Benchmarking Guidebook for North Carolina Urban Transportation Systems

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Prepared for:
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Introduction

Benchmarking improves performance by establishing standards and identifying best practices. The purpose of this Guidebook is to assist urban transportation system managers benchmark the performance of their transit system. Benchmarking helps ensure transit systems throughout the state are using public funding as productively as possible while serving their riders efficiently and effectively.

For more information on the benchmarking process, see the companion report *Implementing a Benchmarking Process at North Carolina Public Transportation Systems*, Institute for Transportation Research and Education, 2010.

Organization of this Guidebook

The guidebook is organized as follows:

1. Finding Your Peer Group
2. Applying Benchmarking Statistics
3. Determining Your Performance
4. Comparing Your System to Your Peers
5. Improving Your Performance

1. Peer Groups

This peer grouping methodology categorizes North Carolina urban transportations systems based on size- small or large. There are many ways to determine a transportation system's size. For these peer groups, the size is determined by the number of weekday peak period routes. If the transportation system has 10 or more weekday peak period routes, they are considered large. If they have nine or fewer routes, they are considered small. We compared the results of more complicated size determinations and found that the number of weekday peak period routes established similar peer groups and was simple and effective way to categorize urban systems into peer groups.

The light rail service operated by Charlotte's CATS and the services operated by Triangle Transit and the Piedmont Authority for Regional Transportation (PART) are recommended for comparison with national peers because they are unique and have no peers within the state.

The table below shows the number of weekday peak period routes and the peer group for each system, based on route statistics compiled in 2010. The route totals should be updated annually.

URBAN PEER GROUPS

Transit System	Peer Group	Number of Fixed Rotues
Charlotte (CATS)	1	70
Raleigh (CAT)	1	43
Chapel Hill (Chapel Hill Transit)	1	24
Winston-Salem (WSTA)	1	24
Greensboro (GTA)	1	23
Durham (DATA)	1	18
Asheville (ATA)	1	16
Wilmington (WAVE Transit)	1	13
High Point (HiTran)	1	12
Fayetteville (FAST)	1	11
NCSU (Wolfline)	1	11
Gastonia (Gastonia Transit)	2	9
Rocky Mount (Tar River Transit)	2	9
Concord/Kannapolis (CK Rider)	2	7
Cary (C-Tran)	2	6
Wilson (Wilson Transit)	2	6
Western Piedmont Regional Transportation Authority	2	5
Greenville (GREAT)	2	5
Goldsboro (Gateway Transit)	2	5
Henderson County (Apple Country Transit)	2	4
Salisbury (Salisbury Transit System)	2	3
Jacksonville (Jacksonville Transit)	2	2

2. Benchmarking Statistics

Urban transportation systems should be cost effective, efficient, and productive. One statistic cannot comprehensively measure performance for each of the three factors. Therefore, each factor has its own benchmarking statistic.

Operating Ratio	
Definition	[Farebox Revenues + Other Local Contributions] ÷ Operating Expenses
Measures	Effectiveness and Efficiency
Goal	Maximize
Description	*Operating Ratio* is the performance measure recommended to assess the local financial support for urban transportation systems. This statistic is the ratio of revenues to operating expenses, and is preferable to *Farebox Recovery Ratio* as a measure to assess the level of all local contributions to operating expenses, not just farebox revenues.

Cost per Passenger Trip	
Definition	[Operating Cost + Administrative Cost] ÷ Passenger Trips
Measures	Effectiveness and Efficiency
Goal	Minimize
Description	The total cost associated with delivering a trip, including Federal, State, and Local operating and administrative funds. This factor measures "efficiency" by using cost and "effectiveness" by using riders carried.

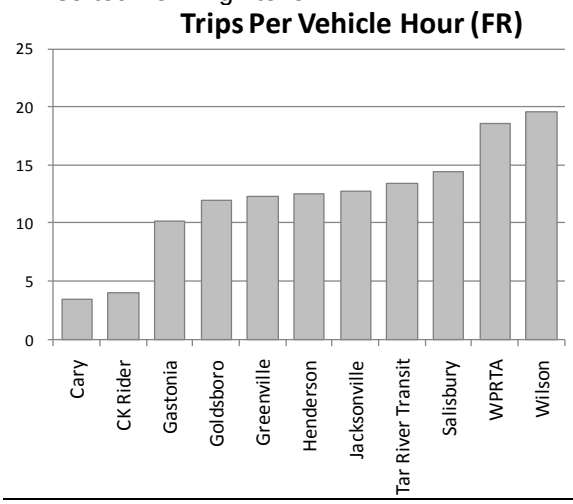
Passenger Trips per Vehicle-Hour	
Definition	Passenger Trips ÷ Vehicle Hours
Measures	Productivity
Goal	Maximize
Description	Measures the productivity of a transportation system. As a performance measure, productivity captures the ability of a transportation system to provide service using the least number of resources—in-service vehicles and personnel—the essence of efficient, effective transportation service.


