Benchmarking Guidebook for North Carolina Community 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 community 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

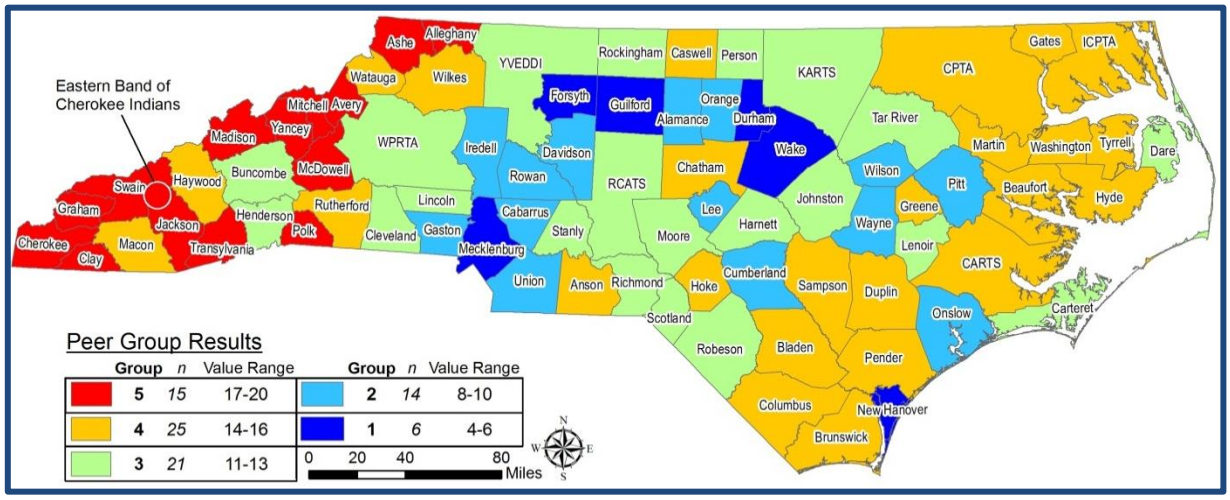
This peer grouping methodology categorizes North Carolina community transportations systems based on uncontrollable geographic and demographic profiles. This scheme groups transportation systems so each system in a peer group has a similar opportunity to perform as well as the highest performing member of its group.

By accounting for uncontrollable factors, differences in performance are primarily due to controllable factors. In other words, all the members of a peer group ***share similar opportunities to succeed.*** The degree to which they succeed can be primarily attributed to factors completely or partially under their control. The transportation system director, staff, and/or governing board can work together to adjust the factors under their control to improve performance.

Two types of factors were used to determine the peer groups and the challenges to a system's opportunity to succeed:

Geographic Factors: Range of Elevation and Highway Density
Demographic Factors: Population Density and Rural Population Ratio

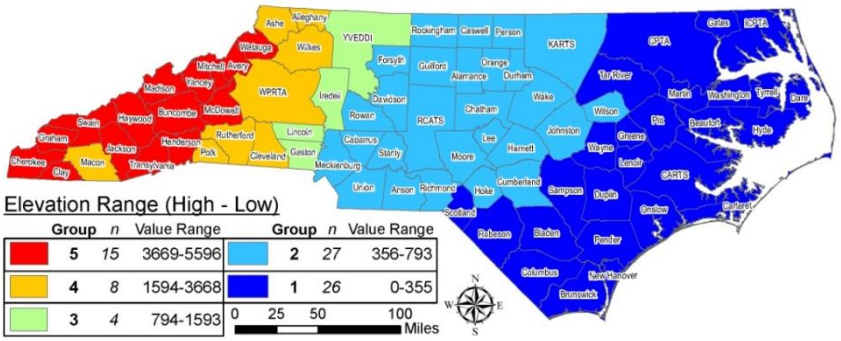
Transportation systems receive scores of 1 to 5 for each factor, with 1 representing the least level of challenge and 5 representing the greatest level of challenge. The scores for each of the four factors are added together to create a group transportation systems with similar opportunities to succeed. The resulting peer groups are shown below. These peer groups will be updated with the decennial Census data and when transportation system service areas change.



