



TRANSPORTATION ANALYTICS: UNDERSTANDING PERFORMANCE

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Transportation services typically represent 4%–6% of a district's operational costs, but most business managers will tell you that transportation management seems to require much more time and attention than it should.

The increasing complexity of transportation service requirements, the perpetual challenge of managing service expectations, and a need to control costs demand that school business professionals be more involved with their transportation operations than they might like or have time for.

Creating an analytics plan that provides a limited number of critical performance indicators in a quickly digestible format can help transportation managers efficiently and effectively measure performance and support the transportation staff.

Formally, analytics involves studying historical data to research potential trends, to analyze the effects of certain decisions or events, or to evaluate the performance of a given tool or scenario. The goal is to gain knowledge that can be used to make improvements.

School districts have always used some kind of analysis, but the most effective mechanism to evaluate transportation performance is a structured analytical plan that is formalized and recurrent rather than ad hoc and incident based.

THIS TYPE OF PROGRAM REQUIRES YOU TO DO 3 THINGS TO BE SUCCESSFUL:

- 1) Define what you should know and what you want to know
- 2) Focus on interpretation, not calculation
- 3) Determine how to evolve the system as you and it grow

KNOWING WHAT TO KNOW

Transportation is a relatively uncomplicated function in theory and a highly complex activity in reality. That complexity provides almost unending opportunities to measure the performance of various aspects of the operation; however, the value of all those measures must be carefully considered. You must be able to gather the data, perform the calculations, interpret the results, and decide on a course of action within relatively short time frames. You must focus on creating simplicity out of complexity.

The first step to simplicity is to define a limited set of meaningful indicators. Meaningful indicators focus on the key components of the organization: people and buses. By focusing on those inputs, you can gain insight into the quality of the outcomes being achieved by the transportation operation.

A reasonable starting point is to focus on indicators related to cost-effectiveness, routing efficiency, fleet age and condition, and staffing adequacy. Within these broad areas of concern are a limited number of key metrics that can provide a surprising level of insight for a limited amount of effort. Table 1 summarizes 12 indicators that serve as a solid starting point for any district.

The next major decision is how frequently to calculate these indicators. In most instances, these values can be established annually and trend analysis conducted on that basis. However, there is value in calculating a number of these indicators—including capacity use and average daily absence rate—more frequently to identify seasonal trends in ridership and daily concerns about driver availability.

This dynamic dozen of indicators will allow business managers and other senior administrators to gain important insights into virtually all aspects of transportation service.

THE RELATIONSHIP BETWEEN THESE INDICATORS WILL HELP DEMONSTRATE:

- 1) The disproportionality between traditional home-to-school and special needs services
- 2) The efficiency of both the routing scheme and the bell time structure
- 3) The effectiveness of capital funding strategies

TABLE 1. KEY INDICATORS OF TRANSPORTATION PERFORMANCE

PERFORMANCE INDICATOR	CALCULATION	INDICATOR'S IMPORTANCE	SUGGESTED GUIDELINE
Transportation cost as a percentage of district-wide budget	Total transportation cost ÷ total school district expenditure	Indicator provides a quick litmus test of transportation costs to see whether they are appropriate	4% - 6%
Cost per student (total)		Indicator is the single most important measure of operational efficiency; objective is to move the maximum number of students with a few resources as possible	
Cost per regular education student	Regular transportation cost ÷ total regular education students transported	Indicator is usually the lowest cost metric since these students are transported in larger number and reflect the economies of scale of a mass transportation system	
		Special needs students cost 4 – 10 times more to transport	

PERFORMANCE INDICATOR	CALCULATION	INDICATOR'S IMPORTANCE	SUGGESTED GUIDELINE
Average number of buses per 100 students transported	Total buses (total students ÷ 100)	Fewer buses used to transport any group of students will reduce costs; indicator shows (a) how well buses are being filled and (b) how well multiple trips are being assigned to buses	1.10 – 1.34 buses
Capacity use	Actual passengers ÷ planned bus capacity	Costs on a per-student basis will decrease as more seats are filled	60% - 70%
Trip pairing	Total daily routes ÷ total active buses	Costs on a per-student basis will decrease as more seats are filled	4.0 – 6.0, depending on school time structure
Daily cost per bus	(Transportation costs ÷ active buses) ÷ annual instructional days	Indicator provides a point comparison with charges from commercial transportation carriers	
Average daily driver absence	Total absent driver days ÷ (total drivers x total service days)	High absenteeism will reduce service quality and drive up personnel costs	4% - 5%
Average vehicle age	Mean age of all vehicles, by major vehicle class	A large replacement backlog can be a reason for an indication of excessive maintenance and repair costs	15% - 20%

Beginning with these metrics, business managers and transportation directors can have a common language from which to develop strategies to address funding and operational questions.

