

## State of Value Analysis/Value Engineering in British Columbia

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### ABSTRACT

The American value engineering industry appears to have grown and matured over the past 20 years from a mandated requirement for VA/VE from the US Environmental Protection Agency. Similarly, the growth of VA/VE in Canada has largely been limited to the provinces of Quebec and BC, where single agencies mandated the VA/VE requirement. The absence of a national requirement has not only hampered membership in societies like SAVE but has virtually precluded the development of locally-based practitioners able to meet the 50% practice requirement for CVS certification.

From a VA/VE perspective, the good news from British Columbia was that all provincial-funded projects with an estimated cost greater than \$10 million would require VA/VE before approval. The bad news that followed was that government didn't have any money for capital projects and would be looking to innovative project delivery strategies. This presentation reviews whether the expected growth of VA/VE in B.C. is going to be over before it starts.

### CANADIAN VERSUS AMERICAN EXPERIENCE

There appears to be a strong link between the legislative requirement for value analysis/value engineering (VA/VE) and the volume of VA/VE work. Even after the process has been seeded for a number of years in Canada, there continues to be

limited acceptance of VE as a discipline. It does not appear able to grow on its merits and does not appear to be attractive to the private sector.

Since the Environmental Protection Agency (EPA) requirement was established, the American VA/VE industry has grown and matured. In comparison, without a government requirement for VA/VE in Canada, growth has been limited and has varied from province to province. This has not only hampered the interest in membership in societies like SAVE but has virtually precluded the development of locally-based practitioners able to meet the 50% practice requirement for CVS certification.

One way of illustrating this disparity is to look at the 1996 SAVE membership directory where, out of a total of about 750 members of SAVE, we find 29 members in Canada (4%). Since the population of Canada is about 10% that of the US, this is a significant under-representation, especially when compared to other societies like AACE and PMI where the Canadian members have historically made up more than 10% of the membership.

Of the 29 members in Canada, 19 are in the French-speaking Province of Quebec. Of the remaining 10 Canadian members, 7 are in our most-populous province of Ontario with 1 each in the western provinces of Manitoba, Alberta, and 2 in B.C. The 19 members in Quebec represent more than two thirds of the Canadian membership. One major firm reportedly started out doing VE work on waste-water treatment plants and then transferred the concept to work for Hydro-Quebec, the provincial owned power utility. Like the EPA experience in the US, this corporate support developed the industry.

Unlike the United States, Canada, through its British heritage, has adopted the use of Quantity Surveyors (QS) for the costing of buildings. Since building design has been the most prolific area of application of VA/VE to date in Canada and particularly so in BC, Quantity Surveyors are the discipline most involved in supplying VA/VE. Together with its provincial chapters, the Canadian Institute of

Quantity Surveyors (CIQS) is the governing body for Professional Quantity Surveyors in Canada. The CIQS has a publication - *Value Analysis Service Guidelines, 1996*, which provides both service guidelines and recommended scale of fees.

### Value Analysis versus Value Engineering

We have developed a preference for using the terms VA and VE for different value applications. We tend to apply value analysis (VA) to the process of analyzing the programming and planning of the project at an early stage, when the project typically has had sufficient planning and design input to have identified a preliminary scope, but before the detail design has commenced - i.e., the VA process is an opportunity to change the scope or content of the project (the what).

Another reason applying the term VA to the process at the earlier phases of the project, is that fewer of the people involved in the analysis are engineers - the process is oriented towards planning rather than engineering. This is somewhat ironic since we understand that the original name for the SAVE process was Value Analysis but it was changed to Value Engineering when the US Navy did not have a cost account for analysis (i.e. VA) but did have one for engineering, hence VE.

Once design development has been completed a value engineering (VE) review is carried out on the engineering issues - i.e., the VE process is an opportunity to change the systems and components (the how).

Currently, in our experience a limited amount of VE work has been carried out after tender. We understand this is common practice in the US.

The process, whether it is VA and/or VE, utilized on buildings in BC is generally similar to the US approach. However, as a cultural group, Canadians by nature tend to be non-confrontational and the VA/VE approach in Canada has evolved to follow the national psyche. This means that there is less emphasis on bringing in a parallel design team to carry out a peer review process, and more emphasis on facilitating or managing the design team of record to re-examine the planning and design approach to identify alternative, more cost effective design solutions.

