

Recent Trends in Risk Management for Transportation Projects



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Risk analysis has experienced an expanding role within the design and construction industry in the U.S. over the past decade as methods, techniques and education have been steadily evolving. This article will explore some of these trends and suggest what the future role of risk analysis will be in the coming years.

The concept of risk is one that has been at least tacitly understood by the industry since the beginning, however, it has generally been viewed as just another consideration of design and construction rather than as a distinct discipline. The development of the modern practice of risk analysis has transcended this basic level of understanding. Risk analysis is currently in the process of being integrated into the industry, though to widely different levels and degrees.

Perhaps the strongest use of risk analysis is currently being witnessed within public agencies, particularly on transportation and infrastructure projects at the state level. The California Department of Transportation, the state with the largest transportation infrastructure, formally implemented a risk management program in March, 2004 as part of its project management practices. In May 2007, the second edition of their Risk Management Handbook was published.¹ Caltrans currently only requires the

¹ http://www.dot.ca.gov/hq/projmgmt/guidance_prmhb.htm

development of a risk register and the application of a qualitative risk analysis to be performed on its projects. Probability and Impact (PxI) Matrices are utilized as part of their qualitative approach in order to assess and rank the criticality of risks. Figure 1 below shows two different PxI matrices that are used, both linear and non-linear (whereby greater emphasis is placed on impacts). The level of risk analysis to be applied is generally left at the discretion of individual project managers. Quantitative risk analysis is used only in special circumstances and a standard approach has not yet been proscribed.

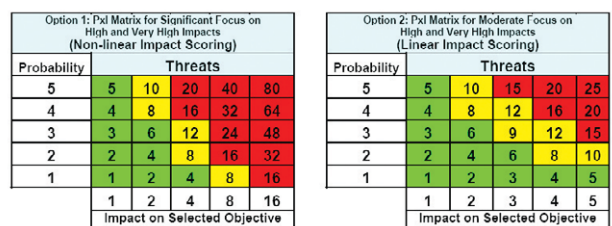


Figure 1

The Washington State Department of Transportation (WSDOT) is currently considered to have one of the most sophisticated and active risk analysis programs among state governments. WSDOT has created a special division called the Cost Risk Estimating Management (CREM) Unit, which is part of the Strategic Analysis and Estimating Office (SAEO), works collaboratively with project managers to review

and validate cost and schedule estimates and assess risks for projects. CREM supports project managers who are under increasing pressure to deliver projects on time and on budget. WSDOT recognizes that project cost and schedule estimates, in particular early cost declarations, are more appropriately expressed, not as a single number, but as a range, to accomplish this WSDOT identifies project risks and uncertainty. Some of the programs that CREM is responsible for administering include:

- * Risk Based estimating workshops: Cost Estimate Validation Process – CEVP®, Cost Risk Assessment ? CRA, combined workshops with Value Engineering (VE-CRA/VE-CEVP), other workshops as requested and tailored to project needs;
- * Reports with actionable information that project managers and teams can use to pro-actively respond to identified project risk;
- * Training in project risk management and risk-based estimating.

CREM provides a very high level of support to WSDOT project managers and utilizes quantitative risk analysis as a standard practice using in-house software, called the Risk Based Estimate (RBE)ⁱⁱ, which performs a Monte Carlo based analysis of the risk data. WSDOT also utilizes the services of consultants to facilitate some of its risk analysis. Figure 2 shows typical output from an RBE quantitative risk analysis.