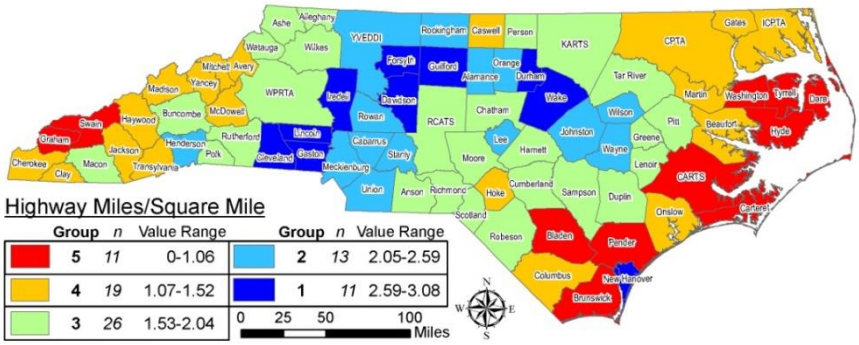
COMMUNITY TRANSPORTATION PEER GROUPS

Maps showing transportation system scores for each factor are displayed below, along with a more detailed explanation of the factors.

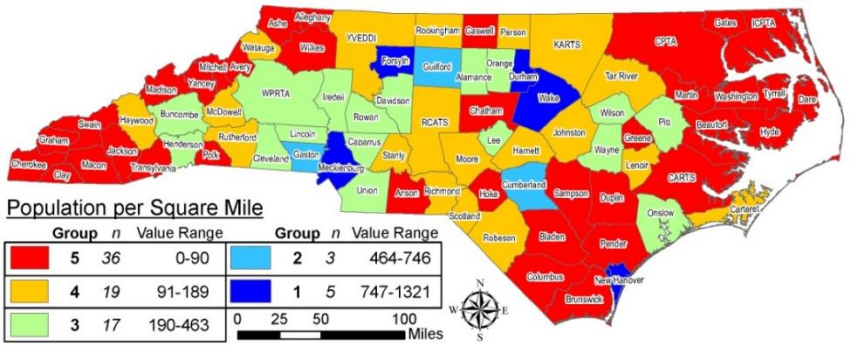
Range of Elevation (*Maximum Elevation (ft) – Minimum Elevation*)- Geographic factor that indicates the potential difficulty of operating due to lower operating speeds resulting from mountainous terrain.



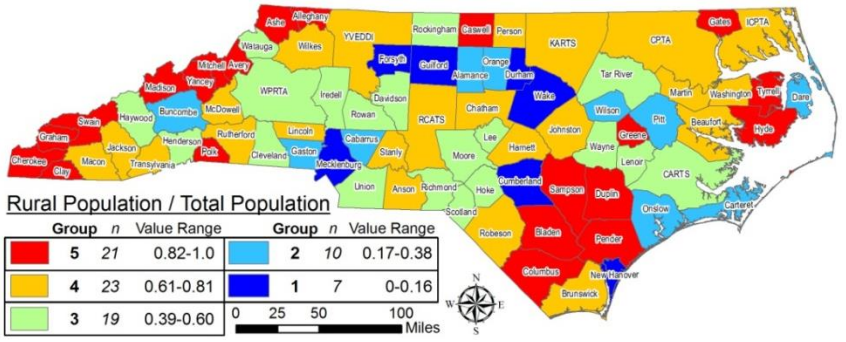
Highway Density (*Miles of State & Federal Highways/ Service Area Size (sq. mi)*)- Geographic factor that indicates the potential difficulty of operating due to having fewer highways in the transportation network.



Population Density (*Population / Service Area Size (sq. mi))*– Demographic factor indicating the relative proximity of trip origins. Areas with lower *Population Density* are more likely to have longer trip lengths and be more difficult to serve efficiently.



Rural Population Ratio (*Rural Population / Total Population)* – Demographic factor indicating the demand for trips outside the service area. Rural areas have fewer services available within the area, requiring more costly, time consuming, and inefficient trips outside the service area.



2. Benchmarking Statistics

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

Subsidy per Passenger Trip	
Definition	[Federal + State Administrative and Operating Assistance] ÷ Passenger Trips
Measures	Effectiveness and Efficiency
Goal	Minimize
Description	The total State and Federal operating and administrative expenses divided by the total number of passenger trips. This measure captures both "efficiency" using cost to State and Federal taxpayers and effectiveness using total passenger trips. This measure assesses the transit system's effectiveness leveraging State and Federal funds to provide service to residents.

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 demand-response transportation system. As a performance measure, productivity captures the ability of a transportation system to schedule and serve passenger trips with similar origins, destinations, and time parameters, using the least number of in-service vehicles and hours—the essence of shared-ride, public demand-response service.

