

Governments are still spending billions on infrastructure construction, but such schemes usually overrun and blow the budget. **Neil Hodge** asks what financial managers can do to keep these mega-projects on track.

PRODIGAL SUMS

Shelling out: the construction of Sydney Opera House started in 1959. A scaled-down version of the original design opened in 1973, ten years after the scheduled completion date. The total cost was A\$102m – over budget by A\$95m.



Although the world's biggest companies may be scaling back their growth plans, some of the biggest countries are intent on pouring cash into massive infrastructure projects in a bid to stimulate their economies and stave off unemployment.

Last November, for example, China announced a construction programme worth ¥4trn (£390bn). India has earmarked Rs23.4trn (£316bn) for public building projects and this February the US announced a stimulus package worth \$787bn (£524bn).

Even if you take these schemes out of the equation, the level of investment in public construction projects has never been higher. In 2004-08 China spent more on infrastructure in real terms than it had during the whole of the 20th century, for example. During that four-year period it built as many miles of high-speed railway as the whole of Europe managed in two decades. Furthermore, of the estimated £15trn that will be spent on infrastructure improvements globally over the next decade, half will go into projects in developing countries.

All this represents “the biggest investment boom in history”, according to Professor Bent Flyvbjerg, director of Oxford University's BT Centre for Major Programme Management, who spoke at this year's CIMA Anthony Howitt lecture.

But national governments may end up throwing vast amounts of money down the drain if they fail to learn lessons from previous mega-projects. The Channel tunnel, for example, cost double the budget and it wasn't until 20 years after the construction started in 1987 that it started to return a profit (*see panel, next page*). The cost of building Denver's

international airport was three times what had originally been budgeted, but Sydney's iconic opera house retains the world record for the worst overrun: it cost nearly 15 times more than the original estimate and was completed a decade late. In fact, nine out of ten projects routinely overrun – a proportion that has been largely constant for 70 years. Even

more worryingly, many of the planned mega-projects are based on IT, which has provided many of the worst examples of overspending.

Flyvbjerg believes that there are three main reasons why projects are undervalued or are given unrealistic schedules. The first is that the data on which assessments are based is inadequate or just plain wrong. The second is “optimism bias”, a phenomenon in which people become overconfident about what can be achieved with the resources available and talk up the benefits that the project will deliver.

The third reason is known as “strategic misrepresentation” – in other words, deception. “There are perverse incentives and rewards for making the project look good on paper in order to win the contract, so contractors deliberately provide clients with ambitious and unrealistic cost estimates and delivery timetables in order to win the work,” he explains.

There are a number of ways to improve this situation, according to Flyvbjerg. First, clients can penalise contractors financially for delays and overspending, while incentives can be introduced to reward those that actually deliver the planned benefits on time, on budget and to the agreed standard. He says that institutions proposing and approving large infrastructure projects should share financial responsibility for covering cost overruns and benefit shortfalls resulting from misrepresentation and bias in forecasting, which helps to align incentives.

The UK government has already wised up to this after a number of Whitehall departments were criticised for their ineffective management of large projects. The Department for Transport, for instance, has introduced a requirement for all large infrastructure projects seeking funds from it to have a minimum local contribution of ten per cent (25 per cent for light railways) of the gross cost. This is based on the belief that, “if an authority has a financial stake in a scheme, this provides a clear incentive to ensure that the right structures and resources are in place to bring it to fruition to time and budget”. The department has also started pulling the plug on planned projects that have inaccurate budget forecasts.

Furthermore, local authorities are liable to cover half of any increase in the cost of a project over the quantified estimate up to a designated approved scheme cost. For example, if a project is estimated to cost £100m but the department has agreed that it could go as high as £140m, the projected £40m overrun would be covered equally by the government and the local authority. But, if the

Abject projects: when infrastructure plans go bad



In 1987 **Eurotunnel**, the private company that operates the railway tunnel under the English Channel, went public to raise funds for the construction project.

The company told investors that the construction would be relatively straightforward and that ten per cent “would be a reasonable allowance for the possible impact of unforeseen circumstances on construction costs”. The actual cost turned out to be double the forecast cost.

From the company's 1987 flotation until cost overruns hit the project 18 months later, Eurotunnel's share price more than tripled. Then it fell by two-thirds and, when it became clear that the revenue projections were as biased as the cost forecasts, it fell by another two-thirds. In 1995 Eurotunnel stopped paying interest on its loans and began a decade-long, tumultuous process of financial restructuring, from which it did not recover until 2007.

In 2003 **Toll Collect** – a consortium of DaimlerChrysler, Deutsche Telekom and Cofiroute of France – was scheduled to start charging heavy lorries on behalf of Germany's federal government for using autobahns. A year later the project was falling apart. The developers had been too optimistic about the capabilities of the software that would run the system. The government was losing toll revenues of €156m (£140m) a month to implementation delays.

By the time all the technical problems were fixed, the total lost from the public purse was estimated at €6.5bn. As a result, all new road projects and related public works were put on hold, threatening 70,000 construction jobs. A lengthy dispute between the government and the consortium ensued.

In a report published on March 12 this year, the UK government's spending watchdog, the National Audit Office (NAO), revealed that the **National Offender Management Service's** plan to build a single IT system covering the prison and probation services had failed to deliver value for money.

