



## Megaprojects and Risk

An Anatomy of Ambition

by Bent Flyvbjerg, Nils Bruzelius and Werner Rothengatter  
Cambridge University Press © 2003  
218 pages

### Focus

Leadership & Mgt.  
Strategy  
Sales & Marketing  
▶ **Corporate Finance**  
Human Resources  
Technology & Production  
Small Business  
Economics & Politics  
Industries & Regions  
Career Development  
Personal Finance  
Concepts & Trends

### Take-Aways

- Huge civil engineering projects are rapidly growing in number worldwide.
- However, evidence is mounting that these “megaprojects” have been poorly managed and are under-utilized by the public.
- Today, infrastructure has become the essential element of all economic activity.
- Megaprojects are so large, their outcome can affect a nation’s entire economy.
- Huge cost overruns and overly optimistic projections of public use are commonplace.
- Scandinavians describe the lack of transparency in megaproject decision-making as a “Democracy deficit.”
- The solution is accountability. Institutions must hold each other accountable for properly factoring in the risk that each megaproject entails.
- Usually, one set of experts’ version of the “truth” can be deconstructed, revised, and repositioned by another set of experts.
- If one-third of the cost of the project is paid for by private money, a more realistic risk assessment and management process is likely to result.
- Government must not let special interest groups capture the public policy process.

### Rating (10 is best)

Overall	Applicability	Innovation	Style
<b>9</b>	<b>8</b>	<b>10</b>	<b>8</b>

## Relevance

### What You Will Learn

In this Abstract, you will learn: 1) What megaprojects are; 2) What risks they entail due to incorrect forecasts of costs and use; 3) How to counter those risks; and 4) How megaprojects affect the economy and public policy.

### Recommendation

Every once in a while a little book comes along that, while small in size, carries sufficient intellectual weight to strike the body politic between the eyes, thereby getting its collective attention. This may be one such book. It offers a realistic look at megaprojects — those major infrastructure endeavors that span vast bodies of water, dam natural resources to generate energy and extend rail lines to previously unreachable regions — and compares the promises of these projects to what they actually deliver. The report card isn't very good. Cost overruns are typically 25% to 100%, and sometimes 200% or more. Worse yet, studies show that the public tends to use megaprojects — be they airports or subway systems — only a fraction of the amount predicted. *getAbstract.com* strongly recommends this book to politicians, legislators and anyone who wants to know the truth behind these huge infrastructure projects, as well as to CEOs, CFOs, project managers and risk officers in the private sector — this applies to your projects, even if there is a difference of scale.

## Abstract

### Big, Bigger, Biggest

Welcome to megaprojects — the civil engineering equivalents of the Great Pyramids, vast and complex engineering tasks. Completing them requires marshalling the resources of an entire region or nation over a period of many years or even decades.

Think of Boston's "Big Dig," Hong Kong's Chek Lap Kok airport, China's Quinling tunnel, Japan's Akashi Kaikyo bridge or Australia's Sydney harbor tunnel. Huge scale engineering projects have become so commonplace in today's rapidly developing world that "mega" seems almost the norm. Other examples include: Malaysia's North-South Expressway, Thailand's Second Stage Expressway, Denver's new airport, Canada's Confederation Bridge, the Sao Paulo-Buenos Aires Superhighway, Three Gorges Dam in China, Russia's natural gas pipelines, the Pergau Dam in Malaysia, the "Chunnel" tunnel linking England and France, the Oresund bridge between Denmark and Sweden, the Vasco da Gama bridge in Portugal and the German MAGLEV between Berlin and Hamburg. More proposals are in the works, including a \$50 billion project linking the U.S. and Russia across the Bering Strait, a European high-speed rail network, a fixed link across the Baltic Sea between Germany and Denmark, and others.

Often, megaprojects reflect the human desire to be freed from the constraints of space, and to be able to transit efficiently from point A to point B. Some thinkers call this the "end of geography" or the "death of distance." Microsoft founder Bill Gates sees the change as a novel step in the evolution of capitalism, a stage he calls "frictionless capitalism."

If this is the era of frictionless capitalism, infrastructure is the name of the game. Not long ago, infrastructure simply meant the basic systems and structures necessary for

"The past decade has seen a sharp increase in the magnitude and frequency of major infrastructure projects, supported by a mixture of national and supranational government, private capital and development banks."

