Annex II

Example Project Value Improvements

Value and risk management methods are applied in many countries, for a variety of goals across a range of business and service sectors.

Some example applications and outcomes are outlined below. Despite their different focus, project value and risk management are inseparable and should be practised in concert. Perhaps the most commonly overlooked benefits of a VRM approach are those of firmer and quicker agreement of definition scope and strategy, subsequently reduced development time and greater confidence in the cost estimates.

The examples that follow cover a wide range of application. Additional examples (elsewhere) relate to business process improvement as well as manufacturing, petrochemical & offshore complexes, government works and urban development.

In this Annex:

Stage A, Study Type V1: Strategic Direction

Studies are conducted at this stage to determine cost-effective options and potential concepts for clear and acceptable business strategies prior to formal commitment to develop program(s) and projects. Effort spent in developing unambiguous and workable strategic direction is undeniably a sound investment for proper direction of subsequent effort.

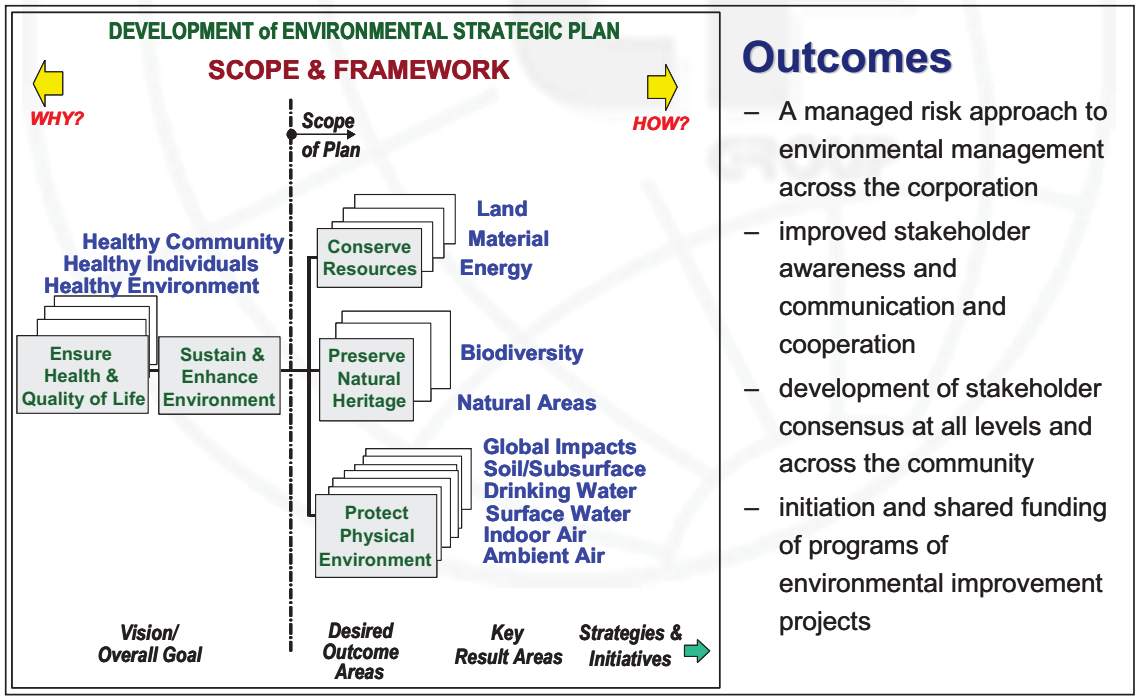
Typical Reason for Study: To build stakeholder consensus on issues and opportunities; to set direction and define a framework for resolution.

Outputs:

- Business case; policy / strategy document; master plan; options identification; project requirements definition; system-wide standards & specifications.

Example Applications:

- Formulation of a municipal Environmental Strategic Plan Policy Document:



- Formulation of Greenhouse Gas Emissions Reduction Strategies for municipal operations and community-wide local action plan

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- Development of strategy to increase reliability of supply and reduce system risks for water network in a national capital city
- Facilitation of River Water Quality Task Force and initiation of program of projects to improve river

Stage B, Study Type V2: Project Definition

This type of study is to derive optimum functionality and cost effectiveness and to confirm or modify the concept / initial project definition for optimum scope, budget, timeframe, standards and risk management approach.

Typical Reason for Study: To finalize definition of project concepts and to develop the framework for project implementation.

Outputs:

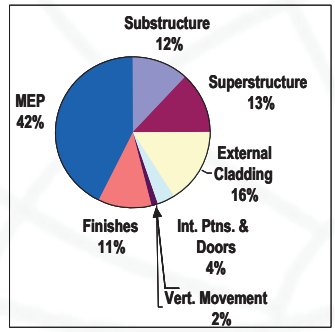
- Feasibility and risk assessment; concept choice; target cost; key performance indicators; project implementation plan; functional performance specification.

