Kansas
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Cost Benefit Analysis of Rural and Small Urban Transit

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Overall, the cost-benefit calculation for rural transportation in Kansas is above average. Kansas is the fifth highest state in the US in terms of rural area benefit-cost ratio (BCR). It is noteworthy that two of the states with higher rural BCRs than Kansas are densely populated, while the other two have large tourism industries in rural areas that fulfill work-related trip needs on a regular basis for transit customers. This is a positive sign for rural transit in Kansas, as tourism in the state is relatively low, and rural areas are often remote.

An important economic principle to many Americans is that "we get what we pay for." When it comes to public transit, many officials, citizens, and policy-makers are very concerned that the money invested in public transit, among other things, produces a return on that investment. Skepticism about transit's effectiveness does exist, but so does the need for transit, even in rural or smaller urban areas. The average commute for rural communities is 21.0 miles compared to 15.5 miles in urban areas (Godavarthy, Mattson, & Ndembe, 2014) with fewer opportunities to walk or bike to work. Transit in non-urban areas gives residents access to work, medical treatment, and recreational trips that may either be unavailable or overly expensive.

So how is the effectiveness of investment in transit measured? One common practice is a cost-benefit analysis, which simply compares the benefits an investment produces compared to the size of the investment itself. This article reviews the types of benefits transit makes available to the public as well as the costs these services requires. The effectiveness or transit in Kansas will also be examined based on current research by the National Center for Transit Research (NCTR) on cost-benefit analysis in transit nationwide (Godavarthy, Mattson, & Ndembe, 2014).

Two unseen benefits of transit

Unlike the conventional idea of investments, which are private and monetary in nature, public transit is a public good, which means its benefits do not realize a return of money or goods, but rather give various benefits to the general public. This makes the measurement of transit benefits hard to measure, since those benefits flow out to the public and not back to the government. This is especially true in rural areas, where transit use is less prominent; approximately 10 times as many people commute via transit in urban areas compared to rural areas, for example (Small Urban & Rural Transit Center, 2012). However, understanding the benefits of transit and their associated costs can help your organization communicate its public value with other stakeholders and decision-makers.

Benefit 1) What transit replaces:

Table 1: Vehicle Operation and Ownership Costs

Vehicle Type	10,000 miles per year	15,000 miles per year	20,000 miles per year
Small sedan	59.5 ¢	46.4 ¢	39.8 ¢
Medium sedan	78.0 ¢	61.0 ¢	52.3 ¢
Large sedan	97.5 ¢	75.0 ¢	63.5 ¢
4WD SUV	$1.00	77.3 ¢	65.7 ¢
Mini van	84.0 ¢	65.3 ¢	55.7 ¢

Source: NCTR, 2014

Reducing the cost of transportation. Simply put, the United States is an auto-oriented culture, and public transit gives people the opportunity to not drive. Owning a vehicle is often necessary in rural areas, but transit can offset at least some of the operating costs or reduce the number of automobiles needed to be owned. Costs of automobile use can be broken into two categories: fixed costs associated with ownership such as debt payments, insurance, and registrations fees; and variable costs such as fuel, maintenance, and depreciation.

Table 1 (above) from the NCTR study shows that it costs an average of $0.65 per mile for personal vehicle ownership and operation, assuming a vehicle is driven 15,000 miles per year. ($0.65 is the average of all vehicles in that column in Table 1.) The 2012 *Rural Transit Fact Book* has the average commute length in 2012 as being 3 miles in urban areas and 6 miles in rural areas. Lower gas prices are one of the primary reducers of variable automotive costs, and can often be extremely variable, which should be kept in mind when considering the results of the NCTR study (Godavarthy, Mattson, & Ndembe, 2014).

Another auto-associated cost is related to chauffeuring non-drivers in personal vehicles. Chauffeur trips are distinct from taxi trips or rideshare in that by definition the trip is unpaid and would not be made if not for the non-driver's request. These trips are often thought of as rides given by family or friends to a non-driver for work, school, medical facility, or other for purposes. Chauffeur trips include not only the costs of automobile use, but the costs of the driver's time consumed by providing the trip. A study cited by NCTR shows that half of transit users who choose to use an automobile that is not their own use rideshare, which leaves the other half as chauffeured trips. The same study estimated each chauffeur trip cost $1.05 per mile, with a time cost for the drive of $0.80 per mile included.

