

**B.Sc Civil
Engineering**

CONTRACT



Project & Contract Management CE 206

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Value Management (VM)

Value in building design and construction

- Value relates to the assessment of the benefits brought by something in relation to the resources needed to achieve it.
 - In the context of construction projects it is normally expressed as a ratio between a function and the whole life cost for that function.
 - Value = Function / Whole Life Cost
- or
- Value = What you get (or want) / What you pay
 - Thus, value can be increased by improved function or reduced whole life cost.

Value for Money

- It relates to the optimum balance between the benefits expected of a project and the resources expended in its delivery.
- The three most common terms associated with the VfM concept are value management, value engineering and value analysis. Whilst they are all keys to the VfM concept, there are functional and systemic differences between them:
 - Value Management (VM) is about *getting the right project*.
 - Value Engineering (VE) is done to *get the project right*.
 - Value Analysis (VA) relates to the improvement of a construction, manufacturing or management process and also to a post project review to establish value achievement.
- The British/European Standards define VM as “a style of management, particularly dedicated to mobilise people, develop skills and promote synergies and innovation, with the aim of maximising the overall performance of an organisation”

Value Management

- An alternative functional definition can be “Value Management (VM), is a systematic and structured process of team-based decision making. It aims to achieve best value for a project or process by defining those functions required to achieve the value objectives and delivering those functions at least cost (whole life cost or resource use), consistent with the required quality and performance” (Hamersley 2002).
- Value is subjective, prone to perceptions and pre-conceived notions. But for teams undertaking VM exercises it is absolutely essential that value is measured and quantified.

Value Management

Early pioneers of VM identified three factors influencing value:

- **Utility** – Will it work effectively and do what it is expected to do? Most buildings are constructed in order to accommodate and support specific activities. The building will be judged a failure if it does not do this effectively. Thus, maximising the productivity of what is done is a key component of the utility value in many buildings. A similar concept applies to civil structures such as roads and bridges. If a new power station is built, it must generate power reliably. In this case, the utility of the product is of primary importance, as is its ability to do so reliably. Thus, there may also be other secondary components of value.
- **Exchange** – can it be sold for a profit? The property and real estate market is driven by the concept of exchange value. Exchange value relies on the fact that parties involved in the exchange have different values. The concept of value drivers enables project teams to optimise value for their projects. Normally this will involve trade-offs (exchanges) between different stakeholders to obtain the optimum balance between their differing values.

Value Management

- **Esteem** – will it convey status or provide a “feel good” factor?
Esteem is a primary value for structures that need to convey an image or otherwise contribute to their environment. For example, corporate headquarters must convey to the public and clients alike what the corporation is about – that it is successful, it cares about details and it cares about its customers and things that its customers care about. In addition, the building must work as a building (utility value) and it must be saleable as an exit strategy (exchange value), but the overriding importance is the esteem in which the outside world will hold the building and, by extension, its occupiers.
- The relative importance of above three core types of value will vary depending on an individual’s perception of values.

Measuring value

- In order to utilise the full effectiveness of the VM process, it is important that a process is in place so that values can be quantified and measured.
- In the construction industry there are a number of key performance indicators (KPI's) that are commonly used to measure value. These KPI's include elements such as client satisfaction, defects, cost predictability, time predictability, safety and so on.
- Most of the emphasis of these KPIs is on the process of delivering construction.
- By contrast, VM focuses on project *outcomes*, rather than the process for delivering project success. For this reason, the VM process utilises value drivers to quantify and measure value delivered by a project.

Value Drivers

- A value driver is a functional attribute that is necessary to fully deliver the expected benefits from a project. In other words, it is a primary function i.e. a function that is directly related to the project objectives.
- Once the main functions (i.e. the value drivers) have been identified, it is beneficial to establish the hierarchy of importance between the main value drivers, thus establishing the *value profile* of the project.
- Assignment of quantitative measures (also known as setting metrics) to each individual value driver and agreeing performance measure will enable the VM team to assess and quantify performance and thus generate the *value index* of the project.
- Successive reassessments of the value index after each value study can give the project team a clear indication of how effective their efforts have been and where additional effort is needed to further improve value.

