



# **Costing of Infrastructure Projects**

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Eduardo Aldunate Riedemann  
FAD STX-Expert

# Historically large infrastructure projects had significant cost overruns

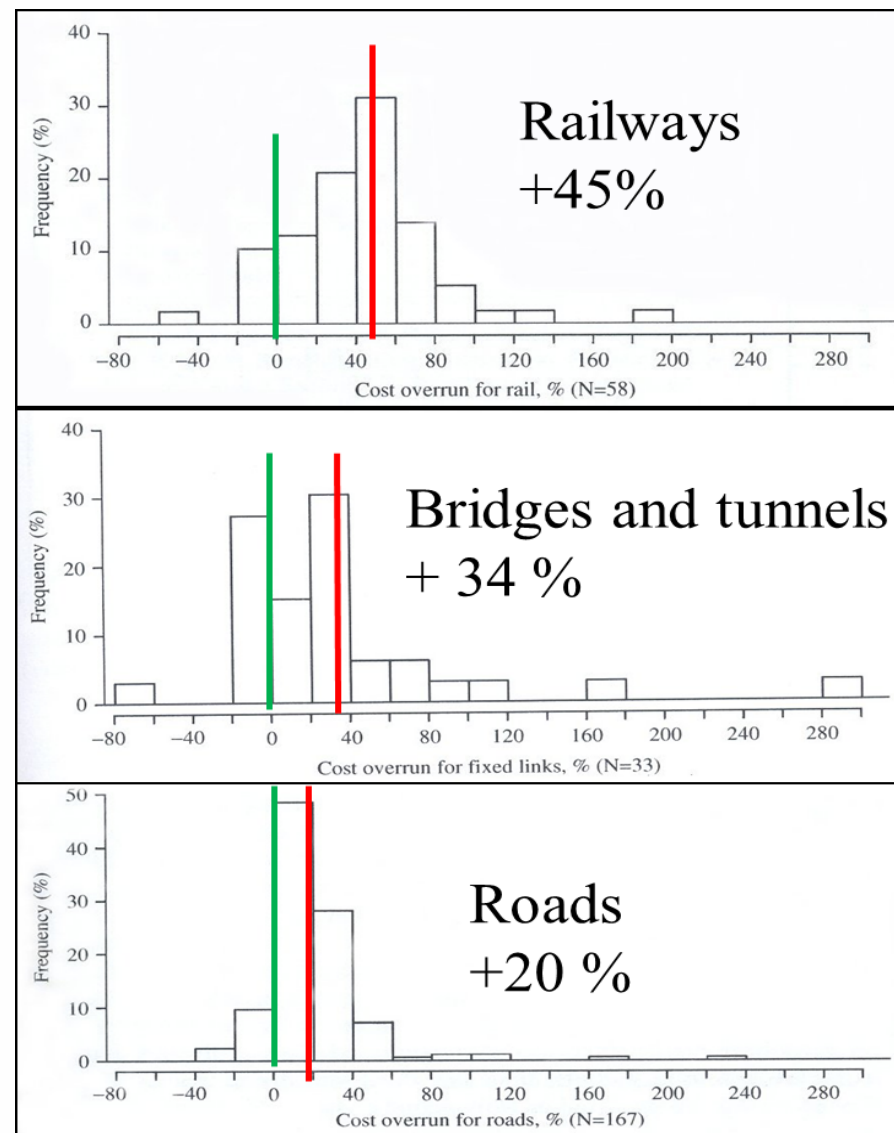
<b>Project</b>	<b>Approximate final cost US million</b>	<b>Percentage cost overrun</b>
Suez Channel (1859-1869)	8.500	1900 %
Sydney Opera House (1959 -1973)	102	1400 %
Panamá Channel (1881-1914)	375 (only to USA)	200 %
Brooklyn Bridge (1870-1883)	15.5	100 %

Source: Staff based on internet data

# Cost overruns in transportation projects are frequent

- In 9 out of 10 transport projects, costs were underestimated (sample of 258).
- This phenomenon was observed in 20 countries on 5 continents.
- The difference is greater in developing countries (in railways).
- Estimation errors have not reduced over the years.
- There is no technical justification.
- It seems to be due to a strategy.