Non-Contract Trips per Non-Urbanized Service Area Population	
Definition	Non Contract Trips ÷ [Total Service Area Population – Population within an Urbanized Area]
Measures	Accessibility
Goal	Maximize
Description	Non-contract trips include only those demand-response trips provided for passengers whose trips are not funded by a human service agency. This measure reflects the number of trips provided to the general public. More general public trips show a transportation system is reaching out and trying to grow its business and better serve its community. Non-urbanized service area population includes only the population of a CT system's service area that lives outside urbanized areas and outside urban clusters[1].

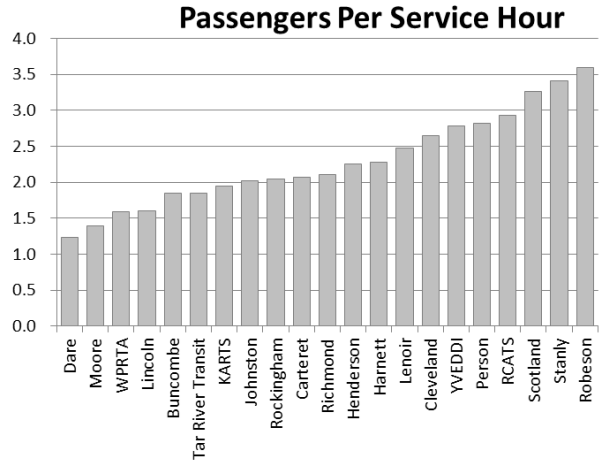
[1] Non-Urban population is the total population of the service area minus the Urbanized Area population and minus the Urban Cluster population, according to and defined by the US Census.


3. Determining Your Performance

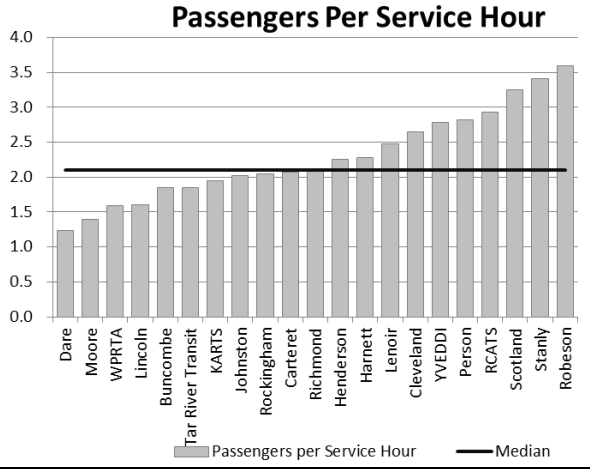
Now that the peer groups have been developed and the benchmarking statistics have been compiled, we rank transportation systems within their peer group. Using peer group averages is not appropriate because there can be significant variation in the data, which skews the average value. To account for variations 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, subsidy per Trip and Cost per Trip should be minimized. Therefore, that data should be sorted from high to low.

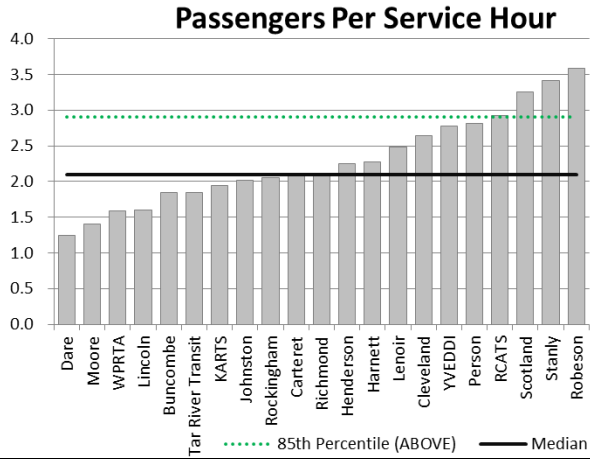


2. Locate the midpoint; where ½ of the values are higher and ½ of the values are lower (solid line). In this example, the median is 2.1.



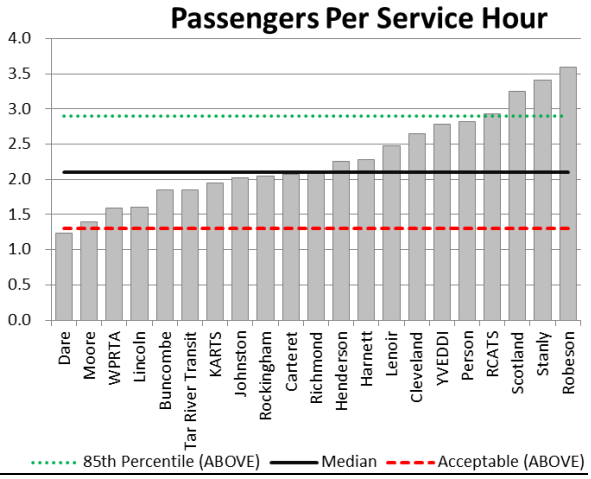
To determine the 85th Percentile (basis of ***superior*** performance):

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 2.95.



