

# Collaborative delivery model for industrial engineering projects

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## Abstract

Industrial engineering projects are technology-intensive and temporary capital projects of private sector investors, and they are characterized by long time horizons, irreversible commitments, risks, and uncertainties. Suppliers and partners for these projects typically bring their specialized expertise and they come from different geographical locations and institutional environments. In the delivery of industrial engineering project, the main types of contracting are lump-sum, reimbursable, and incentivized collaborative contracting. Collaborative delivery models were introduced already in North Sea oil and gas projects and have since been successfully applied in contraction and infrastructure projects. However, application of collaborative delivery models in industrial engineering project context has been limited and the use of lump-sum engineering, procurement, and construction (EPC) and reimbursable EPC and engineering, procurement, and construction management (EPCM) are more dominant.

Coordination of work differs between delivery models and the context and characteristics of the project affect the practical arrangement. In industrial engineering projects delivered by any arrangement, it is important to bring the expertise of different project actors to the project, align the project actors, achieve the best practical front-end loading, and work efficiently together. Delivery models have different approaches for these issues but there is evidence that more collaborative arrangements including risk and reward sharing structures, common goal setting, and more integrated project teams can lead to better results also in the context of industrial engineering projects. This research aims to find how collaboration and collaborative practices can be implemented and how they can support the leverage of the expertise of different project actors in industrial engineering projects. Moreover, the objective is to develop a delivery model that integrates the best features from existing delivery models.

Relying on design science research, a new delivery model engineering, procurement, and construction alliancing (EPCA) was developed and validated together with experienced project people from various companies. Main objective of the EPCA model is to define which project actors are engaged and when, how risks and rewards are shared, and how roles and responsibilities including decision-making structures are set. In the EPCA model, traditional bi-lateral contracts are used but in addition to them also multi-party arrangement between main actors is used. In multi-party arrangement, the issues that are decided together by key actors and

risk and reward sharing mechanisms, decision-making structures, and collaborative practices and tools to be used are defined.

The literature and the results of this research emphasize that the private project investors, the project financiers, and the other key actors might not be ready to adopt a highly collaborative delivery model with purely multi-party contractual arrangement. Instead, in the EPCA model, key actors are engaged early to find together issues that benefit from collaboration and are included in multi-party arrangement to be managed together. Bi-lateral contracts are made to define the basic implementation of the project including the deliveries, costs, schedules, liabilities, and related penalties. The aim of the multi-party arrangement is to find together ways to optimize the work defined in the basic implementation setup and achieve the best-for-the-project results in collaboration. If jointly set project objectives are achieved, the rewards are shared in a way tailored to the project.

The results highlight the benefits of collaboration in the context of industrial engineering projects but also the need for context and situation specific tailoring. Theoretical contribution includes extending the understanding of different project delivery models and the differences in how they leverage the expertise of different project actors. The practical implication of the study is knowledge of how the best practices in existing and widely used delivery models can be integrated and used to define and develop a collaborative delivery of industrial engineering project.