3. Determining Your Performance

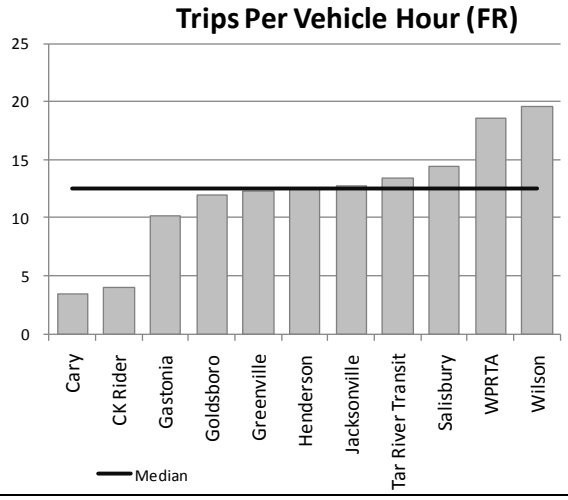
Now that the peer groups have been developed and the benchmarking statistics have been compiled, we have to rank transportation systems by service mode within their peer group. Using peer group averages is not appropriate because there can be significant variation in the data, which skews the average value. To account for variations in the data, we use the 50th Percentile (median) and the 85th Percentile to establish the cutoffs for acceptable and superior performance within a peer group. Percentiles are common statistical methods that disregard extreme values.

To determine the median:

1. Sort the individual system values from lowest to highest. However, Cost per Trip should be minimized. Therefore, that data should be sorted from high to low.

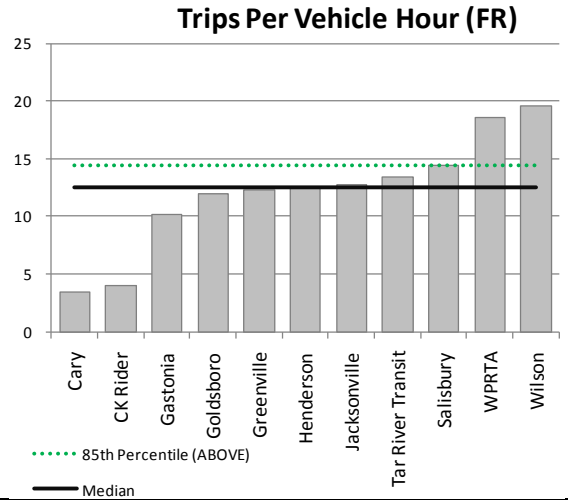


2. Locate the midpoint; where ½ of the values are higher and ½ of the values are lower (solid line). In this example, the median is 12.5.



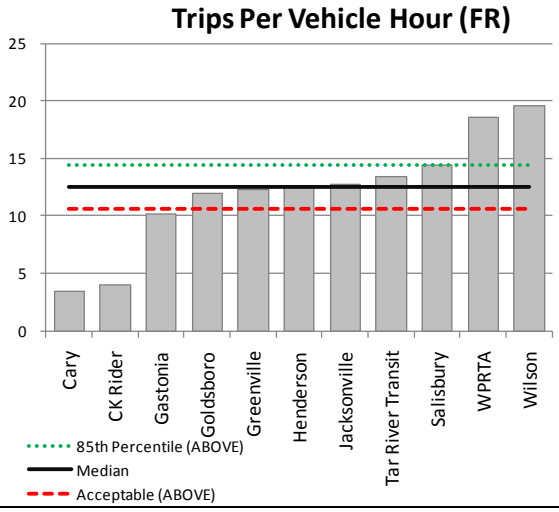
To determine the 85th Percentile (basis of ***superior*** performance):

1. After sorting the data, locate the point where 85% of the values are lower and 15% of the values are higher (green dotted line).
2. Systems with values higher than the 85th Percentile are ***superior*** for this statistic. In this example, the 85th Percentile is 14.5.



To determine the lower cutoff of ***acceptable*** performance:

1. Subtract the median value (12.5) from the 85th Percentile value (14.5), resulting in a difference of 2.0.
2. Subtract the difference (2.0) from the median (12.5), resulting in the ***acceptable*** cutoff value of 10.5. In this example, systems with values between 10.5 and 14.5 are within the acceptable range. Values below 10.5 are below the acceptable cutoff.



The method outlined above establishes the ***acceptable*** range based on the difference between ***superior*** and the norm (median), and subtracts this range from the median to establish the lower bound. This method does not result in having a specific number of transit systems outside of the acceptable range. Some peer group statistics may result in all transit systems with acceptable and superior performance. Other statistics may result in some transit systems performing below the acceptable cutoff.