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

1. Subtract the median value (2.1) from the 85th Percentile value (2.95), resulting in a difference of 0.85.
2. Subtract the difference (0.85) from the median (2.1), resulting in the ***acceptable*** cutoff value of 1.25. In this example, systems with values between 1.25 and 2.95 are within the acceptable range. Values below 1.25 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 having acceptable or 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 both the Peer Group and Individual OpStats reports, you will see the four benchmarking statistics in **bold** and *italics* (see the following pages for examples). These reports are available from ITRE and from NCDOT/PTD.

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

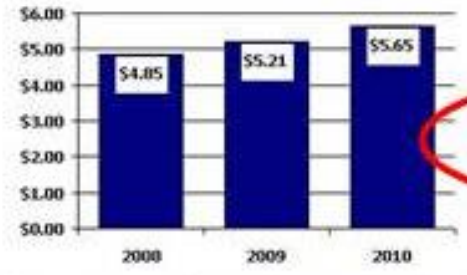
OpStats data are self-reported by the transportation systems. All financial information should match the year-end audit. In the future, trip counts will be verified against the Vehicle Utilization Data and actual manifests.

Some cost information may not appear in the OpStats report. County departments, for instance, may not track driver salaries because they are paid from the general fund. We strongly encourage transportation systems to track all revenues and expenses related to transportation delivery.


Individual System Page 2

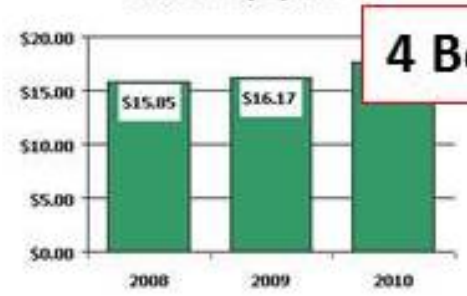
Ashe County Transportation Authority, Inc.
FY 2010 NCDOT Public Transportation Division
Community Transportation Operating and Financial Statistics Report

Subsidy Per Trip By Year

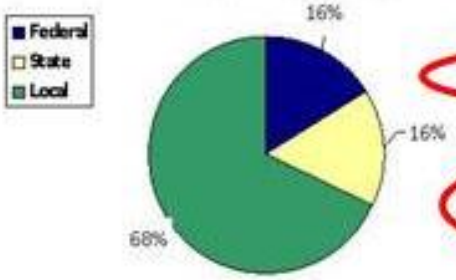


Subsidy per trip is calculated using the total amount of Federal and State administrative and operating funds a transit system received divided by the total number of trips. Cost per trip is calculated using the total system expenses divided by the total number of trips.

Cost Per Trip By Year



Administrative and Operating Funding Sources



Data Summary

	2009	2010	% Change
Subsidy Per Trip:	$5.21	$5.65	8%
Cost Per Trip:	$16.17	$17.60	9%
Cost Per Mile:	$1.52	$1.53	0%
Cost Per Hour:	$32.62	$33.01	4%
5310,16,17, 20 Funds:	$0	$0	0%
5311 Funds:	$146,535	$154,066	5%
ARRA Funds:	$0	$0	0%
Other Federal Funds:	$0	$0	0%
Total Federal Funds:	$146,535	$154,066	5%
CTP Admin Funds:	$9,158	$9,629	5%
Local Contract Funds:	$518,835	$568,139	10%
Local Fares:	$79,007	$59,528	-25%
Other Local Funds:	$12,318	$12,251	67%
Total Local Funds:	$609,160	$639,918	6%
Reportable Incidents:	1	0	0%
Reportable Fatalities:	0	0	0%
Reportable Injuries:	1	0	0%
Miles:	587,452	616,824	5%
Hours:	28,248	28,568	1%
Passengers Per Hour:	1.96	1.88	-4%
Passengers Per Mile:	0.09	0.087	-6%
Total Passengers:	55,248	53,568	-3%
Non-Contract Trips Per Non-Urban Population:		0.91	