The BC Ministry of Transportation and Highways (MoTH), in applying VA/VE to the new Vancouver Island Highways project, has found that the parallel design team peer review approach is not cost effective. MoTH is now using an independent facilitator, with a review team drawn from internal design staff, who are not involved with that specific project.

## THE PAST

### The Public Sector Experience

Until recently, VA/VE had been applied only to provincial-funded buildings (primarily hospitals, schools, colleges and correction facilities). The prime application of VA/VE was to reduce the scope or design of projects to meet the available budget. The process would often be suspended at the budget threshold, even if there were further opportunities to increase the value for money. That approach is changing. Over the past 2 years, our experience on over 40 projects with cumulative capital costs approaching \$500 million has been to identify over \$60 million in cost reductions, of which approximately \$50 million were reductions to achieve the approved budget and \$ 10 million were savings to reduce the cost of the project below the established budget.

One of the major drivers for the public sector in BC to embrace VA/VE is perception that public sector construction is not bottom line driven (that is to say based on a return on investment - ROI). A frequently-voiced criticism (often with good reason) of public sector projects in BC and presumably elsewhere, is that government facilities tend to be over specified, over designed and often go over budget. The last point, to be fair, has often been due to inadequate or overly optimistic budgets being established prior to commencement of planning and design.

As a tool to re-scope projects to meet pre-established budgets, VA/VE has been widely used by the BC Social Capital Ministries in areas such as health, education, corrections and public works - it is seen as a quick and clean way of identifying over design or over specification and correcting the problem before a project goes to tender.

Due to the initial success of VA in reducing the cost of facilities, agencies began to change budgets and

scope in mid-design on subsequent similar projects. Understandably no-one, least of all designers, appreciates the goal posts being moved in mid-project and this, together with the emphasis on cost cutting rather than value for money, has led to some negativity towards VA/VE from professionals engaged in public sector design and construction.

### The Private Sector Experience

VA/VE has not been used extensively in private sector - at least not in the buildings or the industrial sector that we collectively service. There has been a limited application of VA/VE in the hospitality industry in particular - but this is largely due to the marketing efforts of VMI rather than to industry acceptance.

We believe the major reason for the limited use of the formal VA/VE process is that the private sector is already bottom line or ROI driven. As such, private sector projects do not have the tendency for excess scope to creep into the development as do public sector projects, where the multiplicity of stakeholders can and does inflate the scope of a project with enhancements that do not add to its functionality or value.

A number of similar processes to VA/VE are sometimes used in the industrial sector, but they are not usually called VA or VE. They are sometimes referred to as "cost reviews" - is the budget adequate for the given scope?, or alternatively, "design reviews" - has the best solution been adopted?; is the scope right?; are there better ways to accomplish the same objective? The process is not as formal as the SAVE VE process - it does not include functional analysis or brainstorming, but was more of an independent review by outside experts not involved in the development of the scope. The timing was generally in the development phase and, not unlike the public sector, was often initiated by an estimated project cost that exceeded expectations or was greater than the project economics would support.

## THE PRESENT

### Public Buildings

Our present provincial government, like many others in today's fiscal environment, is espousing stringent debt management, particularly within the capital spending envelope.

Since 1995 the province's Treasury Board has required that all capital projects over \$10 million undergo a formal VA/VE study and recently the province has imposed a freeze and intensive review of all capital projects.

While VA/VE has been used extensively as a tool to bring projects back on budget - but not necessarily to minimum cost, there is an increasing appetite in the provincial government to bring capital spending to a minimum consistent with, or below the level of the services being provided.

There are a number of other ways of doing this, VA being one of them. A recent VA study to identify cost savings within a program to provide three new youth custody centres in the province ended up as a major review of the service philosophy of the ministry responsible for corrections. This led to a radical change in the type of facility being provided - changing from a high security facility, with internal circulation modeled along the lines of adult prisons, to an open plan residential style camp facility. The resulting savings of both built space and simplified construction were in the order of 30%.

One of the areas being actively pursued by the BC government is cost modeling and unit rate budgeting methodologies for social capital projects such as schools, colleges, hospitals etc. Properly and intelligently developed unit rates hold great potential for establishing realistic and cost effective budget envelopes, on which subsequent VA process can be applied to achieve minimum cost and maximum value.

