

Industries
Energy, Utilities & Mining

Managing your capital project



*connectedthinking

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Appraisal

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By their nature, capital projects are not part of day-to-day operations. Whether related to infrastructure, construction of a new

plant, buildings or systems, they require separate financing, management, governance and assurance. The scale of projects in the energy, utility and mining sectors present immense challenges at the best of times.

In a world of economic instability, with uncertain demand and plummeting commodity prices, these challenges are magnified.

The uncertainties that arise from the credit crunch and economic downturn amplify and strengthen the importance of bringing effective rigour and challenge to decisions at all stages of the capital project cycle. Now more than ever, success of capital project delivery is critical to survival.

From project appraisal all the way through to completion and operation, a solid project management strategy will optimise your capital project delivery, ensuring survival in the downturn, and emerging stronger and better positioned.

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Execution

Recovery

Project
management
and control

Information
and reporting

Assurance and
monitoring

Back on track

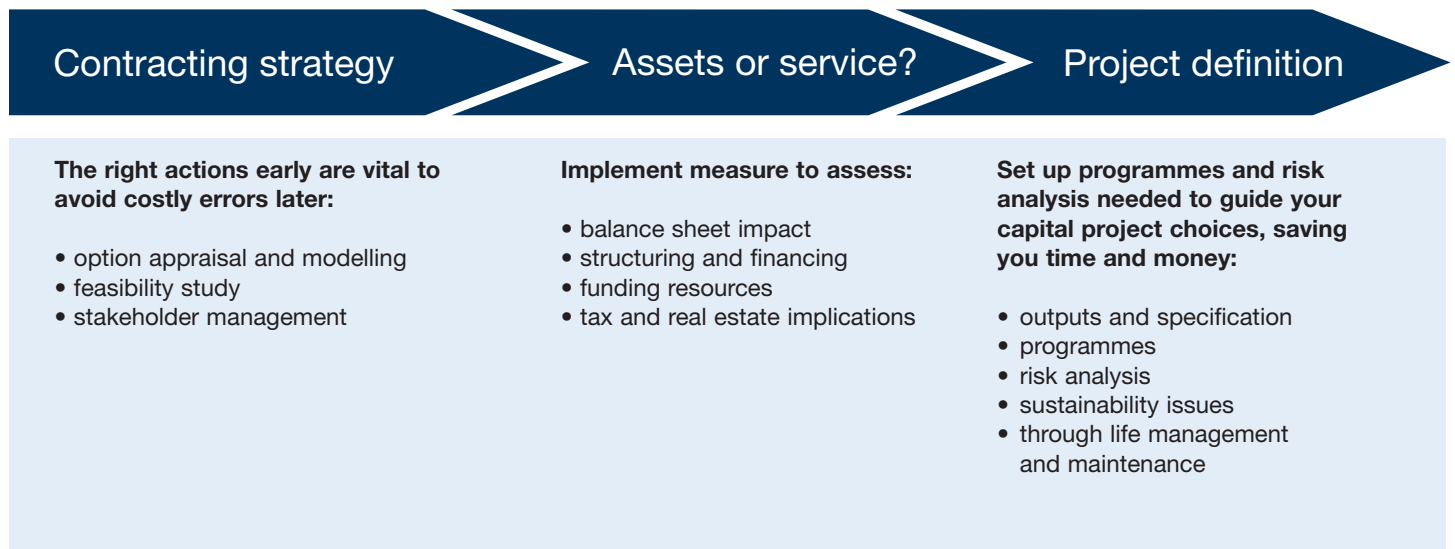
Disputes

Restructuring

Appraisal

Sound project definition and effective decision making at the outset of a capital project are critical to a successful outcome. The ability to influence project success and enhance value is greatest at the start of project evaluation and rapidly declines as a project advances towards implementation. Conversely, the cost of change dramatically increases throughout each successive project stage. The quality of decision making in the early stages is therefore a critical factor in project success. In the context of today's highly volatile markets and an uncertain economic outlook, it is more critical than ever to have a robust project appraisal process in place in which all market, technical and execution uncertainties are factored in to key decisions.