INTERPRETATION, NOT CALCULATION

The unfortunate reality of a well-designed performance measurement system is that all of the work that goes into defining and calculating the indicators represents the easiest part of the process. The hard part begins when we try to interpret what the indicators mean individually and, more importantly, what they mean together. It is only through a thoughtful process of assessment and comparison that the true value of your analytics program can be realized.

The first rule of interpretation is that you must not overreact to a single metric. It is all too common for analysts to see a measure that is outside the expected bounds or that is well out of trend and to presume that it is meaningful and requires correction. You must resist that temptation and be disciplined about evaluating each metric as part of a constellation of metrics that provides context and balance within the group. Creating this constellation of metrics provides more useful insight into operational performance while also identifying whether any anomalous results are being caused by bad data, bad arithmetic, or a true change in performance.

For example, when districts experience an increase in the daily cost per bus, officials may naively interpret that increase as an indication that the transportation staff is doing something “wrong.” The response is to try to find ways to drive costs back down.

However, what if this increase were coupled with an increase in capacity use and the number of trips per bus? Now, we have a much richer picture of the operation that includes two indicators showing increasing efficiency and one indicator potentially showing a decrease in cost-effectiveness. If we think for a moment about the arithmetic of these metrics, the seemingly contradictory indicators begin to become clearer.

For simplicity’s sake, let’s assume we are transporting the same population of students for exactly the same expenditures. In order for us to increase capacity use and increase trips per bus, only one thing could have happened: we reduced the number of buses we use to service these students. Consequently, the arithmetic would have the same numerator but a smaller denominator resulting in a higher quotient. Voila! Our increase in efficiency results in a higher cost per bus.

Although a decrease in the number of buses would likely result in some decrease in expenditures, this example demonstrates why considering a constellation of indicators is critical to appreciating the full effect of operational

changes. The ability to establish a reasonable set of complementary measures provides the best chance of gaining an understanding of what is truly happening in your transportation operation.

EVOLVING THE SYSTEM

Transportation operations—particularly those that are heavily technology-enabled through GPS, bus-tracking apps, and student tracking—are enormously data-rich environments. That factor allows for extensive data collection and near real-time reporting of results. However, it also presents the challenge of finding the signal in the noise. That is particularly true for business administrators and operations managers who may have nominal responsibility for transportation but who are not operationally focused.

Evolving your measurement system to reflect the changing concerns in your school district without losing the value of the historical data that have been collected becomes the next-biggest challenge for school districts.

The natural evolutionary path for these kinds of systems is to focus on increasing levels of detail related to the initial set of measures. Although this approach is certainly appropriate for operations staff, a more valuable approach for the business administrator would be to shift the focus to other key areas of concern. Those areas include customer service and response time, driver recruiting, and operational performance.

In many instances, capturing the data necessary to perform these analyses will require additional investments in systems that are beyond the typical routing software. Often, the funding needed to support these investments can be derived from efficiencies gained through the previous efforts.

Developing an analytics program for your transportation operation requires careful consideration of operational concerns and data collection capabilities. The degree to which the current trade-offs between costs and service are consistent with the district's operational and service philosophy can be clarified through analysis of a small number of targeted indicators. Fortunately, most operations—regardless of their size and sophistication— have both the means and the data necessary to evaluate the core metrics identified above.

About TransPar

TransPar is a leading organization that offers an array of products and services representing the most comprehensive and responsible services in the student transportation industry. And we do this all while keeping your students safe and improving the cost and quality of your school transportation operation.

Our experience with student transportation programs of all sizes includes school districts that own and operate their own school bus fleet, school districts that utilize contractors, and school bus contractors themselves, thereby allowing us to provide innovative solutions to the entire spectrum of student transportation needs.

TransPar provides Management and Staffing Services to develop solutions for difficult operational questions and problems; Advisory Services to deliver resources and expertise that transportation contractors and organizations often cannot access on their own; and Fleet Management Services and Technology Products to help customers create the strong foundation necessary to support effective service delivery. So no matter your needs, we are your all-inclusive solution to creating a successful, reliable, and profitable student transportation program.