Capital Project Priority Setting at the Southeastern Pennsylvania Transportation Authority

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Beginning with its FY 1989 capital program, the Southeastern Pennsylvania Transportation Authority (SEPTA) introduced a methodology for setting priorities for capital projects. The priority-setting methodology evaluates 12 financial and nonfinancial factors, which are each given a weight. The choice of factors and weights was based on the goals and criteria SEPTA believed were important for setting capital project priorities in the Philadelphia metropolitan area. Projects considered to be appropriate candidates for capital funding are evaluated using the priority-setting methodology. A total numerical score for each project is calculated by adding the results from the 12 factors, which creates a numerical ranking of the projects in descending order from 1 to *n*. However, capital projects mandated by regulation or legislation receive first priority for funding, regardless of their priority-setting score.

According to state legislation, the Southeastern Pennsylvania Transportation Authority (SEPTA) must prepare and adopt a capital budget and a 6-year capital program each year. Together, the capital budget and program provide an outline of SEPTA's capital needs and an investment plan for the future.

Since FY 1980, SEPTA has expended over $1 billion on capital improvements from federal, state, and local funds. The investment of these funds contributed to a significant improvement in the quality, reliability, and attractiveness of SEPTA services. The capital program's previous impact and the critical role it will have on SEPTA's future have caused considerable attention to be focused on the selection and programming of projects in the capital budget and program. This attention has been reinforced as the gap widens between SEPTA's future capital needs and available capital funds and as the search for alternative sources of capital funding intensifies. As a result, the SEPTA Board of Directors charged the staff with developing a formalized methodology for setting priorities among proposed capital projects.

BACKGROUND

After reviewing the literature on capital project priority setting, SEPTA hired the consulting firm of Gannett Fleming Transportation Engineers, Inc., to identify, research, and review the methodologies used by other multimodal transit authorities. The results of this research indicated that the existing capital project priority-setting methodologies can be grouped into three general categories:

1. Evaluating capital projects intended for new markets or for expanding service,
2. Assessing and documenting capital needs, and
3. Evaluating and setting priorities for individual capital projects.

SEPTA concluded that the methodologies used in the first category were not appropriate for rehabilitation and replacement projects, which are the kind usually evaluated by SEPTA. With respect to the second category, general inventories and assessments of SEPTA's capital assets have been undertaken in the past by various in-house and consultant efforts. Although a detailed and specific analysis of SEPTA's assets by category, age, and expected service life would provide useful information, this kind of methodology would not fully address all SEPTA capital projects or incorporate factors reflecting SEPTA's existing capital funding situation.

The methodologies in the third category were considered to be the most appropriate resource in developing a priority-setting process for SEPTA. The following methodologies were reviewed in some detail:

- Metropolitan Transportation Authority of New York, Capital Value Matrix;
- New Jersey Transit, Rail Operations Capital Project Planning;
- New Jersey Transit, Process for Evaluating Capital Projects;
- Washington Metropolitan Area Transit Authority, A Methodology for Projecting Rail Transit Rehabilitation and Replacement Capital Financing Needs; and
- Strategic Planning for Capital Investment Programming: A Case Study of the Regional Transportation Authority in Chicago.

Generally, methodologies of this kind include an initial evaluation of the project to determine whether it can be categorized as essential, normal replacement, or discretionary. The next step is to assess the financial and nonfinancial benefits of the projects. Factors used to assess the nonfinancial benefits include safety, reliability, security, passenger envi-

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ronment, and regional development. Each factor is assigned a score and weight that reflect local concerns and conditions.

MAJOR ISSUES

In developing a priority-setting methodology, several issues were initially addressed. SEPTA assumed the existing system would be retained with no major expansion or reduction in service. This assumption resulted in a discussion of two major issues:

- Should priorities for improvements be determined by line (as in a systems approach) or by project?
- Should projects on select rail lines receive more points than projects on other lines?