Generic value drivers include:

- Enhance/achieve desired financial performance (of the structure)
- Manage the delivery process effectively (maximise project delivery efficiency, minimise waste)
- Maximise operational efficiency, minimise operational costs
- Attract and retain employees/ occupants/ users
- Protect the appropriate image
- Minimise maintenance costs
- Enhance the environment
- Comply with third-party constraints
- Ensure health and safety during implementation, operation and occupation

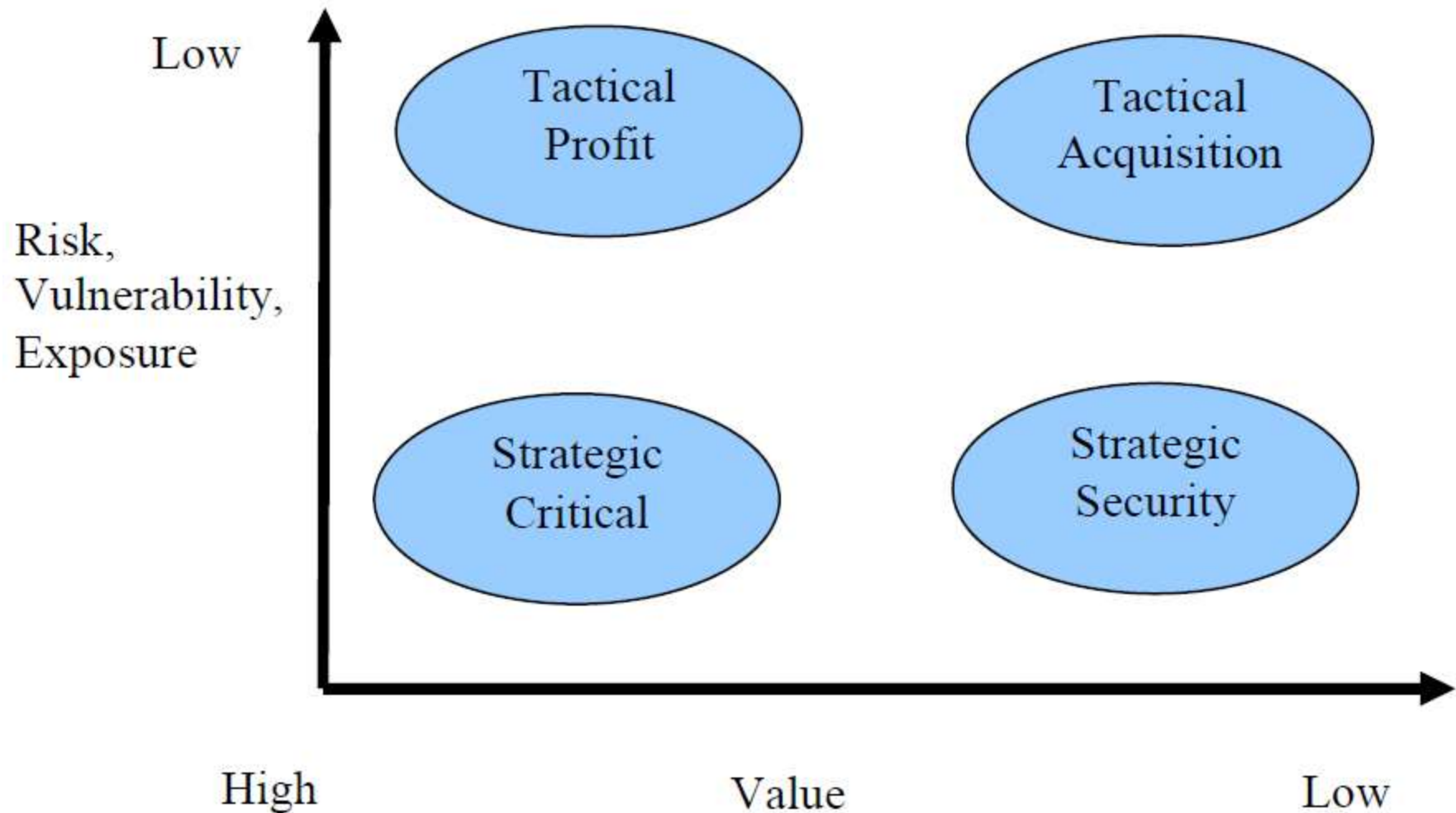
Value Management

- Value management focuses on the expected outcome from a project.
- Only once the outcome is clearly established, understood, agreed and defined, does the process address the question of how it will be delivered.
- The aspired outcomes from a project are represented in a statement of the project objectives, expressed in terms of the expected benefits to the business. These are linked through “value drivers” to the design intent.
- Later, as the project evolves, these relate directly to the design solutions and what is built.

