



White Paper 2023-08

How to conduct Project risk management for Series of Industrial Projects

Some contractors or owners must manage a portfolio of identical or similar projects, and need to account for a series effect between successive projects. Portfolio performance thus depends on each project performance and the actual measured series effect which impacts both cost and schedule. This White Paper addresses how to specifically structure the risk analysis of those portfolios of projects.

Preliminary note on terminology and applicability

In this White Paper we use the terminology ‘portfolio’ because series of projects do not always constitute a ‘programme’, i.e. a set of projects contributing to a single objective. Series projects can sometimes be a venture aiming at producing similar infrastructure for several clients under variable circumstances. However, we acknowledge that such series of projects will often be part of or termed as a single programme.

The method described in this White Paper can also be used within single large projects where series effect is an essential performance parameter (e.g. offshore renewable projects).

Performance factors for series of complex projects

Series of complex projects such as the construction of a series of approximately identical ships, infrastructure or power plants constitutes a portfolio of projects. Its overall performance is heavily defined by the series effect (learning curve and volume effect), whereby significant performance improvement factors both in terms of cost and schedule apply to those projects following the first prototype. This in turn significantly improves the overall economic performance of the series.

Obtaining a true series effect on industrial and complex facilities is quite difficult and the challenges are detailed in our [White Paper 2020-11 “How to Overcome the Dangers of Facility Replication”](#). When larger series are involved, the effects of learning curves are more acute as well as the industrialisation effort needed to ensure that suppliers and contractors organise themselves to support the production rate that is required for the portfolio. A series production rate must be determined that will be limited by the slowest-producing contributor, and this may require substantial investment in capacity for some elements of the project for the overall portfolio to be delivered successfully. Design may also need to account for facilitating industrialisation of the series.

The performance factors for the portfolio can then be divided in three categories:

- Individual performance issues for each individual project due to local circumstances (site preparation, stakeholders, specific factors),
- Effective series effect and learning curve leading to performance improvements on successive series iterations,
- Industrialisation performance, including dealing with capacity issues, bottlenecks, coordination of production rates from various contributors.

Risk assessment for project series portfolios

We recommend that the risk assessment could use this categorisation approach, distinguishing the same 3 categories of risks and opportunities. All of those categories are subject to a wide range of risks, with different drivers and potentially different geographies.

Local circumstances – risk and opportunities

In this category we will find all local issues that may impact the series effect and learning curve. It would typically include, for example:

- Local permitting and stakeholder requirement issues,
- Local site characteristics such soil and climate,
- Locally available raw material characteristics (such as concrete, aggregates, etc.),
- Local facility adaptations e.g. change of layout due to a restricted land area, access issues,
- Local requirements such as local content, labour and immigration law,
- Local political aspects including, corrupt practices, security and social disturbances,
- Etc.

The mitigation actions should generally be to try to avoid as much as possible any change to the standard design and facility requirements. They may require the design of the series to be adaptable to identified local circumstances. The consequences often include some loss of the series effect and learning curve.

Effective series effect – risk and opportunities

In this category we will find all issues that deal with the possibility to implement actual series effects and learning

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curves between each facility. It would typically include, for example:

- Time delay between the start of each facility iteration and/or each site (it should not be too short to allow personnel to move from one iteration to the next after having performed their tasks, and not too long to ensure that people and the supply chain remain focused on delivering for the portfolio),
- Later iterations being more effective, catching up in terms of schedule with previous projects leading to bottlenecks,
- Management of human resources to assign personnel to the various projects,
- Effective lessons learnt management and experience sharing,
- Adequate management of changes and information of subsequent iterations (changes should if possible be in batches of consistent configuration to maximise the series effect),
- Etc.

The performance factors for the portfolio can then be divided in three categories:

- **Individual performance issues,**
- **Effective series effect and learning curve,**
- **Industrialisation performance.**

The mitigation actions should generally be ensuring that certain teams and supervisors are effectively involved in similar stages of the series, and that a substantial lessons-learned and feedback system be put in place to avoid the repetition of mistakes and enhance good practices. An active measurement of the learning curve is also essential to measure potential deviations to the expected benefits of the series approach.

Industrialisation – risk and opportunities

In this category we will find all issues that deal with the capacity of the organisation and its supply chain to deliver the series and synchronise the delivery to the needs of the series. It would typically include, for example:

- Lack of capacity in certain design or production areas that would create a bottleneck,
- Lack of capacity requiring splitting the scope across a number of contractors, resulting in learning curve and dissemination of practice and experience challenges,
- Logistics challenges for major equipment which may require rarely available handling equipment,
- Specific failure of a key supplier to deliver, or delays to delivery,

- Management of long lead items and the synchronisation of their delivery to on-site needs,
- Etc.

The mitigation actions will generally be in the form of some investment in personnel and industrial assets to avoid bottlenecks and in general, facilitate the synchronisation of the various contributors. Therefore, there is one additional risk in this category, which is that the series is cut short, and the investments performed are then only amortised over a much shorter series.

Summary

For projects performed as part of a series of projects, risk and opportunity management needs to be performed at the portfolio level. It involves different categories of risk: local circumstances, effective series effect, and industrialisation to support the portfolio. This framework can be deployed effectively to assess risk and opportunities of those series of project, where the expected benefits in terms of series effect gain can be very substantial up to the order of 30-40% efficiency improvements.

Read the Industrial Projects Practical Owner Guide

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