To date this approach has been used very successfully on schools and, in developing the unit rates, the VA process has been used extensively. Cost models for elementary and secondary schools have been established, based on completed facilities. The models are then optimized by means of VA reviews involving a number of user groups and designers to identify desirable and cost effective modifications to the cost models. In addition, regular audits of completed design stage VA reviews ensure both compliance and feedback of cost effective solutions into the cost models.

There is however, a danger of pushing unit rate optimization too far. We are beginning to see that if the unit rates are set too low, not only does service delivery suffer, but the facility's life cycle costs begin to rise dramatically. Notwithstanding, there is

currently a body of opinion in some of the provincial government ministries that a VA/VE study should be used to identify and justify cost increases from an artificially low base rather than the traditional approach of reducing to minimum cost.

#### Municipal Projects

Since the early 1990's, the B.C. Ministry of Municipal Affairs (MMA) has required formal Value Engineering studies for all water and sewer projects over \$10 million. This closely follows the US experience with the EPA mandating similar requirements. The MMA has reported provincial experience to 1995 in a booklet *Value Engineering for Municipal Projects*.

This booklet reported on the experiences of the following four municipalities:

1. Greater Vancouver Regional District (GVRD). On the upgrade of two wastewater treatment plants to secondary treatment with a capital budget of \$650 million. They reported present value of savings of \$17 million.
2. City of Kelowna - As of March 1995, had conducted 5 workshops on waste treatment programs.
3. Regional District of Nanaimo - They undertook a VE study on a water pollution control centre in 1994, although it was not a requirement as estimated cost was less than the \$10 million threshold. Some recommendations were rejected as were close to proceeding to tender. They commented "it would have been beneficial to undertake the study earlier than the 85% design stage" - i.e. VE should have been carried out earlier in the design..
4. City of Prince George - VE study conducted on an \$8 M upgrade of wastewater treatment centre, when design was 20% complete. Savings of \$350,000. They commented "study could have benefited from additional detail design" - i.e., not enough design was done to enable an effective VE process.

Subsequent to the MMA booklet, the Capital Regional District of Victoria, BC have awarded a VE assignment on a proposed waste water treatment plant - to be carried out in March 1997.

### Transportation

When the Province's Treasury Board required that all capital projects over \$10 million require formal VA/VE studies, the application of VA/VE shifted from simply meeting budget to demonstrating value for money in both scope and design of projects. This led to the first VA/VE assignments in our local transportation sector.

The Treasury Board requirement was imposed on the \$100 million Duke Point Project which consisted of a new \$50 million ferry berth/terminal facility and a new \$50 million access road. When the policy was announced, Bramcon Project Consultants had already been engaged by the Ministry of Transportation and Highways (MoTH) to review the scope and cost of the access road while the project owner, BC Ferry Corporation, had retained Value Management Inc. to conduct a VA/VE study on the terminal buildings.

Since the road portion of the project was far more advanced than the terminal, it was necessary to create a "forensic" VA/VE process where the preliminary designs were reviewed and costed to show how the scope had evolved and the costs had varied through the numerous design reviews that had been conducted. We used an internal team from other MoTH regional offices and one or two independent engineering consultants. VMI and Bramcon prepared a joint VA/VE report that met the Treasury Board requirements.

Subsequent experiences of the B.C. Ministry of Transportation and Highways include :

#### Project 1:

The Vancouver Island Highway Project (VIHP) is a Can. \$1.3 billion upgrade between Victoria at the southern tip of Vancouver Island and Campbell River on the east coast. VIHP conducted a pilot project on VA/VE in 1995 commissioning 9 separate studies on work having an estimated construction cost of Can. \$125 million.

#### Timing:

Detail design substantially complete on sections selected; expected to be tendered within 3 months

#### Outcome:

Savings in excess of \$2 million were forecast as a result of this pilot program. The cost of the program was higher than normal since the goal was to introduce a cross-section of the Ministry and local

consultants to the process. The pilot project concluded that the process had to occur earlier in the project life cycle to obtain optimal value. They also raised the prospect of using non-involved Ministry personnel for future VA/VE studies.