Getting decisions right from the start



Case studies

A power plant engineering company: new power generation construction in South Africa.

A leading German coal fired power plant engineering company received an order for the construction of two power plants in South Africa. The company had to ramp up its South African operations as fast as possible in order to be able to deliver the two large scale capital project orders.

The project involved both PwC Germany and PwC South Africa. It drew on the 'Greenfield Investment Services' methodology developed by PwC Germany and used a performance improvement multi-competencies approach, integrating the design and implementation of organisational structures and all relevant business processes to meet South African regulations and requirements.

The company ramp-up was completed just six months after the initiation of the project giving the client a fully operating subsidiary in South Africa and enabling them to start focusing on their core business of the engineering and construction of the power plants.

Clear and direct communication meant that many risks and problems which might have occurred were identified right from the beginning and preventive actions were taken. The project was characterised by a high level of performance and fast reactions to emerging issues.

Real option analysis

You may want to use Real Option Analysis (ROA), as many companies do, to assess your choices and how the business case and the rate of return for a project shape up under different future conditions. ROA is a quantitative modelling technique for evaluating and managing capital investment and transaction decisions that incorporates the value of management's future decisions throughout the project cycle.

Unlike traditional approaches, which tend to focus on a limited number of best- and worst-case scenarios, Real Option Analysis factors in future risks and uncertainties, enabling you to look across the full spread of scenarios and identify the overall optimal strategy in discounted cash flow terms. In this way, ROA recognises that the future is uncertain and likely to change and that you can take actions both now and in the future to respond optimally to changing project environments.

Project portfolio management

Project Portfolio Management (PPM) provides a structured method of decision making that enables you to select and run an optimal set of projects. A standardised approach to investment evaluation enables you to compare your projects on an equal basis and assign priorities based on strategic fit and risk appetite of your company.

A further level of complexity in PPM is that, once approved, changes in the internal and external environment can negatively impact or even invalidate projects. Your senior managers, therefore, require consistent information on which to assess the impact of such changes. A mature PPM approach is critical to project success. A recent PricewaterhouseCoopers global study* indicated that 75% of projects using a mature process delivered superior project outcomes.

*PricewaterhouseCoopers 'Boosting Business Performance through Programme and Project Management'

A major European oil & gas company: assessment of upstream oil & gas portfolio risk.

The company needed a dynamic assessment of the uncertainties facing their entire existing overseas upstream asset base and how those uncertainties would affect its value and the amount and timing of financing.

Using our Real Option Valuation methodology, PricewaterhouseCoopers constructed a detailed dynamic model template. The key uncertainties we modelled were price, capital and operating costs, reserves, well productivity decline curve and possible export options (access to pipeline capacity and cost).

We determined the value of each holding to the client and the range in expected funding requirements for each asset. The assets varied from rank exploration through to ultra-mature field rehabilitation contracts. In addition, we treated the assets as a portfolio (rather than simply adding the results) to determine the total value and the company's combined cash flow profile position for its entire overseas holdings.

Southern East Siberia: appraisal of a US\$10bn gas investment.

An international oil & gas company needed to evaluate a proposal for major investment in gas exploration, piping the gas to China and selling it in the Beijing area and possibly elsewhere.

PricewaterhouseCoopers modelled the decision using Real Option Analysis. Under conventional valuation techniques, the asset had a negative value. Using our Real Option Valuation methodology, and a more explicit approach to modelling political risk, we demonstrated that the asset value was significantly better than initially believed.

Our work also highlighted the advantages of scaling back the appraisal programme and expanding the market development study in China. We also recommended the instigation of a lobbying effort to align the interests of the two governments with those of the project.