The need for value management on construction projects

- Construction projects have been the subject of frequent reviews and reports.
- The principles and methodology of value management are not only necessary in construction projects to achieve better value from the resources, but also to deliver additional benefits such as better communication, improved team-working, better alignment of the supply chain and a better understanding of project objectives.
- The application of value management in construction projects will largely depend on the value of a particular project and the level of the risks involved.
- The figure in next slide indicates a typical risk & value matrix which can be used to identify the need and necessity of value management.

Risk & Value Matrix



Risk & Value Matrix

- For strategic – critical projects (high risk, high value), a full value management process is almost always justified.
- For strategic – security projects (high risk, low value) and tactical – profit (low risk, high value) projects, the necessity of value management will depend upon the merits of each project.
- For tactical – acquisition projects (low risk, low value) a value management exercise may not be necessary.

Benefits of a VM

- A clear definition of what the owners and end users mean by value, thus providing a precise basis for making decisions throughout the project.
- A tool for optimising the balance between differing stakeholder needs and expectations.
- A basis for creating a clear project brief that reflects the project sponsor's priorities and expectations, expressed on the basis of value and function. This improves communication between all the stakeholders so that each can understand and respect the other's constraints, expectations and requirements.
- A basis for ensuring that the project is the most effective way of delivering business benefits and satisfying business needs.
- A functional basis for embellishing and refining the business case for the project, by addressing both the monetary and non-monetary benefits.
- A functional basis for design development and management, through improved communications, mutual learning and enhanced collaborative working, leading to better technical solutions with enhanced performance and quality, often through innovative solutions.
- A functional mechanism to measure value, taking into account monetary and non-monetary benefits and thus demonstrating value for money.

Benefits of a VM

- Value management can be a very low-cost, high-benefit exercise. When integrated into the project management methodology early in the project life cycle, the cost may become almost negligible because of the reduced need for subsequent reviews and opportunities for substituting value management for some of the routine appraisals and quality audits that are always necessary.
- The benefits of a value management review are often perceived in terms of improved quality and reduced cost. However the “invisible” benefits can be just as, or more valuable. Consensus and mutual understanding between stakeholders, clear objectives, reduced risk of changes in scope and improved communications will help to ensure that the project meets the objectives of the client and is delivered within the relevant parameters.

VM Process

- Value management is a team-based approach used to define the client's objectives and ensure that best value, whole-life solutions are selected to satisfy those objectives.
- It is not necessarily about cost cutting.
- To achieve maximum benefit, value management should be carried out from the very early stages of a project, not simply introduced when problems occur.
- The process of value management includes value engineering, which is a more systematic approach to ensuring that specific functions are satisfied to the required standard for the least cost. It assesses a range of possible solutions against the values required by the client.
- Value management exercises can also be used to recover cost divergence (costs diverging from the budget) that may become apparent when design reports are prepared. Under these circumstances, the client may have to choose priorities, or decide to increase the budget.

VM Process

It may be possible to:

- Identify items that can be omitted.
- Identify items that can have their specification changed.
- Identify items that could be re-instigated later in the programme if the budget allows.
- Identify enabling works that can be incorporated into the design, allowing elements to be added during later phases of construction.
- The client and the full consultant team should take part, along with the contractor, construction manager or management contractor if appointed.



Utilities

Utilities for construction and operation

- Utilities are infrastructure services provided to consumers that are sometimes considered to be 'public' services, that is, they are supplied to the public and are important for the normal functioning of society. As a result they normally come under some form of public control.
- Utilities are generally considered to include: electricity, gas, water and sewage and communications services.
- Utilities providers may be responsible for the infrastructure that supplies the utilities, or the infrastructure may be provided by another organisation.
- Utilities providers may be considered to be 'statutory undertakers' with statutory rights (such as the right to carry out certain works without obtaining the normal permissions) and obligations (such as the supply of utilities). Under certain circumstances, there is a statutory right to connection.

Connection

- Ensuring that utilities are supplied to developments is vitally important, not just for the completed development, but also for the construction process itself.
- It has been cited as the most common cause of delay in construction projects, particularly on larger projects where multiple connections may be required or where the existing infrastructure may need to be extended or reinforced.
- Delays in connection persist, despite the introduction of connection performance standards for suppliers, and the threat of fines.
- The infrastructure necessary to supply utilities may be provided by the network operator, or increasingly, by an independent provider (to an agreed design that is then 'adopted' by the network operator).
- These organisations should be considered stakeholders in the project and identified as third party dependencies that bring risks to the project.