One VA study was conducted in 1996. The \$24 million grading section was at the end of preliminary design. An internal review team with an experienced facilitator was utilized. Savings of about \$200,000 were forecast. One significant recommendation was that there should be a construction representative on all VA studies.

#### Project 2:

Upgrading the floating bridge across Okanagan Lake, Kelowna, B.C.

#### Timing:

At the end of preliminary design when a scope was established and cost estimated but prior to award of the detail design.

#### Outcome:

The VA study identified a higher cost alternative - a new replacement structure adjacent to the existing bridge - but potentially greater value for the expenditure. However, when the new bridge was developed to the same level as the upgrading option, the costs were higher and the project team re-focused on the rebuild option.

#### Project 3:

Trans-Canada Highway 6-laning, Grandview to Cape Horn, Vancouver.

#### Timing:

After the completion of functional design.

#### Outcome:

Saving of \$8 million identified.

#### Project 4:

Trans-Canada Highway Upgrade, Campbell Creek to Monte Creek, Kamloops, B.C.

#### Timing:

Detail design done; ready for tender. Complying with Treasury Board Requirement.

#### Outcome:

Identified about \$6 million savings on the \$23 million project.

Project 5:

Mount Washington Access Road, Courtney, B.C. VE Studies by the MoTH Construction Supervision.

Timing:

Contracts awarded; in construction.

Outcome:

Both the contractors on 2-lane mountain road showed a complete lack of interest in the VEP process. However, the field crew could see a number of opportunities to reduce the cost through design changes. About \$300,000 savings were realized and since the Owner's staff did the documentation, all savings were to the Owner's account.

Alternative service delivery is another term we are hearing more and more in government circles. We are not clear what this really means. It appears to be a desire to farm out public sector program delivery (including facilities) to the private sector.

Design/build is one contracting strategy being used to obtain better value. Although it is our view that design/build contracts do not need the value analysis phase as the design and construction are integrated for proposal preparation, we believe the majority of the potential transportation projects will still be designed and subsequently put out for open tender. Thus the justification for VE and VE work is still valid.

THE FUTURE

Just as the Canadian practices for VA/VE were catching up to those in the US, the rules changed and we now have to learn a different game. Canadian governments - federal and provincial, have choked on their own debt. Bond rating agencies are watching them very closely and monitoring their total debt - not just their annual deficit.

This has led to a debt management plan in B.C. which provided a maximum amount that could be borrowed even for "good debt" - like that which produces physical infrastructure as opposed to "bad debt" that covers the costs of programs. That plan led to a significant reduction in the usual easy targets - capital projects that are not yet under construction.

Then, in the spring of 1996, it got worse. The Province "discovered" they were running substantial deficits and froze all capital projects for what was supposed to be 6 months. Since it looked like this debt issue was not going to go away soon, the government has had to consider other methods of delivering urgently-needed infrastructure.

One potential solution to government's financing dilemma is the use of public-private partnerships (P3) to deliver infrastructure. The government grants a concession to a private consortium to design, build, finance and operate the facility and collect a revenue from those who use the infrastructure. Since these private developers are ROI oriented, they are not as likely to embrace a VA/VE process designed to catch the low-hanging fruit from the excessive designs of the public sector.

CONCLUSION

Does this mean VA will be over in B.C. before it really gets established?

Not likely in our opinion. The fundamental question has to be asked - can government in Canada and its social program delivery really function like the private sector? The answer in our view is no - government is government. It may well be required by debt management pressures to perform more efficiently and cost effectively, but ultimately the major social programs in Canada will remain vested in government.

Reduced capital spending will inevitably result in reduced design and construction in the province and less VA/VE in general.

Reduced budget envelopes for the remaining capital spending will result in a radical re-thinking of programs and the facilities required to provide the services. As a result, we believe there will be more emphasis on VA, as we defined it earlier - reviewing the WHAT in terms of providing programs and capital spending in a more cost effective way. There will be less emphasis on VE in its traditional role of alternative engineering or design - the HOW.

However, dramatically reduced budget envelopes will also require very innovative design to meet the reduced targets. As a result, we believe there will still be an important role for VE in keeping design teams on track. In addition, reduced budgets may be detrimental to life cycle cost efficiency and VE will play an important role in determining value for money in capital versus long term cost decisions.