4. Comparing Your System to Your Peers

Operating Statistics (OpStats) data are used to generate the benchmarking statistics. On Page 2 of the Individual OpStats report and Page 1 of the Peer Group report, you will see the benchmarking statistics in **bold** and *italics* (see the following pages for examples). These reports are available from ITRE and from NCDOT/PTD. The data are divided by service mode (dial-a-ride, fixed route, light rail). There are no light rail peers in North Carolina, so light rail statistics do not appear on the peer group reports.

All of the benchmarking statistics measure something of vital importance to urban transportation systems. Transportation systems may find that they show superior performance for some factors but unacceptable performance on others. If this occurs, do not summarize the benchmarking statistics into one overall score. Systems with superior performance on some factors and unacceptable performance on others should maintain their superior status while working to improve on the unacceptable performance factors.

OpStats data are self-reported by the transportation systems. All financial information should match the year-end audit. Some cost information may not appear in the OpStats report. We strongly encourage transportation systems to track all revenues and expenses related to transportation delivery.

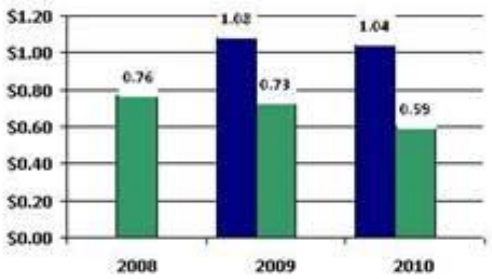
Individual System Page 2

DURHAM

FY 2010 NCDOT Public Transportation Division

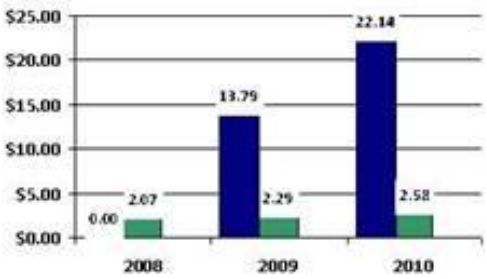
Urban Transportation Operating and Financial Statistics Report

Operating Ratio By Year and By Mode



Operating Ratio is calculated by summing Farebox Revenues and Other Local Funds and dividing by Operating Assistance.

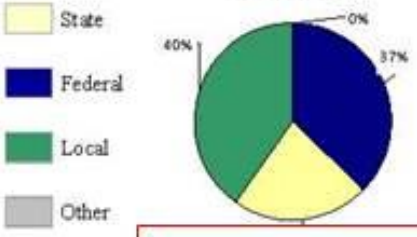
Cost Per Trip By Year and By Mode



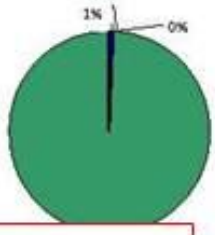
Cost per trip is calculated using the total system expenses divided by the total number of trips.

Revenue Data by Mode

Fixed Route



Demand Response



Light Rail

N/A

Benchmarking Statistics

Data Summar

	Demand Response			Fixed Route		
	2009	2010	% Change	2009	2010	% Change
Subsidy Per Trip:	$0.00	$0.23	0%	$1.12	$1.54	37%
Cost Per Trip:	$13.79	$22.14	61%	$2.29	$2.58	13%
Federal Assistance:	$0	$35,304	0%	$3,532,514	$4,695,364	33%
State Assistance:	$0	$0	0%	$2,681,205	$2,844,713	6%
Local Assistance:	$2,078,126	$3,311,749	59%	$6,507,163	$5,099,084	-22%
Other Assistance	$0	$0	0%	$0	$0	0%
Operating Ratio:	1.08	1.04	-4%	0.73	0.59	-22%
Miles:	1,292,652	1,520,844	18%	2,631,480	2,568,676	-2%
Hours:	72,588	76,692	6%	173,784	171,204	-1%
Passengers Per Hour	2.08	1.97	-5%	29.52	28.67	-3%
Passengers Per Mile:	0.117	0.099	-15%	1.959	1.911	-2%
Total Passengers:	150,708	151,188	0%	5,130,756	4,908,180	-5%

Date Printed: 2/15/2011

ITRE

Data last updated on: 12/1/2010

Peer Group Report Page 1

Urban Transportation Peer Group Summary

FY 2010 NCDOT Public Transportation Division
Urban Transportation Operating and Financial Statistics Report

Peer Group: 1

DIAL-A-RIDE

Number of Systems in Peer Group 10

	Passengers	Hours	Miles	Federal Funding	State Funding	Local Funding	Other Funds
Minimum	6,672	5,208	68,532	$0	$0	$54,239	$0
Average:	145,57				$132,492	$2,537,694	$0
Maximum	580,2				$833,613	$7,094,268	$0
							$0