The NCTR study includes savings from taxi fares, saved travel time, collision costs, and environmental emissions. The average taxi fare in a rural area is several times higher than urban areas. Travel time calculations account for time spent reading, working, resting, or socializing instead of driving, walking, or bicycling ($7.50 per hour driving, $3.75 for car passengers and non-motorized travelers, and $2.50 for rural transit riders,) based on a percentage of mean US wages. Small amounts of money were added per mile in each mode to account for reducing the risk of an automobile accident by taking transit, while emissions savings were

Table 2: Operating Costs and Farebox Recovery for Rural Transit

	2008	2009	2010	2011
Operating Expense per Trip				
Total	**9.57**	**9.91**	**10.54**	**10.78**
Fixed-route-only	6.13	5.96	6.80	6.96
Demand-response-only	14.62	15.18	16.83	17.31
Operating Expense per Mile				
Total	2.30	2.31	2.32	2.49
Fixed-route-only	3.05	3.06	2.93	2.83
Demand-response-only	1.99	2.01	2.02	2.06
Farebox Recovery Ratio				
Total	0.08	0.08	0.08	0.08
Fixed-route-only	0.09	0.09	0.08	0.08
Demand-response-only	0.07	0.07	0.07	0.06

Source: NCTR, 2014

Table 3: Operating Expenses and Farebox Recovery for Small Urban Transit, 2011

Performance Indicators	Total	Fixed-route	Demand-response
Operating Expense (million $)	1,581	1,216	365
Trips (million)	352	335	17
Vehicle revenue miles (million)	301	212	89
Cost per trip	4.49	3.63	21.39
Cost per mile	5.25	5.73	4.10
Fare revenue (million $)	276	232	44
Farebox recovery	17%	19%	12%

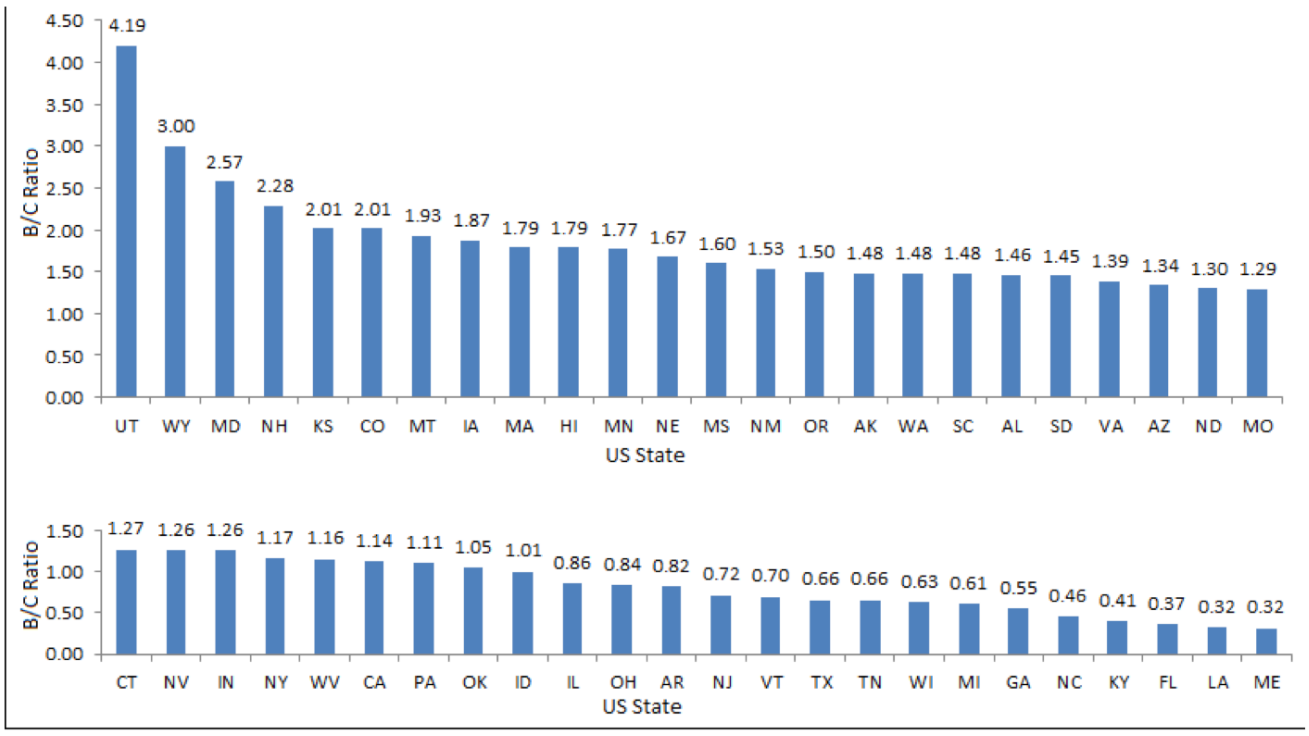
Source:NCTR, 2014

considered negligible for rural and small urban transit.