“At the same time as many more and much larger infrastructure projects are being proposed and built around the world, it is becoming clear that many such projects have strikingly poor performance records in terms of economy, environment, and public support.”

“Megaprojects are central to the new politics of distance because infrastructure is increasingly being built as megaprojects.”

“Megaprojects often come draped in a politics of mistrust.”

conducting routine business. For example, people needed the highway infrastructure to travel, or the electrical power infrastructure to use lights or refrigerators. Today, infrastructure is increasingly sexy. It’s essential for effective, productive activity — the underlying technological, physical and economic basis that makes high-level economic activity possible. Infrastructure is king, the very core of economic activity. One obvious example is the Internet. Without its infrastructure of servers, routers, hubs, networks and broadband links, a substantial amount of international business would simply grind to a lurching halt.

Infrastructure is the entire system by which people, goods, information and money move with unprecedented ease and speed. Society is overcoming the friction of distance with improved transportation, telecommunications and energy infrastructure — in short, through megaprojects. These giant undertakings are central to the new politics of distance, the frictionless society and the emerging world economic order. It is no wonder that the pace of megaproject building is rapidly accelerating worldwide.

### The Performance Paradox

Paradoxically, however, even as additional, larger infrastructure projects are being proposed globally, it is becoming clearer that many completed megaprojects have strikingly poor performance. Very large cost overruns are commonplace. Public utilization is often below projected levels. Environmental costs are high. Examples of poor performance abound:

- Channel tunnel — The Chunnel cost 4.7 billion pounds to build in 1994. Several companies nearly went bankrupt due to 80% construction overruns. Financing costs were 140% higher than forecast, but revenues were less than half of those projected.
- Denver International Airport — The airport cost \$5 billion with 200% cost overruns, yet traffic in 1995, the year it opened, was only half of projected use.
- Chek Lap Kok — Hong Kong’s new \$20 billion airport opened in 1998, with overruns and start-up problems that cost the general economy some \$600 million.

### Cost Overruns

Is there a better way to manage megaprojects? One improvement would be to start with accountability, which requires acknowledgement of the substantial risk of cost overruns. This risk cannot be completely eliminated, but it can be managed and moderated if the parties are willing to face the risk in the first place. Typically, the difference between estimated and actual cost ranges from 50% to 100%, overruns which result primarily from lack of realism in initial estimates. Delays are underestimated, project length is misjudged and design changes aren’t taken into account. Contingencies, safety costs and environmental charges are set too low. Megaprojects often require a degree of uncertain and risky technological innovation.

Researchers at Denmark’s Aalborg University sampled 258 projects valued at \$90 billion, including bridges, highways and trains in 20 countries on five continents. In that sample:

- Nine out of 10 transportation infrastructure projects had cost overruns.
- Rail projects typically came in an average of 45% above estimated costs, with an average of 39% variance in overall projection errors.
- Cost underestimation happened everywhere. It is a global phenomenon.
- The cost overruns were about 28% above estimates for all projects combined.
- Habitual cost underestimation did not improve over a 70-year span.

“Decision makers are well advised to take with a grain of salt any traffic forecast that does not explicitly take into account the risk of being very wrong.”

“The World Bank has called for not only more accuracy in estimates of viability, but also more honesty.”

“Cost overruns of 50% to 100% in real terms are common, and overruns above 100% are not uncommon.”

“The key problem is lack of accountability, not lack of technical skills or data.”

Spectacular overruns include the Suez Canal (1,900%), the Sydney Opera House (1,400%), the Concorde airplane (1,100%), the Panama Canal (200%) and the Brooklyn Bridge (100%). Clearly, the cost estimates used in public debates about megaprojects are, typically, very deceptive. Costs are historically misrepresented and, yet, projects go forward.

Moreover, usage estimates are equally untrustworthy, especially for rail traffic, primarily due to poor methods and bad data. View all traffic estimates skeptically, especially if they do not account for the possibility of being wrong. Projections of usage errors — all these are minus percentages — include: Calcutta Metro (-5%), Miami MetroRail (-15%), Paris Nord TGV line (-25%), the U.K.’s Tyne and Wear Metro (-50%) and the Mexico City Metro (-50%).