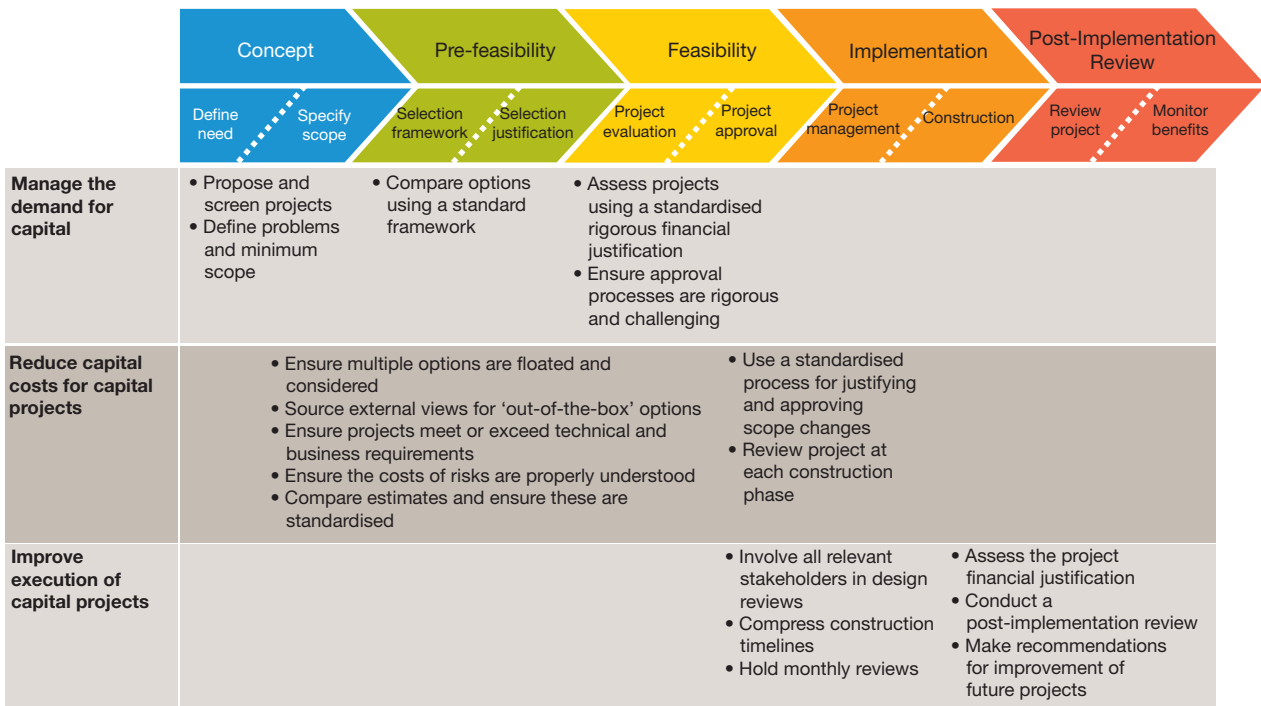
The real options methodology behind this engagement is replicable for any organisation with capital projects that are large, long or complex and hence give rise to significant sources of uncertainty.

Effective capital management

Large capital projects have the potential to create or erode shareholder value. Effective capital management is one of the largest levers that asset intensive companies can pull to extract enhanced shareholder value.

Reducing the capital required to deliver a solution to an identified business requirement has an enormous potential impact on the return that the solution can generate. At each stage of project evaluation there are a number of issues that you need to tackle to ensure effective assessment and capital management.

Figure 1: Capital effectiveness over the project lifespan



Source: PricewaterhouseCoopers, *Managing your capital project*, 2009

Case studies

Anglo Coal Australia: development of a stage gating process for major capital projects

Anglo Coal Australia, one of the world's largest coal mining companies, faced challenges and identified a lack of governance surrounding the evaluation and execution of major capital projects. The projects and engineering team needed to develop and implement a new stage gate process for all major new coal mine development projects.

They adopted a four phase approach:

- 1 Review of current evaluation techniques.
- 2 Definition of a new evaluation process.
- 3 Development of supporting guidelines and documentation.
- 4 Implementation and training of the new process and guidelines across all projects within Australia.

