

TMS Performance Monitoring, Evaluation, and Reporting

Frequently Asked Questions

Q. Who is primary audience of the handbook?

A. This handbook is mainly useful for managers, supervisors, and operators working at a Traffic Management Center (TMC), Department of Transportation (DOT), or anyone interested in the performance of a Transportation Management System (TMS). The last group includes many agencies, such as MPOs (Metropolitan Planning Organizations), Counties, Cities, etc.; specific TMS-related agencies such as law enforcement, emergency response, bridge management, toll management, etc.; and transportation researchers. The general public and elected officials could also learn what to expect from, and ask for, in the context of a TMS.

Q. What is a transportation management system? What is a transportation management center?

A. A Transportation Management System (TMS) and may be loosely defined as the deployed form of Intelligent Transportation Systems which, along with the human resource factor, contributes to transportation management. In particular, a TMS includes computer hardware, software, communications, and surveillance technologies that service freeway and arterial systems. A traffic management center (TMC) is the physical facility that houses central equipment, software and personnel to monitor, control, and operate one or more TMSs.

Q. What is performance measurement?

A. In a broad context, performance measurement is the use of quantifiable indicators (performance measures) of program effectiveness and efficiency to determine progress toward specific, predefined organizational goals and objectives. “Effectiveness” measures whether the right program elements are being executed. “Efficiency” measures whether the execution of those elements is done in the right way.

Q. What are the benefits of implementing a performance measurement program?

A. As president Clinton pointed out while signing the GPRA in 1993, performance measurement helps us to “. . . *chart a course for every endeavor that we take the people's money for, see how well we are progressing, tell the public how we are doing, stop the things that don't work, and never stop improving the things that we think are worth investing in.*”

Specifically, for a TMS, a performance measurement program enables an agency (a TMC, DOT, etc.) to assess and track improvements in their operation by quantifying and documenting benefits, lessons learned, and trends. These trends provide strategic feedback for decision makers, for funding allocations. A performance measurement program also provides increased accountability for public expenditures for internal and external purposes.

Q. Will performance measurement require a lot of time and resources, especially money?

A. Agencies can usually start with whatever they already have and then plan for improved data collection, performance measures, etc. Every program or process is usually started to achieve some objective that is in line with the overall goals of the agency. A simple set of qualitative indicators could record whether the initially specified goals are being achieved or not, and to what degree.

Data collection, quality, and archiving are often cited as concerns. Yet, these could be improved down the line along with other aspects of the performance measurement program such as better measures, frequency of updating these measures, improved presentation, etc. Wherever additional time and other resources seem necessary for performance measurement, the accrued benefits justify them. These benefits include improvements in quantified program performance, better availability of funding, and higher customer satisfaction.

Q. What are the typical goals and objectives of a TMS, and how do these translate into performance measures? (What are some commonly used TMS performance measures?)

A. The typical TMS goals are to improve mobility (reduce congestion, travel time, and increase travel time reliability), efficiency (capacity, throughput), safety, and customer satisfaction. Some TMSs also have the goals/objectives to reduce pollution, fuel usage, and improve quality of life.

Q. How do the goals and objectives of a TMS translate into performance measures? (What are some commonly used TMS performance measures?)

A. There are several measures for each function and its component that is managed within a TMS. Some of these measures are the number of work zone crashes, reliability of equipment within the TMS, and average detection/verification/response times to incidents. A comprehensive list of these measures is made available in the handbook.

Performance measures for TMSs are mainly classified as outputs (which measure how much activity has been done) and outcomes (which measure the impact of the activity). For example, for the freeway incident management function, the number of crashes responded to by the team is an output measure, and the total or average hours of delay to the motorists due to the incidents is an outcome measure.

Q. What are the characteristics of good performance measures?

A. A good measure is defined clearly and is directly related to predefined goals and objectives. Further, it is understandable, logical, and repeatable. It also allows for data collection and shows trends.

It is better if the range of needs and uses of potential performance measures is well understood before an agency can determine which performance measures to implement. This may not be the case when an agency implements performance measurement for the first time – which is okay. As the program evolves, the better measures remain and the other ones are flushed out. The “goodness” of the selected measures depends on the audience, and it is recommended to include all the stakeholders in the measures selection process.

Q. Who should be involved in developing the TMS performance measurement program?

A. TMC management and staff should work with stakeholders to develop a performance measurement program. With respect to a TMS, stakeholders are interest groups who benefit from, or are otherwise impacted by, a TMS and its operations. For example, TMC stakeholders almost always include existing agencies involved in freeway and/or signal systems operations, regional planning, emergency management (fire, police, ambulance), and departments of transportation (at city, county, state, national levels). The stakeholders should be involved in each phase of a performance measurement program, including the processes of defining performance measures and how they are to be used. Stakeholder support is critical for initial acceptance and continued success of the program.