With a few exceptions, the history of megaprojects suggests that they are likely to be under used and over budget. Perhaps an element of delusion is necessary prior to the undertaking of a megaproject, but delusion problematically leads to taking on projects that should have never been pursued, or to selecting one project instead of another, perhaps more realistic, more beneficial alternative. The problem isn’t a lack of valid projects. The problem is that distorted projections create uncertainty over which projects are economically rational. Thus, projects are pursued that should have been left on the drawing boards. Environmental impact statements are equally questionable. However, unlike the process used with cost estimates, auditors rarely go back after the project to assess the accuracy of environmental impact statements or of positive local economic impact projections.

In fact, megaproject advocates often defend them based on presumed, positive, local economic impact. Such projections may be unfounded. While a large rail project, for instance, may help the local economy, today transportation adds only marginally to the price of most goods. Given the risks, regional economic growth should not be a primary, decisive consideration when you are voting pro or con on a megaproject.

### Dealing with Risk

The risks involved in megaprojects cannot be eliminated. However, these projects can be better managed through careful assessment and analysis. Any government weighing a megaproject should conduct a feasibility study based on MLD (Most Likely Development) analysis, and should prepare a risk management plan that honestly considers both break-even and worst-case scenarios. This analysis should acknowledge that government involvement and loan guarantees do not eliminate risk; they merely transfer it from lenders to taxpayers.

Proper policies for dealing with proposed megaprojects really have not been developed yet. Most government analysis systems lack checks and balances, proper institutional frameworks, sufficient public involvement and compelling public-interest objectives.

### The Four Instruments of Accountability

The four factors that should be used to control megaprojects are:

1. Transparency — All documents and information should be available for public scrutiny, which is the best way to ensure accountability in the public sector. Government should identify stakeholder groups and invite their participation via such mechanisms as scientific conferences and public hearings.
2. Specified performance — Project appraisals and the evaluation of technical alternatives should happen after project requirements are delineated, not before. Goals

“There is little evidence that efficiency and democracy are trade-offs for megaproject decision making. Quite the opposite.”

“Public-private collaboration is crucial, even for private-sector projects.”

should drive appraisals. Unfortunately, goals are often set at a time when technical issues remain unresolved.

3. Creation of a regulatory system — Ideally, government should establish the rules of a megaproject’s economic and legal process from the beginning. Regulations should force government to consider and report all potential risks and costs.
4. Risk capital — The decision to proceed with a megaproject should be linked to the willingness of private financiers to expose their capital to risk without government guarantees for at least one-third of the cost of the total project. This generally results in a more realistic assessment of true risk and more effective steps to minimize risk.

### Cures for the Megaproject Paradox

Improving the process begins with giving risk assessment a more central decision-making role. Institutions should provide the necessary checks and balances to ensure proper accountability for the financial, economic, safety and environmental risks associated with any major project. These risks cannot be eliminated, but they can be properly managed. To this end, laws should be passed requiring analysis and risk management in megaproject decision-making, using MLD analysis as well as break-even and worst-case scenarios.

Also, the public versus private responsibilities in megaproject development should be rearranged. Conventionally, the government plays many different roles, some of which conflict. Can a government promote a megaproject while acting as a guardian of the public interest to evaluate its risk? If not, then accountability will suffer. The answer is to shift risk from the public to the private sector.

The argument that there isn’t enough private capital to sustain large projects simply doesn’t hold true. If the venture doesn’t attract capital, there may be a problem with the proposal. Instead of promoting megaprojects, governments should focus on auditing public-interest objectives. Planning and completing a megaproject requires a public-private partnership based on the principles of accountability.

Some see megaprojects as a step toward the “frictionless society” where goods and people move with exponentially greater ease. Yet, risk negligence has created chronic cost overruns and underutilization. To correct this, risk assessment and accountability must be imbedded in the decision-making process. The countries where this is starting to happen may lead the way as the international need for better, more realistic megaproject planning is recognized.

## About The Authors

Bent Flyvbjerg is the author of *Making Social Science Matter* and *Rationality and Power*. He is a professor in the department of development and planning at Aalborg University. Nils Bruzelius is an independent consultant who specializes in transport and planning. He is an associate professor at Stockholm University. Werner Rothengatter is the chief of the Institute of Economic Policy Research and of the unit on transport and communication at the University of Karlsruhe, Germany.

## Buzz-Words

Frictionless capitalism / Megaproject / Megaproject paradox / Most likely development (MLD)