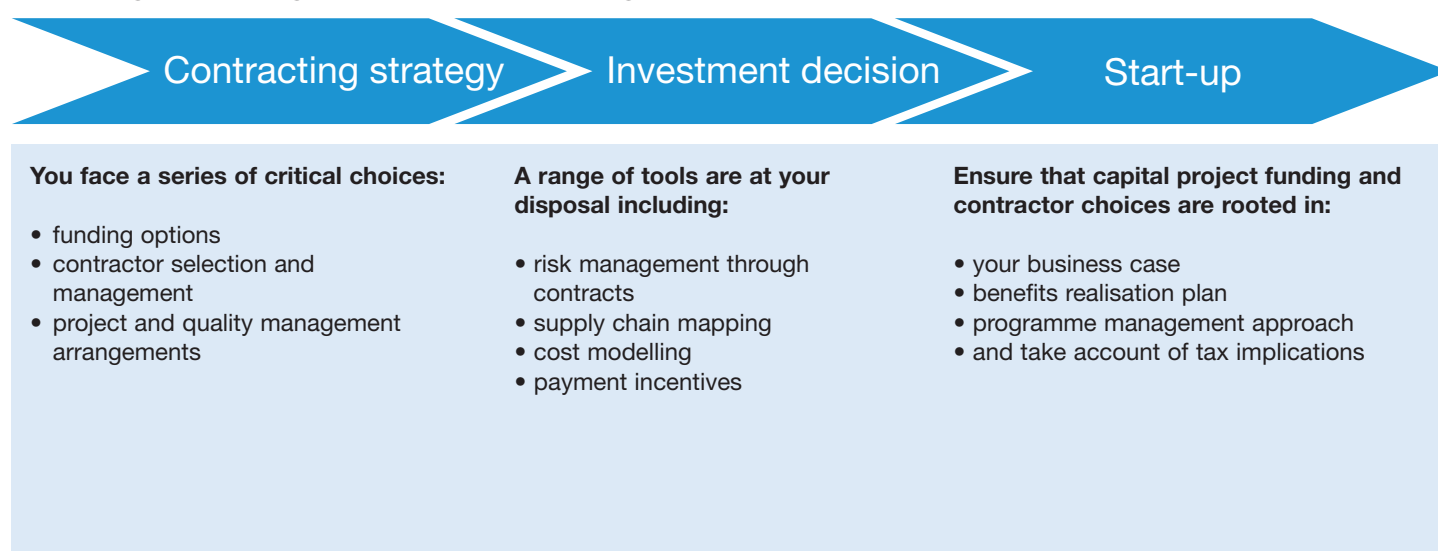
A detailed set of new guidelines was developed for every phase of project development, from concept through to feasibility and post green light evaluation. This required synchronising all Anglo Coal Australia project review stages with the global Anglo American investment review board stages.

Anglo Coal Australia fully adopted the new stage gate process. The guideline documents are utilised widely across the organisation. This has resulted in increased levels of governance and accountability surrounding all major capital project decisions.

Development

The project development phase covers the securing of investment, the contracting strategy and construction start-up. The global economic crisis has changed the investment landscape. The debt markets have all but dried up. However, finance for energy infrastructure projects is likely to be more resilient to the credit crunch than many other markets. The current financial climate will require some companies to look beyond existing funding options and pay greater attention to their balance sheet position. Off-balance sheet investments will likely be scaled back or postponed until financial markets improve. Construction costs, refinery modernisations and new drilling projects are being reigned in. Geo-political risks will play a pivotal role both for emerging countries wishing to attract new energy investments, and companies who would likely invest in these markets.

Deciding on the right finance and the right contractors



Readiness assessment & risk mitigation for nuclear power plant construction

A major utility was undertaking the construction of two Westinghouse Advanced Passive 1000 (AP1000) Pressurized Water Reactors. It needed to assess its own capabilities and identify the steps it needed to put in place to ready itself for the commencement of this multi-billion, multi-year project.

PricewaterhouseCoopers' Utility Capital Project Services specialists conducted an initial readiness assessment to establish key organisational and procedural risk areas and develop relevant, actionable recommendations to help mitigate these risks. This was followed by steps to assist the utility with the development of project organisation, systems, processes and procedures.

