

Why and How to Reduce Construction Costs

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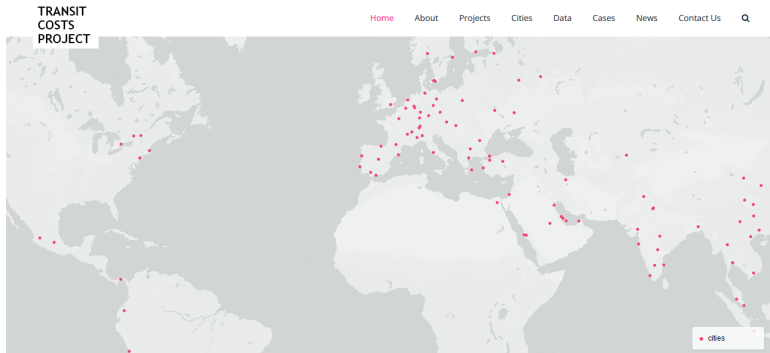
Cost Differences

Why Costs Matter

How to Cut Costs

Introduction

Construction costs for subways vary greatly between countries.



Our first case study is out! Check out "[The Boston Case: The Story of the Green Line Extension.](#)"

Source: <http://transitcosts.com>

Costs in Different Countries

Lesson #1 from our database: costs are primarily national (sometimes city-specific), so subways in the same city cost about the same, and usually also in the same country.

Low costs: around \$100-200m/km, e.g. Southern Europe, Scandinavia, Turkey, South Korea.

Normal costs: around \$200-350m/km, e.g. China, France, Germany.

High costs: around \$400-1,000m/km, typical of the Anglosphere.

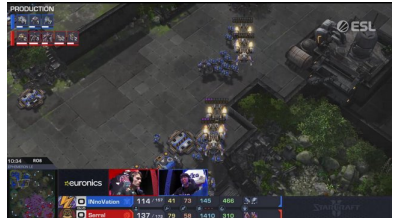
Very high costs: \$1b+/km, just New York plus the occasional HK/SG disaster.

Developed Countries



Similar countries in many ways, but construction costs are different!

South Korea



Seoul Subway

Line	Section	Length (km)	Time frame	Total cost (KRW)	Stations
Total		339.3		18,926,300,000,000	315
Line 1	Seoul-Cheongnyangni	7.8	1971-1974	33,000,000,000	10
Line 2	Phase 1 City hall-City hall (circle) Sinseoul-dong-Seongsu	54.2	1978-1984	877,100,000,000	47
	Phase 2 Sindorim-Kkachisan	6	1986-1996	155,000,000,000	3
Line 3	Jichuk-Ogeum	38.2	1980-2010	1,381,900,000,000	34
Line 4	Danggogae-Namtaeyeong	31.7	1980-1994	831,500,000,000	26
Line 5	Banghwa-Macheon	52.3	1990-1996	3,021,500,000,000	51
Line 6	Bonghwasan-Eungam	35.1	1994-2001	2,549,600,000,000	38
Line 7	Jangam-Bupyeong-gu off.	57.1	1990-2012	3,967,600,000,000	51
Line 8	Amsa-Moran	17.7	1990-1999	850,200,000,000	17
Line 9	Phase 1 Gimpo-Sinnonhyeon	25.5	2001-2009	3,468,400,000,000	25
	Phase 2 Sinnonhyeon-Sports Complex	4.5	2009-2015	482,800,000,000	5
	Phase 3 Sports Complex-VHS	9.2	2010-2018	1,307,700,000,000	8

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In inflation-adjusted PPP dollars, this is around \$150m/km and has been from the start.

Taiwan



Taipei MRT

[As of 2012], Metro Taipei has 114.6km of track serving 101 stations, and carries 1.66 million passengers per day. Total construction cost to date is \$NT 621bn, and \$NT 292bn is budgeted for the 52.1km of new line currently under construction.

Source: https://www.railjournal.com/in_depth/taiwan-transit-in-transition/

In inflation-adjusted PPP dollars, both intervals are \$400m/km, and the system isn't even fully underground. These high costs are persisting.

Why Costs Matter

Taiwan and South Korea have similar economic histories. Seoul built its subway earlier, but it's bigger; both countries opened high-speed rail around the same time, both want to expand transit. But Seoul can afford to build more:

	Taipei	Seoul
Core pop	2,700,000	9,700,000
Metro pop	9,000,000	26,000,000
Core metro length	153 km	353 km
Core ridership	790,000,000	1,910,000,000
Total ridership	815,000,000	3,457,000,000

The big difference is in regional rail, but Seoul can afford to build more of it (Shin-Bundang, etc.) than Taipei (Taoyuan MRT, etc.).

Why Do Costs not Differ?

Within Taiwan, the standard explanation is corruption by the KMT and DORTS; MRT construction was unpopular in the 1990s. But there's corruption in Korea, Italy, etc. too!

In general, local explanations are often only partly true:

- ▶ Boston GLX: the local explanation is station costs—they were important but, ex-overheads, only 20% of the project.
- ▶ New York: deferred maintenance (cf. Berlin), age of city (cf. anywhere in Europe), etc.
- ▶ US in general: ADA, fire safety, and other regulations that exist here too.

This is why we're looking at a number of different cities at once to see what's easy and what's hard.

Why Do Costs Differ?

These engineering factors seem the most important:

- ▶ Station costs: the biggest differences between cities are station costs, not boring (sorry Elon Musk, you're wrong). Good stations: cut-and-cover, built under wide streets or plazas, not too deep, no faregates.
- ▶ Labor: the US Northeast has very low blue- and white-collar construction productivity, esp. New York when the Sandhogs are involved.
- ▶ Speed: building faster tends to reduce costs.
- ▶ In regional rail, electronics before concrete: build the least concrete, based on a coordinated timetable. Zurich has (short) single-track sections on the S-Bahn even in the city.

Drawback: our qualitative research is Western (inc. Turkey, which builds like Southern Europe), not East Asian.

Meta: Why Do Costs Differ?

These sociopolitical issues seem the most important:

- ▶ Strong civil service, run by domain experts (i.e. not the UK).
- ▶ Flexibility in procurement - itemized rather than lump-sum contracts, etc.
- ▶ Weak citizen voice: groups that rely on lawsuits extort negative-sum extras (e.g. Toronto's noise walls for electric trains).
- ▶ Curiosity: Italy and Spain learn from Germany, and Korea from Japan, but not vice versa; the US is incurious, esp. NY.
- ▶ Clean government: Italian costs fell as a result of mani pulite.
- ▶ Pressure to reduce costs: the political layer in Switzerland demands cost limits, that in the US micromanages.

It is obligatory for transit advocates to demand cost-effectiveness to improve public transportation!