Note: Statistics in bolded italics are used for benchmarking purposes

4 Benchmarking Statistics

Date Printed: 1/18/2011 ITRE Data last updated on: 10/12/2010

Peer Group Page 2

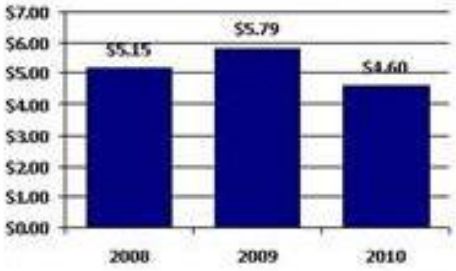
Community Transportation Peer Group Summary

FY 2010 NCDOT Public Transportation Division

Community Transportation Operating and Financial Statistics Report

Peer Group: 5

Subsidy Per Trip By Year



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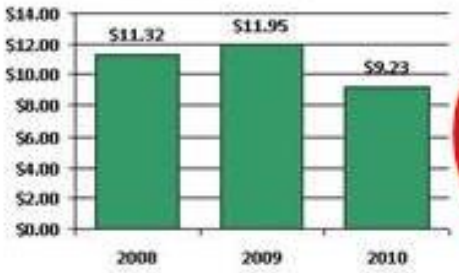
Cost Per Trip By Year



Data Summary (Totals)

	2009	2010	% Change
Administrative Funds			
- Federal:	$1,720,626	$1,744,659	1%
- State:	$107,538	$109,024	1%
- Local:	$236,920	$284,735	20%
Operating Funds:			
- Federal:	$172,000	$419,454	144%
- State:	$1,565,014	$1,615,422	3%
- Local:	$2,389,319	$2,393,551	0%
Reportable Incidents:	3	0	0%
Reportable Fatalities:	0	0	0%
Passengers Per Mile:	0.141	[illegible]	37%
Total Passengers:	649,800	866,088	33%

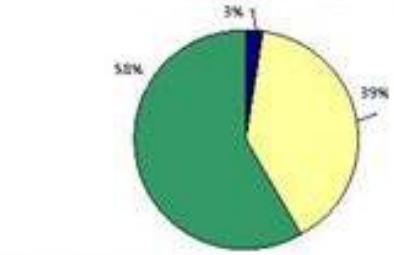
4 Benchmarking Statistics

Benchmarking Statistics

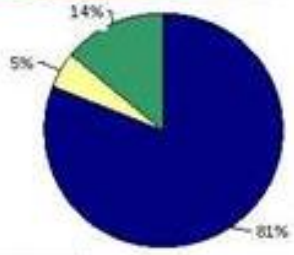
	Acceptable	Median	Superior
Subsidy Per Trip:	$10.25	$6.76	$3.49
Cost Per Trip:	$20.64	$14.69	$5.95
Passengers Per Hour:	2.03	3.10	5.13
Non-Contract Trips Per Non-Urban Population:	0.79	1.01	1.80

Low numbers for $ values, high numbers for performance are best
Superior = value at 85th percentile
Median = value at 50th percentile
Acceptable = Superior Minus Median

Operating Funding Sources



Administrative Funding Sources



Date Printed: 1/12/2011

ITRE

Data Last Updated On: 1/3/2011

5. Improving Your Performance

The desired outcome from benchmarking is an improvement in an organization's performance. For systems that need improvement, NCDOT/PTD and ITRE will schedule a meeting to determine if the poor scores are a result of data irregularities.

If the data are accurate, it will be necessary for the transportation system to work with ITRE and NCDOT/PTD to develop an improvement plan. These improvement plans may be included in the Community Transportation Service Plan, Performance Plans, or another acceptable planning process. The resulting plan should address the reasons for the low performance and set targets for achieving 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:

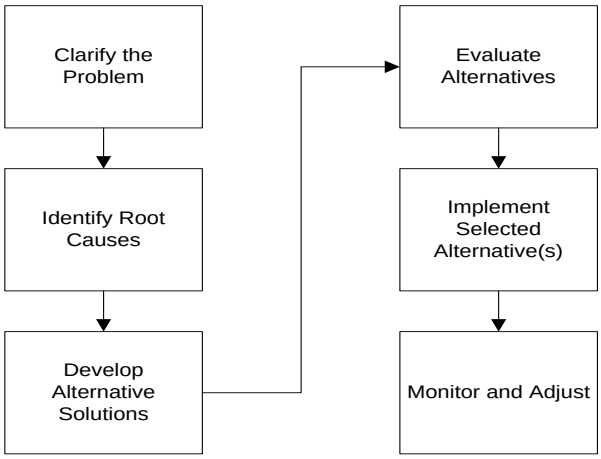
1. Using quality improvement processes such as TQM (Total Quality Management).
2. Using a "best practices" methodology.

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.