The assessment was organised and managed using PwC's Integrated Risk Framework. This framework is used to focus attention on relevant areas of the project organisation and procedures. A second project phase covered the implementation of selected recommendations, including:

- The development of a project financial system used to forecast the total project cost, manage invoice payments, formulate "what if" scenarios, report earned value and develop a detailed cost audit trail suitable for regulatory proceedings.
- The development of a consolidated pre-deployment schedule that incorporated all elements of the project leading to commencement of physical works.
- The development of a project level risk management system used to track, communicate, escalate and report all levels of identified risks across the entire project.

Securing appropriate funding

Typically capital projects are funded from the corporate balance sheet or through equity investment in a SPV which can then be single project financed. As the supply chain is taking less risk in delivery of infrastructure and process plant, whilst certainty of outcome and future cashflows become less reliable, these factors add to the already difficult debt markets.

Selecting an appropriate procurement strategy

Once funding is in place the development of a deliverable, cost effective, procurement strategy is the next key challenge. No two capital projects are alike or have precisely the same set of objectives, issues and constraints. A capital project, therefore, requires a procurement strategy tailored to its specific requirements and needs – particularly to the nature and amount of risk and uncertainty. The procurement strategy must be tailored to the capabilities and resources of both the supply chain and, more importantly, the client.

A critical question is whether to adopt a ‘full risk transfer’ approach, characterised by distinct client-supplier autonomy, or a ‘collaborative’ approach, in which the client-supplier teams are fully integrated and share the risks. A key consideration will be the extent to which a project requires a high degree of innovation, flexibility and a dynamic approach from all project members.

Projects that fit this profile are typically of a technically complex nature, incorporate engineering solutions that are unproven or embryonic and, inevitably, carry high risks. Such projects are likely to employ the collaborative approach as the close client-contract relationship provides a superior environment to manage the risks.

Modelling the best approach

It is important for you to model the suitability of different approaches to procurement. It should be noted that where the project features a high degree of uncertainty and risk, it is unlikely that even a collaborative strategy will be wholly effective and you are likely to have to bear the project risk. Paradoxically, defaulting to a strict risk transfer approach in these cases is likely to further increase risk and cost and may jeopardise the overall success of your project.

It is likely that you will need to make some investment in resources, skills and in your approach to project governance. If that is not feasible, then the project should be re-scoped or sub-divided to address the risks or uncertainties on a more manageable basis.

Case studies

Canadian energy & gas company: capital project procedures risk and controls review

The company wished to invest several billion dollars to increase its production capacity. Client issues included the following:

- Past projects were greatly over budget and time.
- Limited project and oversight skills.
- Organization was heavily reliant on EPC contractors for project and industry expertise.
- Internal audit lacked capital project skills.
- High level of external stakeholder involvement and scrutiny.
- Not sure of what they needed from a risk, governance and compliance perspective.

What we did

- Provided PMO resources to supplement the governance function.
- Performed a risk and governance review to identify and prioritize issues.
- Assessed project resources, skills, capabilities, systems and processes.
- Developed a high level schedule of when to have key activities in place.

- Developed an annual audit and review plan – began reporting quarterly to the project executive.
- Became a ‘project advisor’.
- Developed a ‘portfolio program view’.

How we added value

- We performed a diagnostic of current capital project processes, highlighting areas of strength as well as areas of weakness. This included areas of concern in managing risks and leading practices in overall project governance.
- Increased project management capabilities on owner's side by hiring additional PMO staff.
- Schedule review resulted in uncovering schedule that was not as evolved as EPC contractor presented.
- Assessment of document management needs.
- Contractor reviews.
- Alignment of project governance and internal audit functions.

Results

- Alignment project performance with project sponsor expectations.
- Increased visibility of contractor performance.
- Process in place to lead to project success and quickly highlight project potential actions necessary.

Execution

The history of large-scale capital projects is littered with high profile examples of projects going off course. The Olkiluoto power station being developed in Finland, for example, is the first nuclear power station to be built in Europe since Chernobyl but has attracted immense attention for the wrong reasons. It is currently three years late, 50% over budget and has been beset with technical, commercial and regulatory problems.