Example Applications:

- New technical institute to transfer knowledge locally rather than have students learn overseas:

Facility Scope:

- Petroleum Geosciences
- Chemical Engineering
- Mechanical Engineering
- Electrical Engineering
- Petroleum Engineering
- Student Services
- Mosque
- Foundation
- Recreation
- Resource
- Administration
- Central Services



Outcomes

– A range of options was identified to:

- reduce capital costs
- add value in terms of better space utilization and functionality through only marginal cost increases
- reduce facility operational and maintenance costs
- accelerate project schedule

- Bid improvements for 30-year, major design-build-own-finance-operate-transfer project for major infrastructure urban renewal programs and projects

- Analysis at functional design stage of extension to urban highway and light rail transportation scheme. 13% capital cost savings & improved features
- Concept definition and vertical & horizontal route alignments for 65 km urban rail system plus configurations of 55 stations
- Options identification, master plans and implementation strategies for learning facilities and for health care centres.
- Critical review, functional enhancement, schedule acceleration and implementation plan for major urban flood protection project.

- **Courts centre development** through a P3 (Public-Private Partnership), later design-build-operate contract, for design, construction & long-term operation:

Completed facility consolidates operations by replacing (and expanding upon) 7 old courts facilities located around the city. Houses 600 officials and support staff; the public entrance security clears 4000 people each day.

Project fast-tracked after 20-year period "on the books".

  - Value assurance through series of strategic sessions along with risk and value studies

- Quicker implementation; risk transfer; value for money on life cycle basis; world-class competitors; innovation; integrated approach; incorporates 30-year operations and cyclical renewals.

Stage C, Study Type V3: Project Execution

This has been the most common application stage of the traditional value engineering and risk methodologies: to verify and "tighten" project design and implementation proposals for optimum project performance.

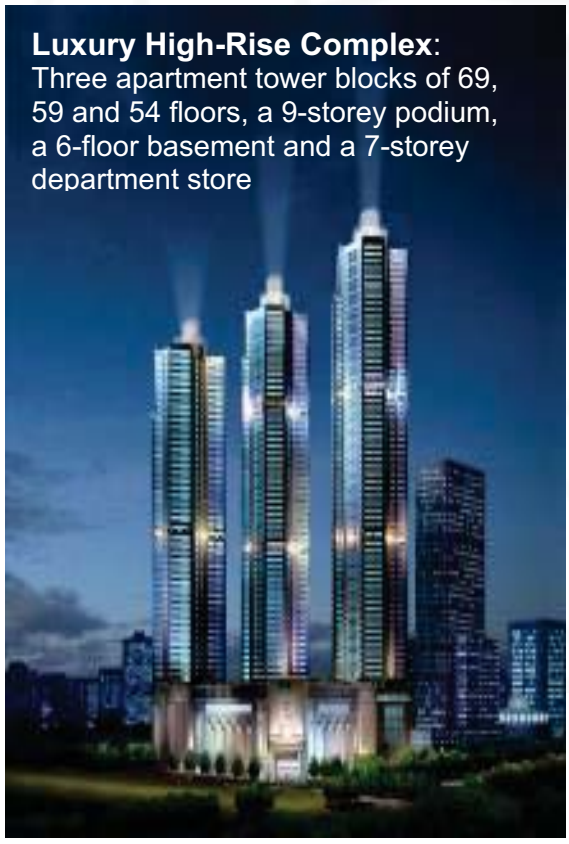
Typical Reason for Study: To improve project delivery, resolve concerns over schedule and ensure maximum cost efficiency within the allocated budget.

Outputs:

- Concept development; design to target cost; functionality, schedule cost & constructability improvements; operations and monitoring plan, client's or contractor's Value Engineering Change Proposals.

Example Applications:

- Luxury high-rise development:



Outcomes

- Options identified to improve constructability and accelerate the construction process
- A range of capital cost saving options and ways to minimize project operations and maintenance costs
- Confidence was provided that optimum choices of key project elements were made in terms of representing best value for money and optimum function / marketability
- The basis of a management plan was established for continuing value improvement and a managed risk approach.