A systems approach to rehabilitating all infrastructure components on a rail line is considered the best method for implementing capital improvements. However, with SEPTA's significant capital needs and limited funding, the systems approach was not considered to be a viable option. For this reason, SEPTA staff determined that priorities should be set on a project-by-project basis with projects on select rail lines receiving more points than projects on other lines.

To identify these select rail lines, SEPTA developed a methodology to evaluate and assess the benefits from operating or continuing to operate service on rail transit and regional rail lines. The lines were scored on nine factors, which evaluated them in the following areas: operating cost efficiencies, ridership, future capital investment, role in the region's economy and transportation system, and alternative service. A weight was assigned to each factor, and the scores were totaled to determine a final numerical ranking for each line. These totals were then used to rank the routes as high, medium, or low on one of the criteria used in setting priorities among individual capital projects (discussed in the next section). The bus system was not subjected to the line rating evaluation because of the multitude of routes, the relatively low capital-intensive nature of the system, and the flexibility of route assignments among the various bus garages.

The methodology used for ranking the rail transit and regional rail routes is presented in Table 1. The results of this evaluation are presented in Table 2.

DEVELOPMENT OF PRIORITY-SETTING METHODOLOGY

After the decisions were reached on these initial issues, the SEPTA staff developed a methodology for setting capital project priorities. The methodology includes 12 financial and nonfinancial factors, of which each factor is given a weight. The choice of factors and weights was based on SEPTA's goals, the criteria used by other transit authorities in their methodologies, and the criteria SEPTA believed were important for setting capital project priorities in the region. The factors included in the priority-setting methodology require an evaluation of a project on 12 different attributes, ranging from safety and service quality to location of project and passenger comfort. This broad-based approach, in terms of the number of factors included, ensures that all different aspects of a project are considered.

The 12 factors are presented in Table 3.

USE OF METHODOLOGY

SEPTA used the priority-setting methodology to evaluate projects considered for inclusion in its FY 1989 and 1990 capital budgets. A total numerical score was calculated for each project by adding the results from the 12 factors. The result was a numerical ranking from 1 to n of the projects in descending order of priority. Capital projects mandated by regulation or legislation received first priority for funding, regardless of their priority-setting score.

After the initial use of the methodology in FY 1989, the weighting of several factors was changed to reflect changes in SEPTA's direction. As stated in its action plan for the 1990s, SEPTA has renewed its commitment to service improvements, passenger amenities, and environmental concerns. As a result, the weighting for five factors was revised. First, the weight of the passenger comfort and convenience factor was increased from 3 to 7 because SEPTA has made an increased commitment to improve services for its passengers. Second, the weighting for the traffic congestion relief factor was increased to reflect the positive impact of transit use on the environment. Automobile use significantly affects air pollution levels and the overall quality of life in metropolitan areas, and much attention has been focused on strategies to improve air quality. Therefore, the revised weighting for this factor reflects the positive impact increased transit use will have by reducing automobile travel and highway congestion. Third, the weight for the critical nature of project factor was decreased from 7 to 6 because it was felt that the highest weighted factor—safety—is also a measure of the project's urgency. Fourth, the weight for the location of project factor was reduced from 7 to 6 because it was agreed that the existing system should be retained. Finally, the weighting for the previous commitment to project factor was decreased because SEPTA recently completed several capital projects and the number of projects to which it previously had been committed was a relatively small percentage of the program. Therefore, it was felt that the previous weighting of this factor was overstated.

These revisions permit the advancement of projects that reflect SEPTA's policy changes. The ability to incorporate the revisions demonstrates that the priority-setting methodology is a dynamic process designed to accommodate an ever-changing environment.

ADVANTAGES OF METHODOLOGY

As previously stated, the priority-setting methodology was used by SEPTA to develop its FY 1989 and 1990 capital budget and program. The methodology is now recognized as the official process for evaluating and ranking transit capital projects in the Philadelphia metropolitan area. The existence of a formalized process provides an effective decision-making tool for SEPTA senior management and policy makers. The process has been well received both by funding agencies and elected officials.