Q. Where does performance measurement start, and what is the entire process?

A. Performance measurement is an iterative process. Defining the services that the organization promises to provide, including the quality or level of service (e.g., timeliness, reliability, etc.) that is to be delivered is a good place to start. Performance measures are then used to prioritize projects, provide feedback on the effectiveness of long-term strategies, refine goals and objectives, and improve processes for the delivery of transportation services. These goals are then used to select and create various measures that will indicate if the stated objectives are being met.

Data pertaining to these measures is then collected, cleansed, and archived. Using the data, the system/process is monitored through quick calculations and visualizations. Evaluation involves extended analysis over a given period of time or space. Lastly, the results are reported and distributed. This again generates a new set of measures/goals depending on the focus of the community or their elected leaders.

Q. How are other TMSs doing in performance monitoring, evaluation and reporting? And how do we know how we’re doing currently?

A. The performance measurement activities of a TMS depends on a number of diverse aspects such as: if there is a performance measurement program in place, what functions are being monitored, how often are they monitored, whether detailed

evaluations are performed, whether the performance information is shared with stakeholders so on. All these various aspects have been captured using a self-assessment toolkit that is available within the handbook. The results from a national survey based on this toolkit are also published in the handbook. Further, the handbook also presents a few specific case studies that include factual information about TMSs (size, budget, resources etc.), discussion by the project panel, and contact information to get more details.

Q. Yes, we definitely need performance monitoring, evaluation, and reporting for our TMS. Can you give us more details?

A. More details of performance measurement are presented in the next section. However, the *TMS Performance Monitoring, Evaluation, and Reporting Handbook* presents far more details, with examples. Interested agencies are encouraged to read the handbook, which details the entire process, including data, metrics, monitoring, evaluation, and reporting practices. It includes an extensive list of performance measures based on agency type (i.e., Freeway, Arterial, or Transit). Best practices, examples of what other agencies are doing well, are presented for each chapter. A self-assessment toolkit is available and the results of a national survey are presented. Case studies, discussion, and contact information are also included.

More Details of Performance Measurement

Q. Okay, we definitely need performance measurement. How do we select performance measures?

A. The measures applicable to a TMS depend directly on the functions, goals and objectives of the TMS. A number of applicable measures are listed in the handbook, for each TMS function category, and sub-category. The final decision depends on the consensus among the important stakeholders also.

Q. What data should be collected?

A. The data needs for a performance measurement program depend on the measures selected. For calculating travel time reliability (for example, the Texas Transportation Institute's Buffer Index), many values of travel times (lots of data!!) for the corridor or route are needed. Many measures also require information about external conditions (like weather) to derive any meaningful information. This data should also be collected.

Some measures (like travel time) directly follow from the data. Other measures may not be available for direct collection from the field due to costs, technology, or the nature of the measure. When it's unclear precisely what data will be needed, one solution is to collect everything possible and sort out the uses later on, though this is expensive.

Q. What is data archiving? Why should we do it?

A. Data archiving is simply storing data for later use rather than throwing it away after real-time surveillance. Data from the past is important because performance measurement requires benchmarking, and historic context is useful for finding trends. Also, data archiving enables many agencies to share data collected by one agency, minimizing costs from repetitive or redundant data collection efforts.

Q. What is the difference between performance monitoring, evaluation and reporting?

A. In summary, “performance monitoring” examines the actual system condition through observed data, “evaluation” analyzes the collected data and compares the results to benchmark performance measures, and “reporting” provides information via various media to decision makers and the public. Reporting also aids in the internal auditing of the agency functions and outcomes.

Q. What are the common methods for performance evaluation?

A. Some of the most popular evaluation methods include before-and-after studies, analysis of trends, comparison group evaluation, root-cause analyses, and cost-benefit analyses. These are all explained in detail in the handbook.

Q. What are the common formats and key contents of a TMS performance report?

A. The TMS performance reports are often either printed as hard copies, published over the Internet, or both. In essence, the external reports explain how successful the agency is with accomplishing its mission, goals, and objectives in the context of “potential significant decision making or accountability implications.” These reports are published at different frequencies such as weekly, monthly, quarterly or annually.

Q. Where can I find more information on TMS performance monitoring programs?

A. The *TMS Performance Monitoring, Evaluating and Reporting Handbook* is available at the TMC Pooled Fund Study Website at <http://tmcpfs.ops.fhwa.dot.gov/>.

