Sector funding

Investment Programming

This section provides an overview of the programming function and process. While the description provides a common framework for reviewing programming practice, the approach to programming varies widely from country to country in response to a range of institutional, political, and financial factors.

There are three key objectives of the investment programming and project selection process.

These objectives are:

- Effective allocation of resources to address policy objectives;
- Facilitating tradeoffs among competing investment opportunities, including among program areas (capital, maintenance, operations, etc.), geographic areas, and individual projects; and
- Supporting efficient program and project delivery.

Types of Projects

Investment programming involves three major types of projects:

- Capital investment, or construction of new or expanded facilities and operating controls;
- Maintenance, including ongoing reconstruction and rehabilitation to preserve the quality of existing facilities; and,
- Operations, such as signal timing, traveler information, ITS and pricing and other control systems that manage transportation flows to make more efficient use of physical facilities.

It is important to direct sufficient resources to each of these program areas and to consider the tradeoffs among them. In the absence of regional inequities in accessibility, capital investment projects should not be programmed unless there is adequate funding available to maintain the facilities. If projects are built and then not maintained, facilities will deteriorate, leading to a reduction in system performance in the future and the need for expensive reconstruction and rehabilitation.

Reducing maintenance budgets, an obvious cost-cutting strategy when there are funding shortfalls, can therefore increase the long-term costs of maintaining a road infrastructure. A variety of analytical tools and methods are available for determining the optimum schedule for maintenance (e.g., that which minimizes “life-cycle” costs); these are discussed in the section under asset management.

The trade-off between capital investment and operational improvements should also be considered. In many cases, comprehensive operational strategies can improve capacity and safety at a much lower cost than expanding the physical infrastructure. For example,

motorized and non-motorized traffic can each be given separate lanes to improve traffic flow, reduce crashes, and make more effective use of road space.

Also, new Intelligent Transportation Systems (ITS) technology is greatly increasing our ability to improve the efficiency and safety of existing infrastructure. Commercial Vehicle Information Systems Networks (CVISN), for example, can be used to establish improved permitting procedures to ease permit approval, speed customs inspections, and maintain safety records for trucks. These technologies can reduce delays in shipping and help ensure that vehicles are being operated safely.

The Investment Programming Process

The primary steps of the programming process include setting goals and objectives; establishing performance measures; assessing needs and identifying potential projects; evaluating projects; establishing program categories; prioritizing projects within categories; evaluating tradeoffs among program categories; identifying financial resources and setting budgets; and implementing and monitoring programs.

The Process includes:

Program Goals and Objectives

The first step in investment programming is to develop explicit goals and objectives that will enable the transportation agency to implement its core policy objectives.

Performance Measures

Performance measures are established so that Highway Authority managers can assess the degree to which the selected investment program is successful in terms of improved system performance, cost, and benefits.

After performance measures are defined, performance standards can be identified. Performance standards are target levels of performance measures, for both system service and design characteristics, that are not subject to further trade-off analysis.

Needs Assessment and Project Identification

Highway Authorities need to establish procedures for identifying deficiencies, needs, and candidate projects. Although this activity typically falls within the planning (rather than programming) function, it is critical to the programming process as a source of basic inputs. Needs estimates and project identification are done through a combination of methods:

- Results of system-wide, corridor, and local planning efforts;
- Facility inventory and inspections;
- Facility management systems;
- Review of accident, traffic, or ridership statistics, and vehicle or equipment breakdowns;
- Sufficiency ratings or deficiency threshold criteria;

- Comparison of outcome-based performance measures and standards; and
- Suggestions by administration staff, elected officials, and citizens.

After needs are identified, specific projects can be developed for consideration, including whether by PPP or not.

Project Evaluation

A key program development activity is to evaluate and compare candidate projects to provide a basis for deciding which projects should be funded. There are a number of methods (see the references in Module 3 and Module 5) for evaluating projects, ranging from informal and qualitative to highly complex and technical.

Methods include:

- Setting priorities based on the judgment of elected officials and/or
- Ranking projects based on the severity of the problem or the estimated benefit or impact of the project;
- Formal cost-effectiveness or cost-benefit analysis; and
- Optimization methods, particularly for pavement and bridge preservation.
- Program Development

Program development includes organizing projects and initiatives into logical program categories from several perspectives, such as project type, policy objective, and scale. For example, a program structure might organize projects into capacity expansion, maintenance, operations, and management/efficiency.

Priority Setting and Program Evaluation

The priority setting and program evaluation builds on the established program categories as well as analysis results for individual projects. The objectives of this step are;

- to develop the most cost-effective mix of projects within a specific category and
- to examine the implications of shifting funds between categories.

A number of analytic approaches are possible to support program evaluation and tradeoffs. For example, economic analysis and optimization approaches are most frequently used to rank projects where the data allows. Where data is inadequate or incomplete, a multi-criteria summary of program impacts - incorporating both quantitative and qualitative criteria – can be a more practical and effective approach.

Sector Funding: Financial Planning and Budgeting

Financial planning includes assessing future sources of revenue, assessing costs of identified projects, and making program tradeoffs so that costs match expected resources. A key step in financial planning is revenue forecasting, or projecting future revenues by source and by year. Techniques for revenue forecasting include expert judgment, trend analysis, component forecasts (trend analysis on more than one variable), and even statistical models.

Various software packages are available to assist with financial planning, revenue forecasting, and cash management.

Program Development: Implementation and Monitoring

System performance, costs, and benefits should be monitored as programs are implemented and program results become available. This monitoring process provides an important feedback loop into both the technical assumptions made in the process and the policy decisions regarding priorities, strategies, and emphasis areas.

Monitoring can be conducted using the system and program performance measures established earlier in the planning process. To support monitoring as well as other planning activities, it is critical to establish a regular program of data collection along with a system for storing and managing the data ("data bank"). Methods for doing this are discussed in a later section.

A monitoring program will help determine whether capital projects and programs are meeting their desired goals. It will also provide an indication of the efficiency and effectiveness of project and program delivery and help identify areas in which delivery can be improved.

Selected Reference:

Methods for Capital Programming and Project Selection. Neumann, Lance A. National Cooperative Highway Research Program (NCHRP), Synthesis of Highway Practice 243, National Academy Press, Washington, DC. Available at the Transportation Research Board on-line Bookstore.
Book Code: SYH243, ISBN: 0-309-06022-2. 1997.