

Large Infrastructure Projects in Germany – Between Ambition and Realities

Fact sheet 1

Summary Part One: Cross-sectoral Analysis

This study, under the leadership of **Genia Kostka**, Professor of Governance of Energy and Infrastructure, analyses the scale, patterns and causes of cost overruns in 170 large public infrastructure projects in Germany. Of those, 119 were finished between 1960 and 2014 and 51 are currently still under construction. Projects from the building, transportation, defence, energy and ICT sectors are analysed based on systematically planned versus real budgets. Three detailed case studies on the Berlin Airport BER, the Elb Philharmonic and Offshore Wind Parks round out the investigation.

The study was made possible by the friendly support of the Karl Schlecht Foundation.

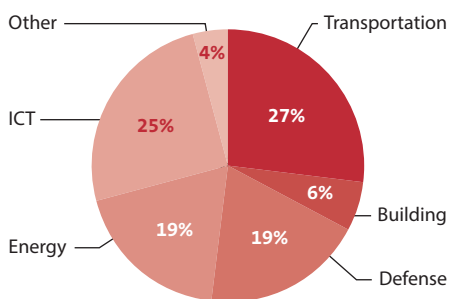


Figure 1: Sector share of additional cost (€59 billion)

Main Findings

We analysed cost overruns for 170 large infrastructure projects in Germany

- » For finished projects (n=119), the average cost overrun per project is 73%
- » Even unfinished projects (n=51) have an average cost overrun of 41% and costs here can be expected to increase

In total, the 170 large infrastructure projects under analysis cost a total of approximately €200 billion, including cost overruns of €59 billion

Projects have varying cost overruns across sectors; the highest average cost overruns per project occurred in the ICT and energy sectors (394% and 136%), followed by defense (87%), building (44%) and transportation (33%)

“Pioneer risks” partly explain variation in cost overruns across sectors:

- » Some sectors such as energy (e.g. offshore wind, nuclear) and ICT (e.g. nation-wide IT projects) involve higher-risk projects characterized by high uncertainty
- » Untested technologies and unforeseen technological obstacles can hinder budgeted and punctual delivery in these pioneering projects
- » Governance issues arise due to lack of previous best practice experiences in governance models. One common result is ambiguity in the division of responsibilities and accountability for project outcomes
- » In addition, lack of bureaucratic implementation capacity further hampered project deliveries

We recommend the adoption of sector-based benchmarking during the public planning process.

Introduction

This study analyses the scale, patterns and causes of cost overruns in large public infrastructure projects in Germany. The results are based on a database of 170 large public infrastructure projects. Of those, 119 were finished between 1960 and 2014 and 51 are currently still under construction.¹

¹ The study included projects if they relate to infrastructure, were carried out in Germany, and public or in the public interest. We categorized projects as “small” if planned costs were less than €50 million, “medium” if more than €50 million and less than €500 million and “large” if more than €500 million. Projects were distinguished between the following contract forms: public procurement, public-private partnerships or semi-private.

Large Infrastructure Projects in Germany – Between Ambition and Realities | Fact sheet 1

Cross-sector Average Cost Overruns per Project

Our database contains 170 large infrastructure projects which were planned for €141 billion, but cost almost €200 billion (real prices). That is a total additional cost of **€59 billion**. In total, we observed a **73% average cost overrun** for finished projects across all sectors and 41% for unfinished projects (a number where further increases should be expected). The average cost overruns for finished projects varied significantly across sectors, ranging from 33% in the transport sector to 394% in the ICT sector. Figure 2 summarizes the cross-sector average costs.

Across sectors, we found differences in terms of cost overruns across subsectors, project risks, and project size:

Sector	Description
Transport (n=51*)	In road (n=24), cost overruns average 27%, varying between -23% and 125% In rail (n=12), cost overruns average 30%, varying between -10% and 59% In airports (n=6), cost overrun average 56%, varying between -3% and 148%
Building (n=87*)	Cost overruns vary between -46% and 425% Building projects comparatively small, with average size €176 million
Defense (n=8*)	Cost overruns vary between -4% and 135% Defense project comparatively large, with highest average size of €8.1 billion
Energy (n=10*)	Cost overruns vary between 19% and 494% Nuclear energy projects particularly risky, with average cost overruns 164%
ICT (n=10*)	Cost overruns vary between -7% and 1150% ICT projects often rely on high risk of pioneer technology; 4 out of 10 projects had cost overruns over 200%

* finished and unfinished. Not mentioned: 4 in category "other".

