TMS PERFORMANCE MONITORING, EVALUATION AND REPORTING HANDBOOK

Performance monitoring, evaluation, and reporting are tasks essential to the successful implementation of a transportation management system (TMS). They help to determine the efficiency of a TMS by examining its existing conditions, analyzing system data and comparing the results to benchmark performance measures, and disseminating these results to various stakeholders (agency officials, the public, etc.). Because of the important roles that these processes play throughout the life cycle of a TMS, TMS operators must implement effective measures and methods for performance monitoring, evaluation, and reporting.

Monitoring

Performance monitoring allows agency decisions—often in real time—to be made based upon up-to-date information produced by the TMS. One way in which to monitor the system is through the use of closed-circuit television (CCTV) cameras. These cameras are placed throughout the TMS area at strategic locations determined by agency officials. Camera images or video can then be viewed by agency officials, usually at the system's transportation management center (TMC). An example of the expanded use of CCTV cameras is from the New York City TMC. Its Advanced Traveler Information System allows the public to view CCTV streaming video or still images of select New York City intersections via a website. This provides the public with real-time traffic condition information with relative ease.

Another common performance monitoring method is the use of real-time maps over the Internet. With this method, TMS operators can display a system map that shows the current road conditions (speed, incidents, etc.). For example, the San Diego TMC has a website devoted to this type of performance monitoring that is used by both TMC operators and the public. This site displays the speed along any section of freeway in the San Diego area in real time. It does so by color-coding the freeways on the map according to set speed intervals. Figure 1 shows a screen shot of the San Diego TMC website. Here, users can select a roadway and direction on the left side of the screen and view measured speeds at various points along the selected corridor on the right side of the screen. In addition, the middle screen shows the main roadways color-coded by speed and sections under construction or with malfunctioning sensors.

Figure 1. Screenshot of San Diego TMC system performance monitoring map (http://www.dot.ca.gov/dist11/d11tmc/sdmap/mapmain.html)

For TMS managers, performance monitoring can also be accomplished with the use of daily or weekly reports.

Evaluation

Performance evaluation is the analysis and manipulation of TMS data to determine the system's conditions and effectiveness. TMSs use a variety of different statistical techniques to assess performance, such as before-and-after studies and trend analyses. For instance, San Antonio's TransGuide system studied crashes and incident response times during its first five months of operation. When compared to the time before its implementation, TransGuide helped to reduce crashes and improve incident response time significantly.

Another TMS evaluation method is trend analysis. Trend analysis examines the changes of certain system variables over time. The main benefit of trend analysis is that it identifies which aspects of the system are benefiting from investments. TMS data, however, must be archived for trends to be identified and analyzed. The INFORM system in Long Island, New York, for instance, tracks the percentage of working field devices online and maintains a trend analysis.

The most widely accepted evaluation methodology for transportation improvements, however, is benefit-cost analysis. In this analysis, values, usually monetary, are assigned to predicted benefits and costs of a system implementation or improvement. If the resulting ratio of benefits to costs is greater than one, the implementation/improvement is considered justified. This type of analysis provides a convenient manner in which to compare alternative projects. Agencies can also use an incremental benefit-cost analysis, which can be used when costs, quantities, and complexities of the alternatives' components build upon each other. In this case, the additional benefits and costs of one alternative over another should be considered. The downside to benefit-cost analysis in general, however, is that it is sometimes difficult to quantify the benefits and costs of TMS implementation and improvements.

Reporting

Performance reporting is the process by which information from the evaluation step is disseminated to stakeholders (agency officials, the public, etc.) in a cogent manner. Effective performance reporting focuses on selected critical aspects of the TMS performance, stating the reasons for selecting these aspects and interpreting their evaluation results in a way that is easily understood by all stakeholders. Reporting also has two important considerations to note—the intended audience and the content/frequency of reporting.

Reporting needs are often different depending on the intended audience. As a result, TMS goals and objectives should establish the reporting needs for each stakeholder group. For instance, reporting to agency and government officials should state the current system status and future plans and goals. Alternatively, reporting to the public should involve information on the use of resources, service efforts, and system accomplishments.

The content and frequency is another important issue in performance reporting. There are two kinds of reports—internal and external. Internal reports are intended for agency staff and communicate information accordingly. External reports inform those outside the agency of its success and progress toward stated goals and objectives. The current trend for disseminating these reports is through intranet and Internet sites, respectively. Internal reports available on an

agency's intranet site are typically updated on a frequent basis—usually weekly or monthly. External reports, however, are not updated as often since their purpose is to communicate information over a longer term. The Washington Department of Transportation (WSDOT), for instance, compiles "The Gray Notebook," a quarterly performance report made available on the agency's website. "The Gray Notebook" explains WSDOT's planning process and rationale behind its decision-making. It also tracks a variety of performance and accountability measures and the overall effectiveness of the TMS.

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