

Schedule and Cost “Overruns” on Mega Projects

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The topic of schedule and cost overruns on mega projects may be as “mega” as the projects themselves. This article explores certain characteristics of mega projects and provides relevant observations ultimately raising the question of whether schedule and cost overruns on mega projects are really unexpected.¹



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Mega Project Defined

For the purposes of this article, the term “mega project” refers to a project with a Total Installed Cost (TIC)² greater than one billion dollars, with other features such as:

- Duration spanning years, and in some cases more than a decade, from inception to completion.
- Numerous stakeholders working from multiple locations, including owner(s),

engineering companies, major equipment suppliers, contractors, subcontractors, vendors, consultants, etc.

- Highly complex and generally unique, with novel design requirements, challenging site and/or geotechnical conditions, and at times built in a remote location. Usually a “one-of-a-kind” project.

Overruns on Mega Projects

No matter the sector or the project delivery method, it is likely that on mega projects:

- Projects will cost more and take longer than estimated.
- The ability to greatly influence project outcomes at a low cost will diminish once the detailed design phase begins.³
- Changes will occur after construction starts, and any sizeable changes will be challenging, expensive, and time-consuming. The degree of disruption will depend on how these changes are managed.

Factors Leading to Overruns

Decisions made early on will determine the fate of a project, regardless of its size. When it comes to mega projects, bad decisions (or indecision) made early on will have far more detrimental impacts, as they can result in months or years of delay (versus days or weeks) and billions of dollars in cost overruns (versus millions).

While the construction phase of projects usually represents the largest percentage of the TIC, the seeds of many of the factors that ultimately result in schedule and cost overruns are sown well before construction starts. These include:

1) Underestimation of project duration and cost when projects are sanctioned, for reasons such as:

- Insufficient investment in studying options, understanding risks, and the front-end phase in general;
- Failure to adequately address the iterative nature of design in the overall project schedule;
- Strategic misrepresentation; and
- Optimism bias.

2) Inadequate professional resources, including:

- Owner and/or engineering teams lacking sufficient experience and expertise on the specific type of project; and
- Insufficient number of resources in the owner and/or engineering teams.

3) Poor management of design and procurement, including:

- Deferring key decisions;

- Continuing to make changes to the design after the front-end phase (see endnote 3);
- Owner interference during design, especially on projects where the contract allocates design responsibility (and risk) to another party; and
- Misalignment, inadequate interface management, and deficiencies in communication within a complex stakeholder landscape.

The above factors lead to a design that is not fully developed and risks that are not adequately dealt with, which ultimately result in changes that add significant time and cost to projects (i.e., so-called “overruns”).

Further, even though an abundance of information is publicly available regarding how critical the front-end and detailed design phases are to the success of projects and how schedule and cost overruns can be avoided, we continue to observe the following:

- Undervaluing of engineering and cost-cutting on the part of owners in the front-end and detailed design phases of projects. This occurs despite the fact that the cost of design (compared to the cost of construction) generally represents a smaller component of the TIC, while at the same time having the potential to positively influence project outcomes for a low cost.
- Transferring risks to parties who are not in the best position to manage them, including risks that are not sufficiently understood by the owner or the party assuming them (if not the owner).
- Choosing project delivery methods that do not promote transparency and collaboration, and instead create a low-trust, adversarial environment where

parties cannot/do not work together to solve problems or address the risks that materialize.

Projects failing to overcome any or all of the issues described so far in this article will not only likely experience schedule and cost overruns, but also disputes, which further exacerbate these overruns.

Estimates: The Measuring Sticks for Overruns

It can generally take months, if not years, to develop a proper estimate for a mega project. On most mega projects, a complete estimate is seldom developed.

Assessing how much more a project will cost, and how much longer it will take to complete, begins with the quality and completeness of the initial estimate.

It is true that a cost estimate is only an estimate, and mega projects are highly complex. That said, all too often we see estimates that knowingly omit (or underestimate) scopes of work and risks, include negotiated rates or factors that may not reflect project-specific conditions, and view allowances (and even contingencies) as “padding.”