TABLE 1 FACTORS USED TO RANK RAIL TRANSIT AND REGIONAL RAIL LINES

Factor	Description	Scale	Weight
1. Operating ratio	Allocated operating costs divided by revenue.	0 = 3.000 and over 1 = 2.500 to 2.999 2 = 2.000 to 2.499 3 = 1.500 to 1.999 4 = 1.000 to 1.499	10
2. Operating cost per passenger	Allocated operating costs divided by annual unlinked passengers.	0 = 3.00 and over 1 = 2.50 to 2.99 2 = 2.00 to 2.49 3 = 1.50 to 1.99 4 = 1.00 to 1.49	10
3. Investment per rider	Total capital investment required to rehabilitate the line divided by average weekday ridership on the line.	0 = Over $20,000 per rider 1 = $15,000 to $20,000 per rider 2 = $10,000 to $14,999 per rider 3 = $5,000 to $9,999 per rider 4 = $1 to $4,999 per rider	10
4. Investment per passenger mile	Total capital investment required to rehabilitate the line divided by average weekday passenger-miles.	0 = Over $5,000 per passenger-mile 1 = $3,750 to $4,999 per passenger-mile 2 = $2,500 to $3,749 per passenger-mile 3 = $1,250 to $2,499 per passenger-mile 4 = $1 to $1,249 per passenger-mile	10
5. Current ridership	Current ridership figures for the line.	1 = 1 to 4,999 riders 2 = 5,000 to 9,999 riders 3 = 10,000 to 20,000 riders 4 = Over 20,000 riders	8
6. Potential for growth retaining current ridership	Impact of continued service on the potential for growth in ridership or retaining current levels of ridership on the basis of investment in capital improvements and the market served by the line.	0 = No impact 1 = Minimal growth (0.1% to 3.4%)[a] and minimal impact on current ridership 2 = Moderate growth (3.5% to 6.9%) and moderate impact on current ridership 3 = Significant growth (7.0% to 10.4% and significant impact on current ridership 4 = Critical growth (over 10.5%) and critical impact on current ridership	7
7. Regional development	Impact of continued service in terms of encouraging, enhancing, and improving the potential for economic development or ensuring the continuation of a strong economy. Consideration is given to surrounding land uses and plans or potential for economic development.	0 = No impact 1 = Minimal impact 2 = Moderate impact 3 = Significant impact 4 = Critical impact	7
8. Alternative mode of service	Availability of a technically feasible alternative transit mode(s) to replace the line if service is abandoned.	−2 = Viable and feasible alternative mode of service is available. −1 = Viable and feasible alternative mode of service may be available. 0 = Not clear whether viable and feasible alternative mode of service is available. 1 = No viable and feasible alternative mode of service is likely to be available. 2 = No viable and feasible alternative mode of service is available.	6
9. Transportation	Evaluation of the role and impact of the line on the transportation network in the region. Factors considered are the relationship between highways and rail lines, traffic flow, and the ability to travel through the region.	0 = No impact 1 = Minimal role and impact 2 = Moderate role and impact 3 = Significant role and impact 4 = Critical role and impact	6

[a]Percentages are intended to provide guidance in evaluating the impact on ridership.

TABLE 2 ROUTE INDEX FOR CAPITAL IMPROVEMENTS

RAIL ROUTE	OPER RATIO	OPER PASS	INV/ RIDER	INV/ PASSM	CURR RIDER	RIDER GROW	REG DEV	ALTER MODE	TRANSP	TOTAL
(Weight of Factor)	10	10	10	10	8	7	7	6	6	
RAIL TRANSIT										
BSS	30	40	40	40	32	28	28	12	24	274
MFSE	30	40	40	40	32	28	28	12	24	274
Subway-Surface	20	30	40	40	32	21	21	12	18	234
Route 56	40	40	30	20	24	21	14	-6	12	195
Media-Sharon Hill	30	30	40	40	16	7	7	0	12	182
Route 23N	30	40	30	20	24	21	14	-12	12	179
Route 15	30	40	30	10	24	21	14	-6	12	175
NHSL	0	0	30	40	16	28	21	12	18	165
REGIONAL RAIL										
Lansdale/ Doylestown	10	0	30	40	24	21	28	12	24	189
Media	0	0	30	40	16	14	14	12	18	144
West Trenton	0	0	30	40	16	14	21	6	12	139
Warminster	0	0	30	40	16	14	14	6	6	126
Chestnut Hill East	0	0	30	40	8	14	14	-6	12	112
Chestnut Hill West	0	0	30	40	8	14	14	-6	12	112
Fox Chase	0	0	30	40	8	14	7	6	6	111
Norristown	0	0	0	30	8	14	14	6	12	84
Ivy Ridge	0	0	10	30	8	7	0	-12	6	49