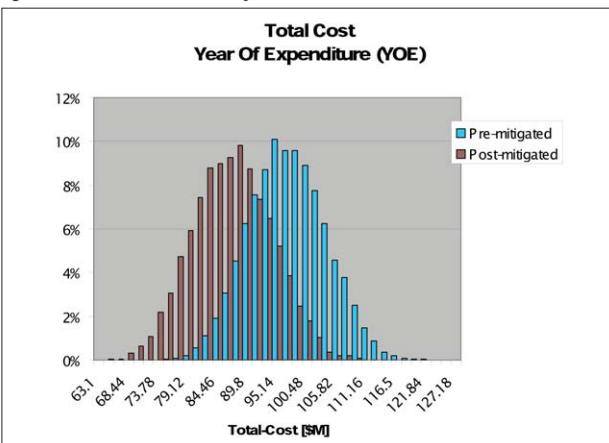


Figure 2

In the past year, WSDOT has been integrating Value Engineering (VE) with risk analysis with great success. VE provides a natural framework for developing risk response strategies for the risks identified through the CEVP® and CRA workshops. The author was recently involved in a major combined CEVP/VE workshop for the \$1 billion Blair Hylebos Terminal Redevelopment Project for the Port of Tacoma, Washington.ⁱⁱⁱ The effort produced excellent results that helped the Port of Tacoma improve its decision making abilities while increasing project value.

Other states are in the process of developing programs of various levels of sophistication. Notable among these is the Minnesota Department of Transportation (Mn/DOT) whose risk management program has been rapidly evolving since the collapse of the I-35W Mississippi River Bridge.

The Federal Highway Administration (FHWA) published the Guide to Risk Assessment and Allocation for Highway Construction Management in October, 2006.^{iv} This resource provides a good overview of the application of risk management on transportation projects. Further, the FHWA’s Major Projects Team provides some direct assistance to state DOTs with respect to the analysis of risk related to cost.^v

There are also a number of professional societies and associations that are advancing risk management to their memberships. These include American Association of State Highway and Transportation Officials (AASHTO), the Project Management Institute (PMI), and the Construction Management Association of America (CMAA).

ii <http://www.wsdot.wa.gov/publications/fulltext/CEVP/RBE-WEB.xls>

iii http://www.joc-digital.com/joc/20081103_portoftacoma/?pg=9

iv <http://international.fhwa.dot.gov/riskassess/index.cfm>

v <http://www.fhwa.dot.gov/programadmin/mega/team.cfm>

The American Association of State Highway and Transportation Officials does not yet have an official committee or sub-committee established to consider risk management, however, the existing sub-committee on Value Engineering is currently the most active forum on this issue. The upcoming 2009 AASHTO Value Engineering Conference, which will be held on September 1–3 in San Diego, CA, will focus a significant part of its program on the topic of risk analysis.^{vi}

The Project Management Institute has long stressed the importance of risk management as a distinct area of expertise within the larger context of project management. In fact, the Project Management Body of Knowledge (PMBOK) identifies project risk management as one of the nine bodies of knowledge. Recently, PMI initiated a new credential that further emphasizes the growing importance of risk management titled the PMI Risk Management Professional (RMP).^{vii} The PMI-RMP® credential recognizes demonstrated knowledge and expertise in the specialized area of assessing and identifying project risks while mitigating threats and capitalizing on opportunities.

The Construction Management Association of America, which represents construction managers in both the public and private sectors, does not currently provide formal training or recognition in risk management; however, it appears that interest is growing within their membership about the subject and that CMAA is moving towards adopting training and standards.

Within the private sector, many A&E and consulting firms are either further developing and expanding

their risk management services or are in the process of developing such services. HDR, Inc., ranked 13th in the 2009 Engineering News-Record (ENR) Top 500 Design Firms Survey has been steadily developing its risk management services and now regard it as a profit center. Smaller niche consulting firms, such as Value Management Strategies, Inc. (VMS, Inc.), which is the largest VE consulting firm in the U.S., has also been developing its risk management services, especially those that involve the integration of risk analysis and VE.

In summary, the field of risk management is continuing to grow more prevalent within the design and construction of transportation projects. The growth of the discipline in government, professional associations and within the private sector indicates that body of knowledge, tools, and training are enjoying an increasing amount of interest. Organizations are becoming more sophisticated in the application of risk management tools and techniques while project managers are developing a better understanding of the importance of managing risk on their projects. Clearly, the field of risk management as applied to the design and construction of transportation projects will continue to grow through the next decade.

About the Author

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^{vi} <http://www.wsdot.wa.gov/partners/aashtove/>

^{vii} <http://www.pmi.org/CareerDevelopment/Pages/AboutCredentialsPMI-RMP.aspx>