industry and benefit category respectively.

Table 17: Total Enterprise Benefits by Industrial Sector

Industrial Sector	Output		Labor Income		Employment		Output per FTE
	$	% of Total	$	% of Total	Number of FTEs	% of Total	$
Agriculture (AGG)	$602,899	0.2%	$21,245	0.0%	0	0.0%	0
Mining (AGG)	$9,180,830	2.9%	$691,637	0.9%	5	0.3%	$1,671,754
Construction (AGG)	$8,136	0.0%	$241	0.0%	0	0.0%	0
Manufacturing (AGG)	$89,003,970	27.9%	$8,538,159	11.5%	302	15.0%	$294,671
TCPU (AGG)	$17,381,192	5.4%	$2,922,002	3.9%	66	3.3%	$263,748
Trade (AGG)	$4,731,487	1.5%	$834,863	1.1%	27	1.4%	$172,313
FIRE (AGG)	$3,679,310	1.2%	$634,876	0.9%	27	1.4%	$133,994
Services (AGG)	$56,412,546	17.7%	$5,350,069	7.2%	258	12.8%	$218,559
Transit (AGG)	$138,048,380	43.3%	$55,259,447	74.4%	1,329	65.9%	$103,874
Institutions (AGG)	$0	0.0%	$0	0.0%	0	0.0%	0
Total Enterprise Benefits	**$319,048,750**	**100%**	**$74,252,541**	**100%**	**2,015**	**100%**	**$158,300**

Table 18: Total Enterprise Benefits by Benefit Category

Category of Benefit	Direct Impact	Indirect Impact	Induced Impact	Total Benefits
Output	$137,900,000	$58,516,762	$122,631,988	$319,048,750
Earnings	$55,200,000	$6,776,877	$12,275,583	$74,252,460
Employment (FTE)	1,329	176	522	2,026

Figures 9 through 11 illustrate the composition of benefits by category (output, earnings and employment) and impact (direct, indirect and induced).

Figure 9: Composition of Output Benefits

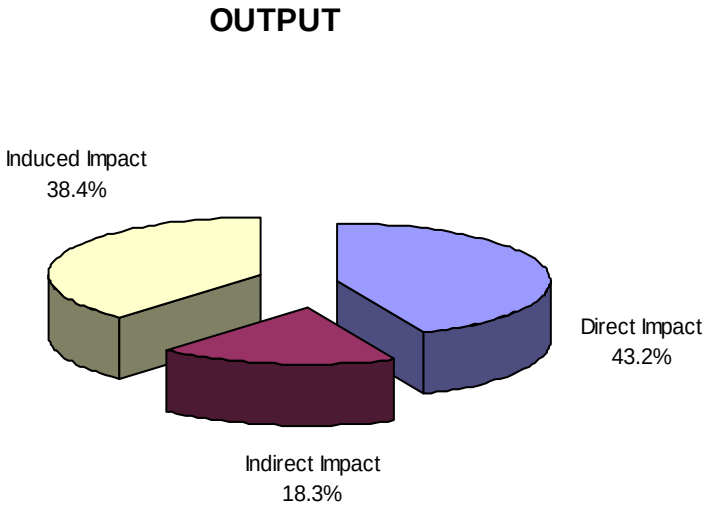


Figure 10: Composition of Earnings Benefits

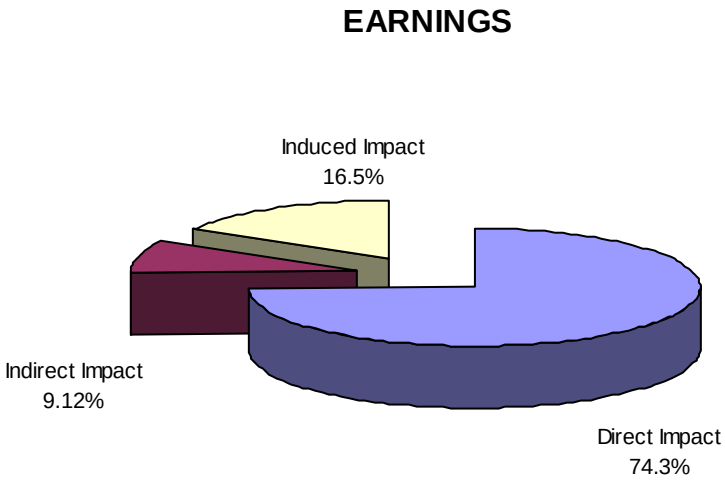
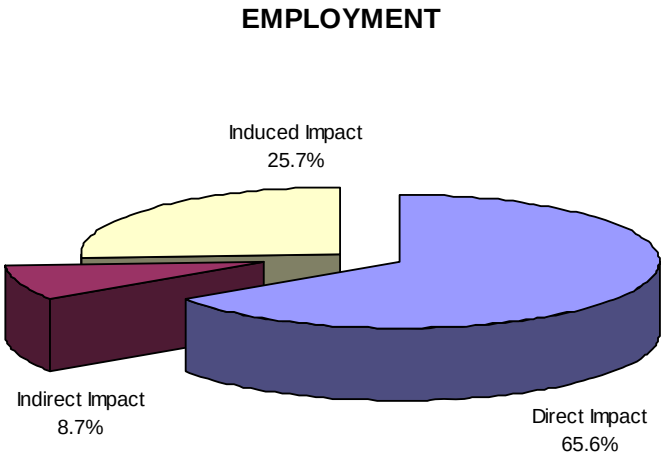


Figure 11: Composition of Employment Benefits



4.2.5 Tax Revenue Benefits

In 2003, MCTS generated about $319 million in output and $74.3 million in earnings that were redirected to the economy through several channels. Based on these estimates one can derive the additional tax revenue for the regional economy. Tax revenue can be estimated using prevailing tax rates in the Milwaukee County. Taxes include corporate profits tax, indirect business taxes (i.e., sales tax), personal taxes (income tax, mainly) and social insurance taxes.