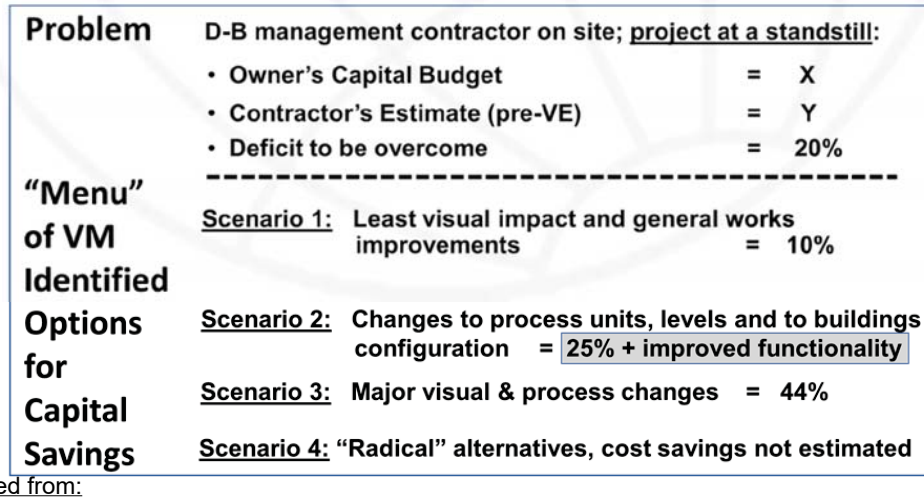
Photograph courtesy of the Hyundai Engineering & Construction Company, Seoul, South Korea

- Analysis of major engineering-procurement and construction management oil refinery projects.
  - Identification of up to 12% capital savings at Pre-FEED & FEED stages
- Analysis of project tender for water supply extension to serve population of 6 million
  - Confirmation of project elements and 28% capital cost savings
- Risk, value & scheduling review for highest quality retail development
- Cost-effectiveness review of $5.6Bn. luxury development on reclaimed land.

Project Rescue

A particularly powerful application of the value methodology is for project rescue, i.e. when the project is about to stall and other methods of keeping the project going have been deemed ineffective at this critical juncture. Examples are:

- Cost reduction of over-budget, design/build management contract for transportation terminal and commercial centre.
  - Capital savings of 8% identified
- Cost reduction for iron ore mine electrical system upgrading.
  - Deadlock over project implementation resolved
- Cost reduction for over budget design-build contract (under construction) "brownfield" scheme to relocate waste management site make the old site available for prime commercial development and thereby finance new major sports and entertainment complex.
  - 7% capital cost savings identified to enable completion of project
- Cost reduction relief of stakeholder "stand-off" for over-budget design-build (D-B) management contract to install coastal wastewater treatment plant:



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Acceleration of Implementation Schedule
- Example Value Improvement Training Projects:

Project: Sewage Disposal for 1Mn. Population City

Status: 15% construction completion

Scope of Study: Sewerage network and sewage treatment system

Workshop Output: Potential 14% capital cost saving, some annual operational cost savings, 1-year earlier operation, reduced odour, less land take, more consistent effluent quality.

Project: Water Intake and Conveyance System

Status: 10% construction completion

Scope of Study: Water offtake from existing dam, plus 95 Km. canals for supply of irrigation water to 72,000 hectares of land.

Workshop Output: Team consensus on revised approach. 5% cost & time savings.

Project: Concrete Arch Dam

Status: Construction 41% complete

Scope of Study: Dam body, spillway, plunge pool, grout curtain, concrete production, placing, cooling and curing

Study Output: 2% construction savings but 2 months earlier impoundment for 1-year additional generating capability.

Project: 9 Km long, 3.7 m Diameter Water Conveyance Tunnel

Status: Construction stage optimization (construction 20% complete)

Scope of Study: Tunnel, adits, access shafts, portals

Study Output: Optimization of construction technique for potential 5% cost saving; 6-months acceleration in construction schedule.

Stage D, Study Type V4: In-Service Systems Optimization

Efficiency reviews to optimize an in-service process or facility. Outputs from this type of study application commonly form the inputs to, or base case for, stage V1 in a subsequent cycle.

Typical Reason for Study: To provide a clear understanding of options to improve performance of in-service product, service or system. Cost reduction, cycle time reduction, resource optimization, product/process improvement.

Outputs:

- In service functional enhancements and operational efficiencies; risk and reliability study; needs assessment; optimization plan; recommendations for strategic and organizational change.

Example Applications:

- Analysis of bids for renewal of city cleaning operations contract. 5-year target price of reduced by 40%
- Analysis of reliability of power supply to treatment plants and identification of necessary improvements
- Review and definition of critical infrastructure and strategies to increase reliability at lower cost for municipal water supply system
- Optimization of control system for 1200 km. transmission pipeline and oil storage / shipping terminal
- Process Control System upgrading for 530 MMSCFD sour natural gas plant - to determine best value for money project and fit project elements with operational budget cash flow constraints.
- Investigation to determine means of obtaining efficiency gains for operating refinery; 1.2 M bbls per year hydrocarbon recovery / performance improvement
- Analysis of vehicle manufacturing plant process; assembly cycle time reduced by 10%
- Workshops to devise an aggressive strategic plan for corporate growth through new product lines and new approaches:

Outcomes

A series of action plans was set up with sponsors:

- for the Board to identify and implement change
- to provide resource and focus for each region
- to raise regional profile
- to determine the level of human resources needed to achieve planned outcomes
- to improve safety standards and procedures
- to ensure the organization understands its role in product development
- to improve communication at all levels and measure performance.

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