White Paper 2012-15

What can Make Execution of Large, Complex Projects more Reliably Successful? Reading Notes from "Industrial Megaprojects" by Edward Merrow[1]

In the "Industrial Megaprojects" book[1], Edward Merrow, a long time researcher of large, complex projects and founder of the consultancy Independent Project Analysis Inc., provides key statistical data and insights about the failure rates of large infrastructure projects and what are the factors that would make them more successful. What can we learn from this data when it comes to the execution of these projects?

Two-third of megaprojects also do fail

Merrow draws from a wide database of projects covering a number of industries (mining, oil & gas, chemical facilities, power plants), all over the world. For a start, Merrow confirms that the general statistics of failure of projects can be transposed in the field of megaprojects (projects of a total capital cost in excess of 1 billion $): about two-third fail and don't deliver the economic returns that were envisaged. It can either happen through a large cost overrun (generally linked at the same time with a significant schedule overrun) or a poor operability and production level of the resulting facility.
Merrow notes that there is a statistical aberration of some sort: projects either succeed brilliantly or fail miserably; there are not so many projects that would show moderate failure. Such a distribution clearly shows that success or failure of projects is not a random event, but that there must be definite causes.

Quality front-end preparation is critical

The key message of the book is obviously that the main factor that determines the fate of projects is the quality of their preparation (Front-End Loading), in particular when it comes to:

- Assigning realistic objectives and feasible schedules;
- "shaping" the project environment to provide a much-needed stability during its execution.

The book is full of clear and useful advice as to what the Front-End Loading stages should be, what maturity of deliverables should be expected, etc.

In this paper we will suppose that the project enters execution phase. Notwithstanding the quality of the preparation that has been done, what advice can we draw from the book that would help increase the reliability of the project?

Speed kills: start with realistic expectations

The main piece of advice, demonstrated against live examples in the book, is that it is important to set realistic expectations from the project in terms of schedule. This means, to take into account the intrinsic limitations of manpower (and other constraints e.g. seasonal weather) that will necessarily constraint the delivery of the project, would it be in terms of engineering or in terms of construction crew. To do that, the initial project schedule should be resource-loaded to see where resource constraints will be at play and delay the execution. While the exercise of resource-loading, coupled with an appropriate schedule risk analysis, might lengthen significantly the baseline schedule, Merrow shows that it is statistically very beneficial to the success of the project.
Doing a reality-check analysis of the schedule at the beginning of execution will allow to check that resource constraints have been adequately considered, and will give the project team a feeling on the quality of the project preparation. Should the schedule or the execution plan be found unrealistic, it would be better to take the time to fix it before moving on. Take the time to do this reality check before agreeing to lead a large, complex project!

Clear project objectives are primordial

Merrow shows that clear business objectives strongly correlates with the project success. It allows project teams to be significantly more effective and aligned and is thus conducive to better decision-making and finally, project success. Taking the time to clarify as a team what are the detailed objectives of the project (ref. our White Paper 2012-13) is more than a good practice: it is essential to effective leadership and alignment of the team.

Strong, integrated Owner teams are key

Merrow demonstrates statistically that strong, integrated teams are key to the success of projects. By integrated, he means that it must group representatives of all relevant functions, including crucially the future operator of the facility. A message is that the facility Owner should not believe he can delegate part of his responsibility to a Contractor; the Owner needs to retain throughout the

project a strong integrated team allowing appropriate control of the works, sufficient technical supervision, and adequate coordination between the needs of the project execution and of the future operator. Adding clear objectives flowing down to clear roles & responsibilities is a beneficial factor.
Remote projects are shown to be particularly prone to project team integration issue as many functions do not want to move representatives to the project office, the actual project team is generally much smaller and less resourceful, and this contributes significantly to project failure.
As a note, discontinuity of project leadership during the project correlates very strongly with project failure; the direction of the causality link could be discussed at length.

The contracting strategy does not influence much the outcome

Merrow discusses in depth the contracting strategies. His benchmarks show that lump-sum contracting does not fare better or worse than reimbursable in terms of project success. Overall, the presence of a strong Owner team that has put the right level of controls in place early enough is a key success factor that dominates the effect of the contract type. Because lump-sum EPC contracts often give the false impression that risks have been pushed to the Contractor, Owners tend to be less focused on the follow up of the execution of the project. This is a mistake; in particular because the Contractor is generally not preoccupied by future operability issues: if the project encounters some problems, the Contractor will tend to cut corners on that aspect and the Owner will finally end up with a facility that will take ages to start up.
One contract type seems to be statistically much more successful though; it is what Merrow calls "mixed contracts". In that case, engineering and procurement are contracted with a first Contractor (generally on a reimbursable basis); and actual construction is contracted with a second Contractor (generally on a lump-sum basis). It might be that this type of contract works because it requires the level of controls and attention from the Owner that is often missing from the other contractual setups.

Remoteness and new technology make it more difficult

Both remoteness and the application of new technology correlate significantly with higher rates of failure. Remoteness correlates with Basic Data issues, i.e. imprecise or inaccurate data that is then used to develop, assess and engineer the project; this is due to the fact that obtaining this data proves difficult and costly in remote situations, in particular when there is no infrastructure. Poor basic data leads to significant additional costs, delays due to surprises and often to a much poorer operability.
Brand new technology is used less often in mega-projects than in smaller projects; yet it correlates very strongly with delays and costs at the startup phase, and thus a much longer time for the facility to reach design production; this has a strong impact on venture profitability.

Early permitting is critical

Permitting issues during project execution correlate very clearly and strongly with project failure; it is important that permits be secured prior to the effective start of execution. Permitting issues are notorious in countries with poor or unstable governance, which influences negatively the outcome of projects in those countries.

Conclusion

Merrow provides statistical data and background analysis that support a number of good practices to enhance significantly the success rate of large, complex projects. The most important ones are:

- A realistic execution plan and schedule that take into account the actual resource constraints (resulting from a thorough Front-End Loading process)
- Clear project objectives that are shared with the team
- A strong, integrated Owner project team (including the future operator and strong controls).

In addition, remoteness and the use of new technology are factors that need to be considered carefully. This analysis gives a useful analysis framework for increasing the odds of success of a project right at the beginning of its execution.

Note- 1 - "Industrial Megaprojects" by Edward D. Merrow, ISBN 978-0-470-93882-9, published by Wiley & Sons, 2011

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