NOTE: The Marcus Hook, Paoli and Trenton lines operate on Amtrak-owned facilities. The Airport Line recently opened and does not need capital investment at this time.

The process was successful in identifying the highest and lowest ranked projects. However, many projects were closely ranked in the middle of the scale. Because capital funding resources are currently limited, the process worked well from the perspective that only the highest ranked projects were advanced. However, as additional funding becomes available, the need to distinguish among closely ranked projects will have to be addressed.

LIMITATIONS OF METHODOLOGY

Some limitations were identified by using the process for the FY 1989 and 1990 capital budgets. One major area requiring improvement is the subjectiveness of some factors. In particular, it is difficult to measure the impact of a project on such factors as economic development, passenger comfort, and traffic congestion relief. It is SEPTA's goal to work toward a more quantifiable and supportable process.

Differences in the scale and scope of the projects proved to be a significant problem. Projects evaluated as part of this effort range from specific, localized projects to large, systems-oriented projects. In addition to the inherent problems associated with comparing projects of different scales, the systems-oriented projects tend to rank higher in terms of their potential to have a greater benefit on many of the factors evaluated. One avenue under consideration is a method for breaking down large-scale projects into smaller, individual projects.

The lack of uniform base data is another problem because the SEPTA capital program includes more than 200 projects in various stages of development and definition. Projects that are close to implementation tend to be better defined and documented when compared with projects in the later years

TABLE 3 FACTORS USED TO SET CAPITAL PROJECT PRIORITIES

Factor	Description	Scale	Weight
1. Safety	Potential improvement in safety and security for passengers and employees. This includes safety in operations and in accessibility to the system.	0 = No impact 1 = Minimal impact 2 = Moderate impact 3 = Significant impact 4 = Critical impact	10
2. Service quality	Estimated degree of change and improvement in reliability (on-time performance), frequency (headway), and travel time. Current conditions in service quality are compared with the anticipated level of service quality after the improvements.	0 = No change 1 = Minimal change 2 = Moderate change 3 = Significant change 4 = Critical change	9
3. Current ridership	Current ridership for the line, route segment, or station affected by the project.	0 = New project 1 = 1,000 to 4,999 riders 2 = 5,000 to 9,999 riders 3 = 10,000 to 20,000 riders 4 = Over 20,000 riders	8
4. Investment per rider	Current estimated cost for the capital project divided by current average weekday ridership. Ridership is by line or lines, station, subsection of a line, and so on, depending on the project.	0 = Over $10,000 per rider 1 = $7,500 to $9,999 per rider 2 = $5,000 to $7,499 per rider 3 = $2,500 to $4,999 per rider 4 = $1 to $2,499 per rider	8
5. Ridership	Estimated impact in terms of encouraging or attracting new riders to the line or to the station being improved. It is assumed that ridership growth will result in increased revenue.	0 = No impact 1 = Minimal impact (0.1% to 3.49% increase)[a] 2 = Moderate impact (3.5% to 6.9% increase) 3 = Significant impact (7% to 10.5% increase) 4 = Critical impact (over 10.5% increase)	7
6. Operating cost impact	Estimated beneficial or negative impact on operating costs.	0 = No impact; changes in operating costs and revenue are offset +1/−1 = Minimal impact (0.1% to 2.49% change)[b] +2/−2 = Moderate impact (2.5% to 4.9% change) +3/−3 = Significant impact (5.0% to 7.5% change) +4/−4 = Critical impact (over 7.5% change)	7
7. Passenger comfort and convenience	Estimated positive impact on passenger comfort, convenience, and amenities.	0 = No impact 1 = Minimal impact 2 = Moderate impact 3 = Significant impact 4 = Critical impact	7
8. Critical nature of project	Evaluation of the condition of the facility to be rehabilitated or replaced or of the vehicle to be overhauled or replaced and the need for the project in order to continue operating service. An assessment of the condition of SEPTA's assets provides an input to the evaluation of a project for this factor.	0 = No critical need/ completion of project eventually needed for continued operation (over 10 years) 1 = Completion of project needed for continued operation (9 to 10 years) 2 = Completion of project important for continued operation (6 to 8 years) 3 = Completion of project a priority for continued operation (3 to 5 years) 4 = Completion of project critical for continued operation (immediate to 2 years)	6