Benefit 2) What transit prevents: Valuable missed trips. In addition to cost-savings from taking regular trips via transit vs. personal automobile, public transportation can help individuals make medical and work trips that may be missed otherwise. Persons with chronic or severe health conditions, especially the elderly, often do not have access to personal transportation, especially problematic in rural areas. Separate studies have shown an estimated 3.6 million people miss medical treatment because they lack transportation, and that transportation-disadvantaged persons are more to be low-income, female, minority, and elderly. Using information from these studies, NCTR estimates an average $713 round trip benefit for medical trips.

Work trips can also be monetized, in a similar way. The NCTR study values work trips based on potential government savings at $49. Obviously, the amount of money a trip is worth is contingent on how much a given employee is reimbursed and the cost of alternative transportation modes, compared with vehicle ownership and maintenance. The $49 estimate is based on reduction of SNAP (food stamp) program participation costs, which cost approximately $24,400 per year for a four-person household. By maintaining steady employment, workers could overcome the

Figure 1: Benefit-Cost Ratio of Rural Area Transit by State



Resources on Travel Training

Cevallos, Fabian, Jon Skinner, Ann Joslin and Tekisha Ivy (2010). Attracting Senior Drivers to Public Transportation: Issues and Concerns. Miami, FL: Florida International University. http://www.fta.dot.gov/documents/TRANSPO_Attracting_Seniors_Public_Transportation_Final_Report.pdf

Project Action provides a number of resources, including online training, in-person training and printed resources on Travel Training. http://www.projectaction.org/ResourcesPublications/TravelTraining.aspx

McCarthy, Dennis P., Lucinda Shannon, and Karen Wolf-Branigan (2010). Current Practices Used by Travel Trainers for Seniors. Washington, D.C.: National Center on Senior Transportation. 12pp. http://www.seniortransportation.net/Portals/0/Cache/Pages/Resources/Current_Practices_Used_by_Travel_Trainers_for_Seniors.pdf

need for such benefits and discontinue SNAP participation.

Rural transit costs and revenue

According to the National Transit Database, the 1,393 rural transit agencies who reported data had operating budgets of $1.3 billion in 2011. Sources for funding include the federal government ($456M), state ($243M) and local ($323M) governments, fare collection ($100M) and contract income ($247M.) For capital expenses, the federal government spent $253 million while state and local governments both spent $23 million each.

Tables 2 and 3 (on page 2) show the NCTR study's estimation of rural transit operating expenses based on the National Transit Database (NTD). These numbers are the basis for the study's "cost" side of its calculation.

What makes a good cost-benefit ratio "good?"

Whenever a benefit-cost ratio (BCR) is higher than 1.0, it is a sign that there is some kind of measurable return on the investment. The NCTR study shows a 2.16 BCR for small urban areas and a 1.20 ratio for rural transit. In other words, for each dollar invested, $2.16 is realized in a small urban setting while $1.20 is returned in rural transit.

Typically, fixed-route service has higher BCRs than does demand-response, since demand-response service is more time and labor intensive, typically serving few passengers per hour (Burkhardt, Hedrick, & McGavock, 1998).

BCRs can vary greatly between systems. An older study of 22 systems by the Transit Cooperative Research Program (TCRP) showed certain systems with BCRs as high as 4.22. This included in-depth study of eight systems and desk audits of 16 other systems. Other studies cited by TCRP show results similar to those of NCTR with 2.06 and 2.12. The TCRP results have a small sample size, and focused on programs with a variety of goals besides general public transportation, but noted that systems were grouped together, some with BCRs close to 4; others, close to 2 and some, closer to 1. The highest-scoring systems in the TCRP study had lower operating costs (Burkhardt, Hedrick, & McGavock, 1998).

How does Kansas compare regionally and nationally?

Figure 1 (on page 3, from NCTR 2014) shows that, overall, the cost-benefit calculation for rural transportation in Kansas is above average, with a BCR of 2.01 in rural areas. Small city performance in the state is similar with a 2.26 BCR in fixed-route systems and 0.45 in demand-response, averaging to 1.94.

Kansas is the fifth highest state in terms of rural area BCR, and twenty-sixth in small urban areas. It is noteworthy that two of the states with higher rural BCRs than Kansas are densely populated, while the other two have large tourism industries in rural areas that fulfill work-related trip needs on a regular basis for transit customers. This is a positive sign for rural transit in Kansas, as tourism is relatively low, and rural areas are often remote. (Burkhardt, Hedrick, & McGavock, 1998).

Transit benefits to the public

Skeptics of rural and small urban public transit often cite a lack of return as a reason transit is not effective. These studies show that the return is there; it is often simply difficult to measure monetarily. While transit is not a necessity for most people in less populated areas, for some it offers enormous benefits that they might not have otherwise. Transit availability in rural areas is not typically about overwhelming need for coverage; it is more about providing choice in mobility. The estimated benefits of transit in Kansas have shown to well exceed the associated costs, something to keep in mind when you're educating your stakeholders about your services.

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