As a result, the reality is that all too often, projects start with incomplete estimates, which are further negotiated downward to palatable, final “estimates” to allow projects to be sanctioned. These “estimates” are then carried forward as the expected costs upon which contracts are awarded and the success of projects is measured. However, the inadequacy of these so-called final “estimates” means that schedule and cost “overruns” are, in fact, inevitable – and not actual overruns.

As more stakeholders become involved and design is further developed, scope changes ensue, and schedule durations and project costs begin to increase. Add to this an

increased likelihood of facing unplanned/unpriced risks during the detailed design and construction phases, if risks are not studied or are ignored. In other words, when a project attempts to present a more palatable “estimate” by negotiating costs down, this becomes a negotiation against the project itself.

Unfortunately, based on the track record of mega projects, the question may not be “Will your project experience an overrun?” but rather “How large will the overrun be?” Perhaps an even more suitable question may be “If projects have spent adequate time studying options, advancing design, preparing schedules and estimates, and understanding risks in order to establish appropriate contingencies, why are overruns so pervasive on mega projects?”

Thoughts for Future Mega Projects

A considerable amount of information in the public domain confirms that the vast majority of mega projects experience schedule and cost overruns. These projects could serve as lessons-learned for future mega projects if parties are willing to reflect on the key causes of such overruns.

First and foremost, experience shows that while it is possible to transfer risks around a project, it is impossible to completely transfer risks off a project.

With this in mind, it is important that parties recognize that projects with large TICs, long durations, and complex/unique features come with project-specific risks that must be taken into consideration when developing designs, schedules, and estimates.

When incomplete estimates are used as the baseline for a project, costs that are not true overruns may be perceived as such, leading to an overstatement of the actual overrun.

Another point to consider relates to the

mindset of the parties. It seems that significant effort goes into drafting contracts where the individual parties protect themselves. But what about protecting the projects?

With respect to project delivery methods, collaborative contracting⁴ may be a potential solution to delivering projects more successfully. Among other things, these contracting models: (i) provide formal mechanisms to spend more time on the front-end phase of projects and understanding risks; and (ii) include more project stakeholders from the early project phase.

In reality, no matter the project delivery method, if more time and money are spent developing projects and bringing stakeholders together earlier to collaborate and execute toward a common goal and agreed scope, the so-called “overruns” on mega projects may be mitigated and these projects could be more closely delivered as sold.

Of course, setting up mega projects for success is only the beginning. These projects must then be executed by an experienced and engaged team operating with discipline and in the continued interest of a common goal and agreed scope.

In the end, no one solution can solve the problem of schedule and cost overruns on mega projects. Rather, a combination of solutions, including adequate design and planning, complete (and realistic) schedules and cost estimates, fair contracts, and early stakeholder collaboration, are needed. Changes and risks are bound to arise; however, to what degree, and how impactful they are, can be greatly reduced by implementing different solutions to mitigate overruns instead of continuing down the path of history repeating itself.



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- 1 “...91.5 percent of projects go over budget, over schedule, or both. And 99.5 of projects go over budget, over schedule, under benefits, or some combination of these.” Source: Bent Flyvbjerg and Dan Gardner. *How Big Things Get Done – The Surprising Factors Behind Every Successful Project, from Home Renovations to Space Exploration*, New York, Penguin Random House, 2023, p. 8.
 - 2 Total Installed Cost, or TIC, comprises costs such as land acquisition, environmental, regulatory, engineering, procurement, construction, commissioning, and owner’s costs, among many other costs up to the project completion.
 - 3 The terms “front-end phase” and “detailed design phase” are used throughout this article. Depending on the sector, the front-end phase of a project, which occurs before the detailed design phase, may be referred to as the Front-End Engineering and Design (FEED) phase, the basic design phase, the development phase, or by another similar term. The level of design completion at the end of the front-end phase varies by project. For the purposes of this article, the detailed design phase generally refers to the design completed after a project is sanctioned and up to design completion.
 - 4 Examples of collaborative contracts include Early Contractor Involvement (ECI), progressive design-build, Integrated Project Delivery (IPD), and alliancing.

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