TABLE 3 (*continued on next page*)

TABLE 3 (*continued*)

Factor	Description	Scale	Weight
9. Location of project	A line-by-line analysis of the rail transit and regional rail lines is conducted to determine which lines generate the greatest benefits from an operating, transportation, and economic perspective. The result of this analysis is a ranking of the lines. Because the system's approach is not feasible under a limited funding scenario and the assumption is that service will continue on all lines, the ranking of the lines is used to evaluate an individual project on the basis of its location and overall impact on the system.	0 = System expansion project 1 = Project located on line ranked "low" 2 = Project located on line ranked "medium" 3 = Project located on line ranked "high" 4 = Systemwide project, not line specific	6
10. Traffic congestion relief	Evaluation of potential to reduce traffic congestion by attracting additional riders to the line or system. A reduction in auto traffic would have a beneficial impact on air pollution and energy use.	0 = No impact 1 = Minimal impact 2 = Moderate impact 3 = Significant impact 4 = Critical impact	6
11. Economic development	Estimated impact in terms of encouraging, enhancing, and improving the potential for economic development or ensuring the continuation of a strong economy on the basis of adjacent land uses and future development plans.	0 = No impact 1 = Minimal impact 2 = Moderate impact 3 = Significant impact 4 = Critical impact	5
12. Previous commitment to project	Evaluation of degree of previous SEPTA commitment to the project (whether engineering is underway or completed) or whether implementation of the project will ensure effective utilization of a previous project.	0 = New start/initiate major rehabilitation 1 = Minimal level of previous commitment to project 2 = Moderate level of previous commitment (i.e., engineering in progress) 3 = Significant level of previous commitment (i.e., engineering is complete) 4 = Additional phase of previously funded project; project will ensure effective utilization of previous project or phase	3

[a]Percentages are intended to provide guidance in evaluating the impact on ridership.
[b]Percentages are intended to provide guidance in evaluating the impact on operating costs. The positive numbers indicate decreases in operating costs, whereas the negative numbers indicate increases in these costs.

of the capital program. This lack of uniform base data may serve as a bias against projects with incomplete and poorly documented data.

One factor not addressed by the process is the interrelationship among projects. For example, the process does not indicate whether one project must be underway or completed before a second project can be initiated. It would be helpful to evaluate the desirability or requirement of simultaneously advancing two or more projects.

Closely related to this issue is the concern of whether adequate project management capabilities exist to advance the project if funding becomes available. The availability of project management resources is important for two reasons. First, the value of funds decreases over time because of inflation; as a result, a project may have to be redesigned or scaled back to fit within available resources or additional funding may need to be requested. Second, to support transit's position that additional funds are required, SEPTA must be prepared to expend funds quickly. Delays in program implementation may result in a loss of credibility; in other words, it may seem that funds were not actually required or that the infrastructure was not as badly deteriorated as stated.

In summary, SEPTA has found that a professional and documentable approach to capital project selection is critical. As competition for public- and private-sector funds increases, transit must be prepared to document the need to rebuild the existing infrastructure and serve new and emerging markets.

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