The NAO found the project had been hampered by poor management leading to a three-year delay, a doubling in project costs and reductions in benefits. In fact, the main goal of the original project – a single shared database of offenders – will not be met. The project to provide an IT system to support a new way of working with offenders was to be introduced by January 2008 and had an approved lifetime cost of £234m to 2020. By July 2007, £155m had been spent on the project, it was two years behind schedule and estimated lifetime project costs had risen to £690m – nearly triple the original estimate. The NAO commented that the scheme had “suffered from four of the eight common causes of project failure in full, and three in part”.

scheme were to end up costing £180m, the department's share of the overspend would still be capped at £20m, leaving the local authority to cover the remaining £60m.

Flyvbjerg says that there are also established methods for improving project cost estimates. For example, organisations can make wider use of reference-class forecasting (RCF) to aid due diligence. RCF is a benchmarking tool that seeks to make comparisons between the project in question and those of a similar type. The client can use it to obtain a more accurate estimate of the probable budget, schedule and benefits.

RCF was first used – successfully – on the construction of Edinburgh's tram system in 2004. Cost estimates and delivery times were studied in 46 comparable rail projects. By examining their outcomes, planners gained a clearer indication of the potential problems they might face and formed a more realistic idea of the eventual investment required. As a consequence, the original cost estimate was increased by more than a third and the project was completed within that revised budget.

RCF has become mandatory in some UK government programmes, such as Treasury projects costing over £40m and Department for Transport projects worth more than £5m. The system has also been adopted in Denmark, the Netherlands, Switzerland and South Africa, but it's not yet in widespread operation. Its use is mainly restricted to relatively low-cost programmes (although it has been applied to London's £16bn Crossrail scheme), so we can still expect a slew of mega-project failures.

Edward Moore, chief executive of Resolex, a consultancy that specialises in solving project disputes, says that the blame for such failures rests squarely with management teams and their inability to plan effectively or define what “success” actually means. “Projects often fail because the people backing them do not understand what they are supposed to achieve and how they are supposed to achieve it,” he argues.

Keith Braithwaite, head of technology at consulting firm Zühlke Engineering's Centre for Agile Practice, agrees that the main cause of project failure is poor or misunderstood requirements at the outset. He says that, in his experience of managing IT projects, “it is not so much that programmers do a bad job of writing the code – although that does happen – but that they write the wrong thing”.

Braithwaite continues: “One response to this syndrome is to try to nail down requirements before designing a solution to address them. On very small projects this can almost be made to work, but on large projects spending a long time on doing this has the unintended consequence of increasing the probability that the wrong thing will be built. While all the requirements are being gathered and analysed, the world is moving on. With very large projects this can result in a system that at best addresses the needs of an organisation from several years in the past.”

Such examples abound in long-term public-sector IT projects. They tend to result either from the rapid obsolescence of the original technology over the lifetime of the programme or from the client's desire to update other systems and equipment as an extension of the project. Moving the goalposts is rarely a cheap option.

“Major transformation projects can take years to complete and it is common for them to deviate substantially from what was originally agreed,” says Ian Lamplough, director of project assurance at PricewaterhouseCoopers. “Senior management teams and project managers must keep on top of these changes in scope and factor them into the schedule. They also need to ask constantly whether such changes are necessary, affordable and will deliver the originally planned benefits – or improved ones – by the end.”

Another main cause of failure is a lack of management involvement from the client. While eager to negotiate with contractors before the deal is signed, clients tend to absent themselves from the actual implementation. Alistair Maughan, partner at international law firm Morrison & Foerster, says that clients’ senior management teams often focus more on ensuring that the terms of the contract with the third party are made watertight, rather than examining what the project is designed to achieve.

“There is a tendency for executives to spend more of their time on hammering out the legal details than on planning what the venture is actually supposed to deliver,” Maughan says. “As a result, the plan can be fatally flawed from the outset, but the terms and conditions of what the contractor is supposed to be doing – even if they’re wrong – are just about written in stone. This means that the senior team could be handing some poor project manager, who wasn’t even party to the negotiations, some total turkey that he’s responsible for delivering and could easily take the blame for if (or when) it goes wrong. The governance of such projects, both in the initiation and in the delivery, is often poor and it’s a key area where they often fail.”

Inadequate initial planning and diminishing senior management involvement tend to make project managers less inclined to highlight problems as the work progresses. “They simply tend to get on with the job and do not challenge the assumption that the project is capable of delivering the desired benefits or actually necessary,” says Pip Peel, founder and chairman of PIPC, a project management consultancy. “Most project managers are of the mind that if the contract has been agreed, then that’s it. They keep their heads down and carry on regardless.”

Peter Lunio, associate director in the management consulting practice at accounting firm Baker Tilly, stresses that it’s essential for senior managers to sponsor the project throughout its lifetime and not only at the start. “Risk and responsibility ultimately rests with the



board. As with any other business process, executive management is in charge of what activities are performed and what impact they have on the business,” he argues. “Managing projects is no different.”

The future of project management on large projects could be grim if existing practices are not improved – and fast. As Flyvbjerg points out: “If better management accounting is not put in place and RCF not used more widely in mega-projects, these stimulus packages will be throwing good money after bad.”

Neil Hodge is a writer specialising in business and regulation.

Further reading

“Changes to the policy on funding major projects: consultation document”, Department for Transport (DfT), 2006: www.snipurl.com/hsbtp.

“The estimation and treatment of scheme costs”, DfT, 2006: www.snipurl.com/hsbx.

“Procedures for dealing with optimism bias in transport planning: guidance document”, DfT, 2004: www.snipurl.com/hsbz5.