Dial-A-Ride Statistics

Benchmarking Statistics	Acceptable	Median	Superior
Operating Ratio:	$0.08	$0.99	$1.07
Cost Per Trip:	$28.25	$18.22	$10.02
Passengers Per Hour:	0.181	2.259	2.441

FIXED ROUTE

Number of Systems in Peer Group 11

	Passengers	Hours	Miles	Federal Funding	State Funding	Local Funding	Other Funds
Minimum	779,088	28,776	398,136	$0	$0	$0	$0
Average:	4,703,285				4,645	$7,931,776	$115,106
Maximum	20,361,108				3,653	$56,936,425	$1,261,848

Fixed Route Statistics

Benchmarking Statistics	Acceptable	Median	Superior
Operating Ratio:	$0.22	$0.62	$0.84
Cost Per Trip:	$4.44	$2.54	$1.90
Passengers Per Hour:	9.535	24.485	34.020

* *Some systems are not required to have Dial-A-Ride service*

Peers

- ASHEVILLE
- CHAPEL HILL
- CHARLOTTE
- DURHAM
- FAYETTEVILLE
- GREENSBORO
- HIGH POINT
- RALEIGH - CAT
- RALEIGH - NCSU
- WILMINGTON
- WINSTON-SALEM

BENCHMARKING EXPLANATION

High numbers for performance and Operating Ratio are best
Low numbers for cost per trip are best
Superior = value at 85th percentile
Median = value at 50th percentile
Acceptable = Superior Minus Median

Operating Ratio is the total Farebox and Local Contributions divided by the total operating expenses. This statistic is a measure of the local contribution to the transportation system.

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5. Improving Your Performance

The desired outcome from benchmarking is an improvement in an organization's performance. Organizations that are not within the acceptable or superior levels should work with ITRE, NCDOT/PTD, and other resources to develop a plan for improvement. Specific actions for improvement should be included, along with a timeline for completing each action.

Transportation systems may also pursue improvement plans on their own, using the following methodologies:

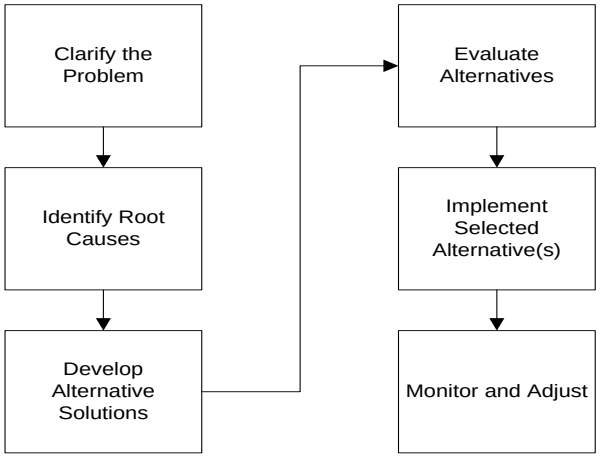
1. Using quality improvement processes such as TQM (Total Quality Management).
2. Using a "best practices" methodology.

Quality Improvement Processes

Quality improvement processes usually involve the concept of "continuous improvement." The underlying premise is that the way to achieve excellence is to make continuous small improvements in the quality of a product or service. This quality improvement requires regular, data-driven measurements of quality ("metrics"). Wherever possible, an attempt is made to define quality from a customer perspective (whether the customer in an external or internal one).

If it is determined that there is a quality (or performance) problem in a particular area, a common practice is to form a small team of people who have responsibility and/or expertise in that area. The team then conducts a problem-solving process to address it. Typically, such a process involves the following steps:


Quality Improvement Process



These steps are explained below:

1. *Clarify the problem.* Make sure that the exact nature of the problem is clearly understood and agreed to by everyone.
2. *Identify the causes of the problem.* Dig down to determine the underlying root causes. Make sure that there is a cause and effect relationship.
3. *Develop alternatives for solving the problem.* Ideally this would include preventing the problem in the future rather than just fixing the current problem.
4. *Evaluate the alternatives and select the best one(s).* It can be useful as part of this effort to have the team develop and agree on the criteria that will be used to choose the best alternative(s).
5. *Implement the selected alternative(s).* It is important to have individuals who have responsibility for implementing the changes on the problem-solving team. This involvement helps them understand and accept what is proposed.
6. *Monitor the results and make adjustments as necessary.* A key to implementing change is to monitor actual results to make sure that they are what was intended. If not, make necessary adjustments.

Best Practices Methodology

Best practices methodology utilizes external references as sources of information for performance improvement. Once it is determined that your organization is falling short in a particular area of performance, you can search for another organization that performs well in that area and adopt its practices.

In addition, you can study organizations outside the transit industry for relevant best practices. For example, the parcel delivery industry could provide useful information on vehicle scheduling and/or utilization. Other, non-related industries could serve as information sources for best practices in areas such as finance or human resources.