Source: Megaprojects and Risk (2003), Bent Flyvbjerg, Werner Rothengatter based on "Economic Appraisal of Large-Scale Transport Infrastructure Investments" by Mette K. Skamris.



# Causes of cost overruns in infrastructure projects

- Frequent design change due to lack of clearly defined project objectives and scope.
- Contractors financial difficulties that affect project progression.
- Payment delay for completed work (more often in government funded projects)
- Lack of contractor experience causing rework and delays.
- Poor cost estimates due to unreliable data, lack of a national database for prices, lack of experience of estimators and optimistic bias.
- Poor tendering documentation
- Poor material management resulting in late delivery or higher prices

Based on a critical review of 17 studies concerning cost overrun in construction projects. Results of studies based on analysis of 489 projects and 1674 questionnaires/interviews in 16 countries and one worldwide.

Source: Construction Projects Cost Overrun: What Does the Literature Tell Us? by Abdulelah Aljohani, Dominic Ahiaga-Dagbui, and David Moore. International Journal of Innovation, Management and Technology, Vol. 8, No. 2, April 2017.

# Causes of cost overruns in infrastructure projects

Level of detail of pre-investment studies	Actual vs. forecasted cost of project	Actual completion time vs. planned
High	- 4 %	- 13 %
Medium	- 2 %	+ 8 %
Low	+ 16 %	+ 26 %

Source: Construction Industry Institute

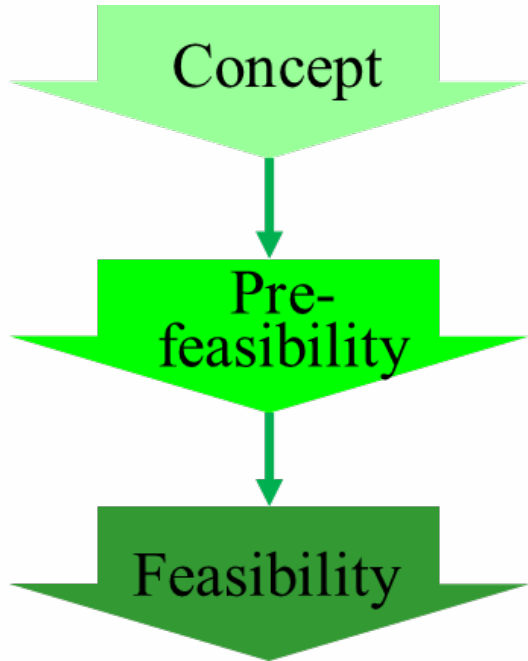
- Poor initial studies
- Optimistic bias
- Strategy

- **Proper planning of infrastructure projects is key!!!**

39 %

20 %

# Usual costing method by project stage



## ▪ Project concept

- ▶ Quantities based on previous experience (similar projects)
- ▶ Costing based on secondary sources

## ▪ Pre-feasibility studies

- ▶ Quantities based on preliminary architectural or engineering design
- ▶ Cost estimates based on market prices

## ▪ Feasibility

- ▶ Quantities based on architectural and engineering designs
- ▶ Cost estimates based on quotes and market prices

# Main challenge for precise estimation: **Uncertainty**



Factors that contribute to uncertainty include:

- **Experience with similar projects:** The less experience, the greater the uncertainty.
- **Length of planning horizon:** The longer the planning horizon, the greater the uncertainty.
- **Project duration:** Like planning horizon, if a project has a shorter duration it is more likely to account more precisely for all costs.
- **Required personnel:** A higher quantity of personnel and higher skill levels will increase the uncertainty of cost estimates.
- **Infrastructure governance:** weak PIM processes and institutions increases uncertainty.

## Recommendations to reduce cost overruns

- Don't take shortcuts on front end planning (pre-investment studies). Complete all necessary studies/designs before tendering for construction.
- Develop and maintain an updated national costs database and provide training to cost estimators.
- Implement independent reviews to avoid optimistic bias.
- If rights of way are necessary, acquire all before tendering.
- Prepare complete and detailed tendering documentation to avoid disputes and judicialization.
- Select contractor with adequate experience and financial backing.
- Streamline payment procedures to avoid construction stoppages.
- Have an effective system for project monitoring and management to detect deviations and adopt timely corrective measures.
- Do ex-post evaluations to learn from actual cost overruns and avoid them in future projects.