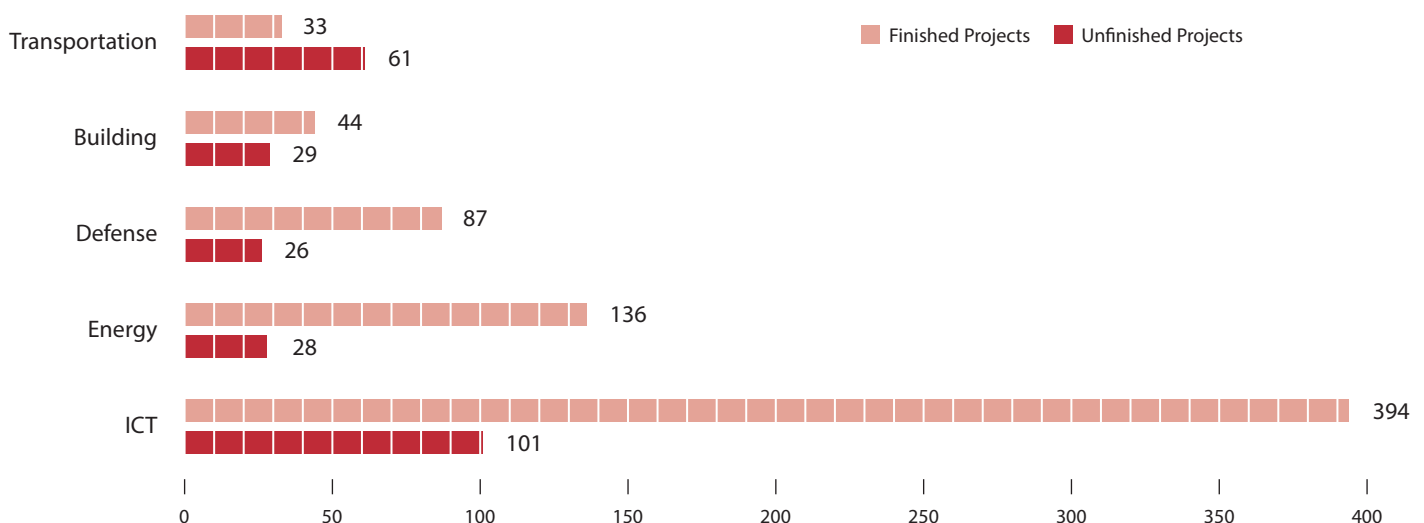


Figure 2: Cross-Sector Average Cost Overruns Per Project (in %)

Large Infrastructure Projects in Germany – Between Ambition and Realities | Fact sheet 1

Explanations

A combination of technological, economic, political and psychological factors explain project-specific cost overruns, confirming findings in the previous literature. **Technological** factors include interface complexity, unanticipated changes in project technology and unknown magnitudes of risk at project start. **Economic** factors include hidden action and perverse incentives for companies. **Political** factors include strategic deception, inexperienced planners and unfit governance setups. **Psychological** factors include “optimism bias,” systematic underestimation of risks and overestimation of benefits.

The study finds that in Germany public planners in sectors with particular high cost increases are prone to take “**pioneer risks**”:

(1) Pioneer risks and technological challenges: the German state often chooses and carries out high-impact, high-risk projects. Examples are nuclear energy, offshore wind, and nationwide IT projects (e.g. taxation system, health card, toll system). Here project planners and implementers face many unforeseen technical obstacles, including the use of untested technologies and first-time implementation.

(2) Pioneer risks and governance challenges: with the lack of best practice experience, the governance set-ups are often suboptimal, with unclear contracts, allocated responsibilities, risks and incentives.

Key Recommendation: Sector-based Benchmarking

Our key recommendation for the governance of large-scale projects is “sector-based benchmarking,” i.e. comparison of public planning in infrastructure based on performance criteria. To do so the German government should follow three steps:

- » Introduce a publicly available database about large-scale infrastructure projects, following the example of the UK “Major Project Authority”
- » Use reference class forecasting (RCF) in public planning, entailing sector-based reference classes to calculate a “risk uplift” that safeguards projects against cost overruns
- » Use specifically designed micro-level risk insurance contracts for effective cost control and risk allocation to incentivize public planners to stay on budget

Authors

Genia Kostka is Professor of Governance of Energy and Infrastructure at the Hertie School of Governance, endowed Chair by the Karl Schlecht Foundation. Her research interests are in energy governance, public policy and political economy, with a regional focus on China. In addition to her research and teaching, she regularly consults for international organizations, such as the Asian Development Bank, AusAID, GIZ, Oxfam and the World Bank.

Niklas Anzinger is Research Assistant and Master of Public Policy Candidate at the Hertie School of Governance.

Further Information

The detailed working paper and case studies are available for download at www.hertie-school.org/infrastructure. A book publication is forthcoming.

Media requests can be directed to **Regine Kreitz**, Head of Communications, Tel: 030 / 259 219 113, Email: pressoffice@hertie-school.org.

The **Hertie School of Governance** is a private university based in Berlin, accredited by the State and the German Science Council. Interdisciplinary and practice-oriented teaching, first-class research and an extensive international network set the Hertie School apart and position it as an ambassador of good governance, characterised by public debate and engagement. The School was founded at the end of 2003 as a project of the Hertie Foundation, which remains its major partner. www.hertie-school.org