Keeping projects on or ahead of course



A North American power transmission company: assessment of controls for capital project execution

The company had a long-term working relationship with an EPC contractor but was entering a phase of unprecedented capital spend. The company wanted to make sure that the governance structures, both internally and at the EPC, were sufficiently robust.

PricewaterhouseCoopers assessed five recent and ongoing projects to look at project execution controls at the company and the EPC. Our focus was on:

- Reviewing respective roles and responsibilities to identify gaps and duplication of effort.
- Identifying any breakdown in the flow of information and giving both parties greater understanding about each other's processes.
- Assessing the design and robustness of cost, schedule, procurement and scope change controls and providing recommendations to improve project execution.
- Assessing the adherence of project teams across the organisation to established controls.
- Helping to establish practices which would support regulatory filings to demonstrate prudence in project execution.

Our work enabled the company to focus its efforts on areas with the highest risk and address any control and communication gaps prior to its significant capital programme expansion. The project started a constructive dialogue between the parties to improve the level of buy-in and cooperation.

Oil & gas industry: avoiding a cost blow-out

An oil industry client had identified a significant opportunity to build a new refinery which would be their largest single investment for a number of years. They decided that they should appoint an independent risk advisor to assist in the establishment of controls and a governance regime that reflects the special risks that this project brings to the company.

Having established a sponsoring board for the project and the assignment to establish the governance regime, we reviewed the organisation structure and company procedures that would be applied to the project.

Using the risk register as a starting point, we enhanced existing controls and developed a monitoring control regime for the risks and opportunities in each of the project components as they changed over time.

Preventing disputes

High levels of dispute have been a significant issue in recent years. Inappropriate risk allocation has been a major contributor to this trend. Some project owners have transferred whatever risks they can to contractors, who in the past have accepted them and often passed them on to subcontractors. This practice passes risk down the supply chain to parties that are not equipped to manage it and, when unexpected events occur, entire projects can be put in jeopardy. Another common issue is that some organisations select contracting strategies that are inappropriate for the project concerned. Past experience is often relied upon with the same contracting strategies used as in previous projects, with little or no regard to specific project risks, scope or commercial relationships. These issues all point to the importance of establishing the right allocation of risk and responsibility and putting this within a robust project management and control framework.

Performance management

Companies often rely on what is being reported to them by the contractor or the contracted project manager. While they may have followed a robust contractor selection process and have defined performance management mechanisms, they may not be effectively monitoring performance in practice. You need to ensure that performance is transparent throughout the supply chain. Such transparency enables you to understand the true performance and intervene pro-actively before issues become critical.

Capital project assurance

Capital project assurance provides clarity to the programme board and stakeholders on the performance of their business-critical projects and gives confidence in the messages that your project team is communicating. This allows senior management to make informed decisions predicated on robust data. It also flags up projects showing signs of distress, allowing you to take remedial action before issues escalate and become critical.

The key risks and critical success factors are mapped, allowing management to understand and influence the in-life performance and activate the appropriate levels of management intervention where necessary to maintain the project performance. Learning points are also captured to enable best practice to be flowed throughout other projects in the company's portfolio.

Case studies

EnergyAustralia: capital works programme procurement strategy

EnergyAustralia had restructured its operations to increase its capacity and effectiveness to deliver a five year US\$8bn electricity infrastructure programme. The increased CAPEX required innovation, flexibility, new engineering design and contracting solutions. The aim of the project was to create a procurement function that could help increase the overall efficiency and capacity to deliver the works programme by removing unnecessary requirements, reducing efforts and driving greater standardisation.

PricewaterhouseCoopers proposed the establishment of a centralised 'engineering and procurement branch' for the client to manage the procurement and performance of the major plant items (high-cost, low-volume plant items with long lead times). The strategy was developed to ensure the branch would introduce more innovation from suppliers and was capable of delivering complex projects within changing market conditions in a supply constrained market.