Connection

Delays can result from the action or inaction of the developer as well as the provider. Delays can be avoided by:

- Starting discussions with providers as soon as possible, ideally with a single point of contact.
- Early exchange of information and confirmation of feasibility and ability to supply.
- Better communication of dates, procedures for access, locations and so on.
- Adequate notification.
- Providing access, and ensuring that appropriate personnel are available.
- Identifying routes for utilities and obstacles.
- Not overestimating loads, which can lead to unnecessary reinforcement of the existing infrastructure. It is important that the developer is aware of the thresholds at which reinforcement will be necessary.
- Timely submission of designs for approval, or timely request of designs from the provider.

Connection

- Developers will need to ensure that existing site information is obtained, and surveys carried out to determine the position, extent and capacity of existing services. They will need to agree with the provider, the design of any new infrastructure that is required, who will provide it, who will adopt it, and any charges, as well as the appropriate testing, inspection, certification, connection (or disconnection in the case of demolition), installation of meters and so on.
- The costs associated with utilities can be significant, both in terms of the initial capital cost of installation (particularly if there is no existing supply or if the existing supply is inadequate) and ongoing bills during operation.
- It is important therefore to ensure that the best deal is being obtained from providers and that alternative quotes are obtained if possible.
- During mobilization for construction, the contractor will need to arrange for the necessary water, power and telecommunications services to enable the site to function.

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Budgeting, Cost Plan & Control

Budget

- A budget is a statement of the amount of money that is available to spend over a period of time, or on a specific thing, such as a building. It may include an outline plan for how that money will be spent, and a breakdown of the items it will be spent on.
- Budgets help determine what is affordable and should be set as early as possible. It is important that they are based on evidence and that they are realistic.
- A budget can be established by:
 - Assessment of projected income and expenses through the life of the project.
 - Comparison with similar projects.
 - Assessment of the funds available.
 - Pre-design analysis of requirements.
 - Analysis of preliminary design options.

Budget

- The budget is set by the client and is distinct from cost plans prepared by a cost consultant which are likely to focus on the construction cost.
- The client's total project budget may include:
 - The construction cost.
 - Land or property acquisition.
 - Approvals fees.
 - Planning costs.
 - Financing costs.
 - Site investigations.
 - Fixtures, fittings and equipment.
 - The cost of decanting and relocating, including costs associated with moving staff.
 - Contracts outside of the main works.
 - Insurance.
 - Consultant fees.
 - Inflation.
 - Contingency.
 - VAT

Cost plans for construction projects

- Cost plans evolve through the life of the project, developing in detail and accuracy as more information becomes available about the nature of the design, and then actual prices are provided by specialist contractors and suppliers.
 - Initial cost appraisals (studies of options prepared during the feasibility study stage).
 - Elemental cost plan (prepared during the project brief stage and carried through to detailed design).
 - Approximate quantities cost plan (from the end of detailed design through to tender).
 - Pre-tender estimate (prepared alongside tender documentation).
 - Tender pricing document (strictly speaking this is not a priced document, but is part of the tender documentation issued to the contractor for pricing).
 - Contract sum (agreed with the contractor during the tender period and adjusted during the construction period).
 - Contract sum analysis (a break down of the contract sum prepared by the contractor on design and build projects).
 - Final account (agreed during the defects liability period).

Cost plans for construction projects

- Other than initial cost appraisals, these all relate to the construction cost of the project (rather than wider project costs that the client might incur, which could include: fees, equipment cost, furniture, the cost of moving staff, contracts outside of the main works and so on).
- It is important that the client makes clear what costs should be monitored by the cost consultant and what will remain within the control of the client organisation.
- Initial cost appraisals are carried out without the benefit of a design for the project. They include client costs that may not feature in later cost plans and as a result will almost certainly need input from the client's finance director or financial advisers. Once the initial cost appraisal is completed, the client will decide the scope of costs that will in future be monitored by the cost consultant and those that will be monitored and controlled by the client organisation.

