

# An Editorial for the Special Edition 'Megaproject Management' of Organization Technology and Construction

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## Megaproject Management: The State of the Art

### What Are Megaprojects and Why Are They Important?

Megaprojects (sometimes known as major projects) are extremely large-scale investment projects involving a substantial construction component. Major projects encompass all aspects of infrastructure provision including powerplant (conventional, nuclear or renewable), oil and gas extraction and processing projects and transport projects such as highways and tunnels, bridges, railways, seaports and even cultural events such as the Olympics. Megaprojects, which take place in both the public and private sectors, are united by their extreme complexity, their criticality to society and by a long record of poor delivery (Li and Guo 2011). Megaprojects are globally recognised instruments of economic growth and urbanisation (Altshuler and Luberoff 2003; Fainstein 2008; BAEV and Øverland 2010; Olds 2011; Ponzini 2011) though their benefits are contested (De Bruijn and Leijten 2007; Jia, Yang et al. 2011; Shatkin 2011; Novy and Peters 2012).

Despite their societal importance, major projects continue to be associated with a poor record of design and delivery in both the public and private sectors. Merrow in his recent study of 380 major projects in the oil, gas and process industries found that only a third of the projects in his sample could have been judged successful in terms of being delivered on-time and to budget (Merrow 2011). This experience echoes previous empirical studies ((Miller and Lessard 2000; Flyvbjerg, Bruzelius et al. 2003) A recent review of major projects in the energy sector shows characteristic overspends of 30% and overruns of between 50 and 70% (Brookes 2012).

Not only are megaprojects critically important to society and suffering from poor performance but they are also increasing in frequency (Fiori and Kovaka 2005) 2010 -- Independent

Project Analysis (IPA), a global capital project benchmarking organisations predicts the demand for megaproject developments will increase dramatically in the next few years as the global recession subsides. Further, the increase in megaproject spending is expected to be even more rapid than in the boom period from 2005 to 2008. Global demand, especially in the emerging regions (China, India, Middle East, Brazil, etc.), is a primary driver of the increased number of megaprojects. Also, the rebound in commodity prices (such as oil and metals) will contribute to the economic feasibility of these huge capital investments.

Given that megaprojects are critically important and are being performed badly with more frequency, it is highly appropriate that *Organization, Technology and Management* should be taking this opportunity to producing a special issue on megaproject management.

### Megaproject Management: The State of the Art

Although interest in the research community in megaprojects has begun to grow (e.g the International Journal of Project management's special issue on '*Complexities in Managing Mega Construction Projects*' in October 2011), many areas of megaproject management still remain largely uncharted. This special issue brings together six novel research contributions that explore differing facets of megaproject management.

Haml looks at a group of stakeholders that are not widely considered in megaproject literature: the megaproject investor. She does this in the context of renewable energy megaprojects and proposes a theoretical framework to explain how investor acceptance of these megaprojects can be increased both directly and indirectly. Marinova again focuses on a novel aspect of megaproject management that of research infrastructure megaprojects. Her work outlines

the principal characteristics of megaprojects in the field of research infrastructure using an ecosystem perspective. The paper provides an empirically informing positioning paper that seeks to encapsulate the success factors required for research infrastructure megaprojects. Her analysis is informed by a range of approaches involving deduction and synthesis. In particular she finds a systemic holistic approach particularly useful to address the issues under examination.

This special issue includes two considerations of risk in megaprojects. Boateng presents a system dynamics (SD) model to describe STEEP risks and their interactions in megaproject development and uses the example of the Edinburgh Tram Network Project to explain the complexity of risks in this on-going project. The SD model is set up in accordance with British Standards on risk management in order to provide a generic tool for risk management in megaproject development. Evidence collected from the case project is used to explain the nature of STEEP risks in particular, the social and environmental risks in the past stages of project development. Further research is also discussed for applying the SD method in risk management in megaproject development. A second paper in this special issue considers risk in megaproject construction in the context of a large ring road development in Brno in the Czech Republic. Kotyrtarova uses this case to explore methods for identifying critical risks at the start of a megaproject.

Irima-Diequez looks at the issue on Public and Private Partnerships in megaprojects in the milieu of the Spanish experience. She provides a novel framework using six classification criteria and goes on to use these in analyzing the various forms of PPPs in megaprojects in order to determine the potential efficiency gains that can be achieved in the implementation of these models. Oliogmobe addresses a similar holistic issue with respect to value in megaprojects. Using ideas from 'Making Projects Critical' group (that there is a need for multiple images in the management of projects), Oliogmobe, by using the lens of value creation for stakeholders, sheds more light on megaproject value. She discerns how multiple stakeholders in the megaproject complex environment engage with the megaproject delivery process and value creation. Using a framework, the perspectives of internal and external stakeholders and value from the project outcome are discussed.

### **The Future of Megaproject Management**

Collating the individual offerings on megaproject research contained in this issue provides a tantalising glimpse for future directions in megaproject management research. Many

of the contributors (e.g. Boateng et al., Oliogmobe, Marinova) refer to the need to adopt systemic perspectives in addressing megaproject management research issues. Interdependencies in megaprojects are of particular import and are amenable to systemic and holistic examination.

Mega-projects are complex in nature and therefore characterised by interdependence and uncertainty. It has been argued that the traditional project management approach, which views the construction process as an ordered, linear phenomenon that can be organised, planned and managed top down, does not accurately reflect the actuality of the process (Williams 2002; Winter, Smith et al. 2006; Remington and Pollack 2007). For example, a critical look shows that the interdependencies and uncertainty in the construction project delivery process make planning, organising and execution less predictable. According to Dörner (1997), projects are built systems that consist of elements and connections. Project delivery however is a 'team' industry, where representatives of the client, consultants, and constructors come together to form a temporary organization that interdependently deliver a project. Thus mega-projects delivery entails the formation of a temporary organization made up of organizations coming together (as a team) to interdependently deliver built systems that consist of elements and connections. The delivery process therefore becomes the vehicle through which benefits are achieved and relationships mediated, by many variables (such as organisational boundaries) that create the interdependencies and uncertainty. The interdependence is a characteristic of the way tasks are planned, coordinated and executed and/or outcomes are shared in relation to other features of the mega project.

Socio-technical systems theory in particular may form a useful lens through which to explore megaproject management. Social-technical systems theory proposes that the effectiveness of an organization is related to the joint maximization of its social and technical factors (Cherns 1987; Clegg 2000). On the basis of this approach, an organisation can be viewed as a system comprising various interrelated, co-dependent sub-systems in a state of dynamic interplay (Clegg and Shepherd 2007). It becomes necessary therefore, to view a megaproject as a single, interrelated system whose sub-systems must be considered jointly for maximum performance. This may prove a useful way forward in providing the kind of deep understanding required to reconcile the complex societal requirements of megaprojects and their extreme complexity of delivery.

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