The benefits included:

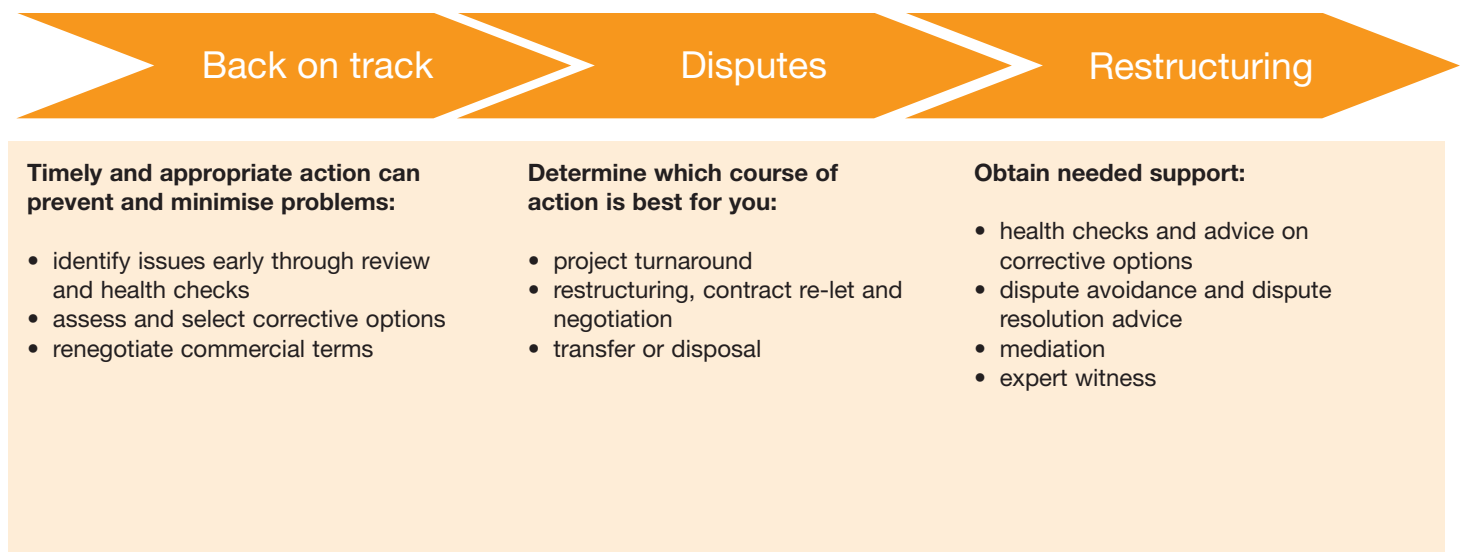
- A single point of accountability for the total life cycle performance of all major plant and equipment; procurement, installation, operation, maintenance, advice, faults and defects.
- A category sourcing strategy for all major plant, equipment and contracts for major projects.
- Provision of deeper understanding of the external market to reduce financial exposure to fluctuating market conditions.
- The fostering of strategic relationships with key suppliers to increase innovation and secure supplier capacity.

The strategy has delivered significant commercial benefits through cost containment, played a key role in mitigating risks, increased innovation and has freed up scarce engineering resources for other projects. The procurement strategy was able to transform the client's procurement function into a powerful part of the business that adds value well beyond purchasing cost savings.

Recovery

For projects in distress, management focus must shift from normal operation to recovery. All too often, failure to recognise the symptoms of a distressed project and take appropriate remedial action can compound the issues, resulting in increased costs, further delays, failure to achieve the business objectives, and in the worse case, overall project failure. The first vital decisions that managers make set the course for the recovery programme and have a substantial influence over its success – it is therefore vital that you make the right decisions at the right time to ensure an optimal turnaround.

Getting projects back on track



Major gold mining company: shaft construction project review

The company had acquired a mining operation with a deep mine shaft construction project already underway but recognized that key risks and strong project controls and procedures had not been adopted to manage the project. It needed to determine how systems and controls could be strengthened in order to complete the project in time and on budget while ensuring a good safety performance.

PricewaterhouseCoopers was able to advise the company on a range of preparedness and project strengthening issues. Our work included:

- Determining whether or not the estimated completion cost and schedule were achievable.
- Determining the level of reliability and risk associated with the planned commissioning and operations transition.
- Assessing the relationship and interaction between 'operations' and 'projects' in managing changes in scope and other project modifications.
- Assessing how the current procedures could be improved to ensure compliance with existing and standard company procedures.