As shown in Table 19, tax revenues totalized $427,633 in 2003.

Table 19: Tax Revenue per 1 Million of Direct Expenditures

	Corporate Profits Tax	Indirect Business Tax	Personal Income Tax	Other Taxes	Total Tax Revenues
Federal	$ -51,866	$ 11,662	$ 137,667	$ 06,168	$303,631
State	$ -7,480	$ 73,892	$ 55,719	$ 1,871	$124,002
Total	$ -59,346	$ 85,554	$ 193,386	$ 208,039	**$ 427,633**

5. CONCLUDING REMARKS

Milwaukee County Transit System (MCTS) impacts the regional economy through several channels. Using methods developed by the Federal Transit Administration, HLB estimated the diverse effects of transit on Milwaukee County. In summary, the economic value of transit stems from three categories of benefits:

- **Congestion Management Benefits** – In the absence of transit, new trips would be added to the roadway network, and as a result, additional VMT would be generated. The congestion management benefits of transit are the cost savings of these additional VMT to the regional economy.

  The analysis has revealed that, in year 2003, MCTS reduced congestion-related costs in the Milwaukee County region by ***$65 million***. In particular, vehicle ownership and operating cost savings have been estimated at $42.9 million and Travel time value savings totaled $13.4 million. The environmental and safety costs savings attributable to the transit system were estimated at $2.9 million and $5.8 million, respectively.

- **Affordable Mobility Benefits** – Many low-income households do not own a car, and thus depend upon taxis or transit for their mobility needs. In the absence of either fixed-route service or paratransit service, those people have no choice but to forego mobility and employment or spend a considerably higher portion of their income on transportation (taxis, mainly) at the expense of food, health care, housing and other staples. By providing an affordable transportation alternative, transit thus creates expenditure value and employment value. Affordable mobility also generates cross-sector benefits by reducing social service outlays on home health care and welfare services such as food stamps and unemployment compensation.

  This study has found that, in fiscal year 2003, MCTS Transit System added a total estimated value of ***$267.4 million*** in affordable mobility benefits to the regional economy. The expenditure and employment values have been estimated at $194.7 million (72.8%) and $29.6 million (11.1%), respectively. Cross-sector benefits amounted to $43.2 million (16.1%).

- **Enterprise Benefits** – Operating a transit agency generates economic activities in diverse ways, which can be measured in terms of output, employment and labor income (or earnings). These economic impacts can be further divided in three sub-categories: direct impacts (direct expenses by the transit agency), indirect impacts (purchases by local firms who are the direct suppliers to the transit agency) and induced impacts (re-spending of income from the direct and indirect impacts).

  In year 2003, MCTS Transit System generated about ***$319 million*** in output value. Direct impacts (that is, MCTS's total expenses) amounted to $137.9 million or 43.2% of the total output value. Induced impacts accounted for $122.6 million (38.4%), while indirect impacts accounted for only $58.5 million (18.3%). MCTS also created 2,026 jobs (FTE) and generated about $74.3 million in earnings.

Transit in Milwaukee County generates significant and diverse benefits for the regional economy. It creates jobs, earnings and output. It adds to the development value of neighborhoods. It also reduces some negative effects associated with the use of automobiles such as traffic congestion, delay, productivity losses, accidents and pollution. And it raises the economic standard of living among the region's most disadvantaged groups.

Overall, the analysis has shown that the agency generated nearly $651.4 million in economic value for the regional economy in year 2003. On the other hand, MCTS's expenses totaled $137.9 million in the same year. In other words, MCTS's benefits to the community exceeded its costs by as much as $513.5 million. The benefit-cost ratio shows that MCTS delivered $4.59 of economic value for each dollar spent on providing services (Table 3). Even when we exclude the enterprise benefits of MCTS, the study shows that the agency provides about $2.28 in benefits for its $1 of expenditures. It is worth noting that the total economic value excludes neighborhood development benefits, making the overall estimate conservative.

Table 20: Summary of Results

Category	Value ($ Millions)
MCTS Transit System Total Expenses in 2003	**$137.9**
MCTS Transit System Economic Impact in 2003	
Congestion Management Benefits	$65.0
Affordable Mobility Benefits	$256.3
Enterprise Benefits (Output)	$319.0
Total Benefits	**$651.4**
Economic Value Created per Dollar of MCTS Transit System Expense – Excluding Enterprise Benefits (dollars)	**$2.33**
Economic Value Created per Dollar of MCTS Transit System Expense – Including Enterprise Benefits (dollars)	**$4.72**