Cost control in building design and construction

- A development budget study is undertaken to determine the total costs and returns expected from the project. A cost plan is prepared to include all construction costs, all other items of project cost including professional fees and contingency. All costs included in the cost plan will also be included in the development budget in addition to the developer's returns and other extraneous items such as project insurance, surveys and agent's or other specialist advisers' [fees](#).
- The purpose of the cost plan is to allocate the budget to the main elements of the project to provide a basis for cost control. The terms budget and cost plan are often regarded as synonymous. However, the difference is that the budget is the limit of expenditure defined for the project, whereas the cost plan is the definition of what the money will be spent on and when. The cost plan should, therefore, include the best possible estimate of the cash flow for the project and should also set targets for future running costs. The cost plan should cover all stages of the project and will be the essential reference against which the project costs are managed.

Cost control in building design and construction

- The method used to determine the budget will vary at different stages of the project, although the degree of certainty should increase as project elements become better defined. The budget should be based on the client's business case and should change only if the business case changes. **The aim of cost control is to produce the best possible building within the budget.**
- The cost plan provides the basis for a cash flow plan, allocating expenditure and income to each period of the client's financial year. The expenditures should be given at a stated base-date level and at out-turn levels based upon a stated forecast of inflation.

Cost control in building design and construction

- **The objective of cost control is to manage the delivery of the project within the approved budget.** Regular cost reporting will facilitate, at all times, the best possible estimate of:
 - Established project cost to date.
 - Anticipated final cost of the project.
 - Future cash flow.
- In addition cost reporting may include assessments of:
 - Ongoing risks to costs.
 - Costs in the use of the completed facility.
 - Potential savings.
- Monitoring expenditure to any particular date does not exert any control over future expenditure and, therefore, the final cost of the project. Effective cost control is achieved when the whole of the project team adopts the correct attitude to cost.

Actions to be taken for Effective Cost control

Effective cost control will require the following actions to be taken:

- Establishing that all decisions taken during design and construction are based on a forecast of the cost implications of the alternatives being considered, and that no decisions are taken whose cost implications would cause the total budget to be exceeded.
- Encouraging the project team to design within the cost plan at all stages and follow the variation/change and design development control procedures for the project. It is generally acknowledged that 80% of cost is determined by design and 20% by construction. It is important that the project team is aware that no member of the team has the authority to increase costs on its section or element of the work. Increased costs on one item must always be balanced by savings on another.
- Regularly updating and reissuing the cost plan and variation orders causing any alterations to the brief.
- Adjusting the cash flow plan to reflect alterations in the target cost, the master schedule or the forecast of inflation.

Actions to be taken for Effective Cost control

- Developing the cost plan in liaison with the project team as design and construction progress. At all times it should comprise the best possible estimate of the final cost of the project and of the future cash flow. Adherence to design freezes will aid cost control. Developing the cost plan also involves adding detail as more information about the work is assembled, replacing cost forecasts with more accurate forecasts or actual costs whenever better information can be obtained.
- Reviewing contingency and risk allowances at intervals and reporting the assessments is an essential part of risk management procedures. Developing the cost plan should not involve increasing the total cost.
- Checking that the agreed change management process is strictly followed at all stages of the project. The procedure should only be carried out retrospectively, and then only during the construction phase of the project, when it can be demonstrated that otherwise significant delay, cost or danger would have been incurred by awaiting responses.
- Arranging for the contractor to be given the correct information at the correct time in order to minimise claims. Any anticipated or expected claims should be reported to the client and included in the regular cost reports.

Actions to be taken for Effective Cost control

- Contingency provisions are based on a thorough evaluation of the risks and are available to pay for events which are unforeseen and unforeseeable. It should not be used to cover; changes in the specification, changes in the client's requirements or variations resulting from errors or omissions. Should the consultants consider that there is no alternative but to exceed the budget, a written request must be submitted to the client and the correct authorisation received. This must include the following:
 - Details of variations leading to the request.
 - Confirmation that the variations are essential.
 - Confirmation that compensating savings are not possible without having an unacceptable effect on the quality or function of the completed project.
 - Submitting regular, up-to-date and accurate cost reports to keep the client well informed of the current budgetary and cost situation.
 - Ensuring that all parties are clear about the meaning of each entry in the cost report. No data should be incorrectly entered into the budget report or any incorrect deductions made from it.
 - Ensuring that the project costs are always reported back against the original approved budget. Any subsequent variations to the budget must be clearly indicated in the cost reports.
 - Plotting actual expenditure against predicted to give an indication of the project's progress.