We provided a statement of project risks for each aspect of the construction project, a tabulation of sound practices already in place; and identified the major risks associated with completing the project on time, on budget and with a high level of safety performance.

Power station construction: dispute resolution

Our client faced a £80m claim from the contractors responsible for constructing a new power station. Our work showed that the claimant had not:

- Properly supported its claim by reference to the appropriate clauses in the contract.
- Kept adequate records to show what additional resources were deployed and why.
- Split out time delays between those arising from client changes and its own faults and inefficiencies.

As a result, the client was able to settle the dispute for about 5% of the amounts claimed.

Project recovery

You may want to seek outside guidance to help get projects back on track. Experience shows that rescuing distressed projects requires:

- Making bold decisions
- Robust information on physical and financial status and forecast outturn
- Rapid investigation into causation of variances (e.g. losses to date)
- Reorganisation, or changes of people, processes and procedures
- Injection of enthusiasm, resources and/or finance
- Rapid resolution of commercial / contractual issues

Disputes and investigations

A third-party perspective is also invaluable when disputes arise. You should select an outside advisor with deep experience providing financial, economic and business services to both lawyers and corporations globally who are involved in litigation, arbitration, and other alternative dispute resolution forums. Such experienced professionals can offer assistance with early case assessment, class certification, discovery assistance, quantification of exposure, claim preparation, and rebuttal and expert witness testimony. Whatever the situation, your advisor should be able to draw upon a wide team of experts to help.

No matter how complex or urgent your situation is, obtaining seasoned support is key. A qualified advisor can offer a combination of forensic accounting, capital project management and investigative skills to the financial and legal implications of your issues to help you make intelligent, informed decisions, whether in the boardroom or the courtroom.

Case studies

TUAS power station, Singapore: dispute resolution advice

This was a construction of a 700 MW coal fired power plant where a dispute arose between contractor and subcontractor. There had been a late issue of design information and materials. Reduced resource levels and out of sequence working had caused slow progress. The contractor believed that subcontractor should have been progressing faster with the work but the subcontractor had difficulty planning its work as the material deliveries for piping were late and out of sequence. These delays were concurrent with other delays on the project.

What did we do?

- Analysed the material deliveries.
- Linked the material deliveries to the actual fabrication and installation work done.
- Ascertained the consequences of these impacts on the completion of particular milestones.
- Completed the work started by a joint task force (which had been set up to analyse the problem).
- Submitted an independent analysis of delay.
- Participated in expert's meetings attended by legal counsel.
- Achieved resolution.

Lessons learnt

The analysis of the delay, like that in many other construction projects, produces useful insights into the management of large capital projects:

- Increase the level of governance to match the level of risks.
- Consider the value of an independent risk advisor both at the early stages and during implementation.
- Promote sound project management through the use of a stage gate approval process.
- Provide appropriate support to key people running project delivery teams (eg skills training, personal development, regular performance appraisals).

Checklist

- 1 Analysing and planning for the project's regulatory climate enable you to fully identify and manage relevant issues based on regulatory expectations and requirements.
- 2 Establishing a capital investment management framework identifies project components and related issues for each phase of your project lifecycle.
- 3 Implementing a phased project evaluation process ensures that you make investment decisions based on sound financial, social, environmental and sustainable development analysis.
- 4 Effectively managing project portfolios enables you to compare projects and ensure priority is based on strategic fit and risk considerations.
- 5 Front end loading key elements of project evaluation reduces risk and decreases cost blow-outs at later stages.
- 6 Determining a contracting strategy early in your project evaluation process, which incorporates a sound risk management approach, increases the likelihood of a successful outcome.
- 7 Developing focused management reporting of both ongoing and exception situations highlights project risks, adequacy of mitigating actions and the impact on operations and enterprise risk.
- 8 Learning from successes and mistakes and ensuring these are documented and incorporated into knowledge management for future projects is key to continuous improvement.

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