

# **VALUING THE BENEFITS OF TRANSPORTATION RESEARCH: A MATRIX APPROACH**

## **PROBLEM STATEMENT**

The activity generally defined as *research* encompasses a variety of work types and touches many functional areas. While it is sometimes taken for granted that investments in transportation research should yield positive social and economic benefits, little work has been found that helps a transportation agency to systematically quantify the benefits of its program. State transportation research centers, just as any other research institutes, strive to measure their performance activities. Positive economic returns associated with research findings help to justify investments in research. Programmatic benchmarking and performance measurement take on even greater significance in times of fiscal restraint, when budget cuts might affect research programs significantly.

Extensive research on currently available evaluation methods demonstrated that there is not a universal approach to project valuation. Rather, there are different valuation approaches, which have been applied to tentatively ascribe economic value to the benefits of transportation research programs. Some of these approaches try to provide quantitative measurements, but most rely on qualitative assessments to overcome what appears to be the main constraint to evaluation: the capability to measure economic benefits of transportation research programs.

## **OBJECTIVES**

The objective of this study was to develop an approach to measure the value of research projects and to provide some measure of the benefit and return on research expenditures. To achieve these objectives, the researchers initiated a review of the projects sponsored by the Florida Department of Transportation (FDOT) Research Center. The researchers further investigated what had been already accomplished in the field of quantification of research benefits and sought to determine which measurement tools were best able to measure different types of research. Finally, researchers compared traditional measurement tools to the Real Options Approach and found valuable evidence indicating the significant contribution that this alternative approach provides.

## **FINDINGS AND CONCLUSIONS**

Among the currently available evaluation approaches, researchers found that no single method is suited to evaluate projects across all proposed categories. Rather, even within a single category, one or more approaches may be appropriate, depending on agency constraints and objectives.

The research team, therefore, developed a matrix approach for categorizing projects as a means of determining appropriate methods for calculating benefit. Among some of the well-established and more traditional methods, such as Benefit-Cost Analysis and Net Present Value, the research team included an alternative approach, Real Options.

Researchers found that the Real Options Approach is capable of providing a better assessment of Transportation Research and Development (R&D) projects whenever there is a relevant element of risk and uncertainty. Transportation R&D projects have the potential to produce enormous benefits, but they come with the risk that actual benefits, costs, and other factors affecting implementation may differ greatly from those predicted. The option approach enhances the decision-making process so that it does not consist merely of a choice whether to invest in an R&D project but of a management perspective that considers a range of possible decisions, with the potential value of each decision measured in terms of its option-creating value.

The Real Options Approach represents not only a potential method for estimating expected project benefits, but also a way of thinking about research programs. Importantly, this approach sets clearly the concept that research expenditure today is a “call option” on future gains for the FDOT.

## **BENEFITS**

This research will support project portfolio design and assessment decisions. The findings of this study support that the Real Option Approach enters as a valuable tool within a matrix approach to evaluate some, but not all, R&D projects. The Real Options Approach is not a “fits all” solution, but one that has a place in a decision matrix for project and program evaluation. It should, therefore, be considered an additional tool within a toolbox that can be used to measure the performance and benefits of conducting transportation research. The “matrix approach” may also be useful in creating an optimal research portfolio geared towards maximizing returns given annually fluctuating budgetary constraints and relative risk aversion.

Ultimately, this project is part of a needed effort to tackle the difficulties inherent in measuring the benefits of transportation research. Some research projects immediately and obviously demonstrate their benefits to the Department and its constituency, while the benefits of other projects are not so easily determined. Other projects fail, but provide useful information in the process. A systematic approach to determining the value of research will aid research programs to optimize their effectiveness to produce benefits, both qualitative and quantitative, through their results. The results of this research are a positive contribution to developing such systems.

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