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Megaprojects

XL challenges in project organizing

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23. Megaprojects: XL challenges in project organizing

Alfons van Marrewijk

23.1 INTRODUCTION: WHAT ARE INFRASTRUCTURE MEGAPROJECTS?

Although megaprojects have been executed ever since the construction of the Egyptian pyramids, the Canadian government and the American contractor Bechtel were among the first to conceptualize the notion of megaprojects in the early 1970s (Morrow et al., 1988). In the Oxford Advanced Learners Dictionary (1990) the word ‘mega’ is connected to the number of 1 million, to indicate something very large, great or extraordinary. ‘Megaproject’ thus emphasizes a project’s greatness, large size, huge impact and enormous budget. Megaprojects are generally perceived as non-routine endeavours, requiring special authorizing, funding, revenues, land acquisition and regulatory actions by two or more levels of government, while they are initially controversial, proceeding slowly and passing through different electoral and business cycles in which public-private cooperation is needed (Altshuler & Luberoff, 2003). Furthermore, megaprojects require complex integration of tasks and technical expertise, resource and materials management, long time frames and numerous interfaces among multiple contractors and third parties (Greiman, 2013).

In recent decades there has been a clear increase in the magnitude and frequency of construction megaprojects (Flyvbjerg, 2017; Gemünden, 2014). According to Flyvbjerg (2014), megaprojects are attractive to decision-makers and investors due to the tendency to build larger, more complex and aesthetically interesting infrastructures. Such projects have become symbols of great engineering (van Marrewijk, 2017). Furthermore, megaprojects have become popular with public politicians and local officials as a way of creating attractive, sustainable and economically viable urban areas for citizens (Diaz Orueta & Fainstein, 2008; Lehrer & Laidley, 2008). Construction megaprojects thus serve as an important political legacy; as highly visible, material results of public policy and officials at the local and national levels (Trapenberger Fick, 2008). For example, the construction of the Øresund bridge and tunnel facilitated political, economic and cultural integration of the Copenhagen and Malmö region (Löfgren, 2015).

For a long time, academic attention to the organizing of megaprojects was reserved to the engineering discipline (Cicmil & Hodgson, 2006; Morris, 2012) and urban development discipline (Altshuler & Luberoff, 2003). In these disciplines, megaprojects were perceived as monolithic constructions. This type of megaproject, called ‘old’ megaprojects by Lehrer and Laidley (2008), received strong criticism for their dominant perception of organizing megaprojects as technically defined matters occurring in demarcated spatial settings with a particular set of complex tasks (Morrow et al., 1988). To counter the megaproject as a monolith view, scholars introduced critical perspectives of understanding the organizing of megaprojects as temporal, organizational and social arrangements that should be studied in their context,

culture, conceptions and relevance (Kreiner, 1995; Lundin & Söderlund, 1995; Packendorff, 1995). Frequently, work-related goals and activities in megaprojects are not completely clear, nor can be fully predicted in advance as they have their own internal dynamics (van Marrewijk et al., 2008). Therefore, Flyvbjerg et al. (2003) call megaprojects ‘political and physical animals’. This new and critical attention to megaprojects has resulted in a growing number of megaproject studies over the last two decades (Clegg et al., 2002; van Marrewijk et al., 2016; Winch, 2013).

23.2 THE CHARACTERISTICS OF A MEGAPROJECT

Do construction megaprojects differ enough from ‘regular’ construction projects to justify separate academic attention? Generally, a distinction between regular and megaprojects is made based upon the large financial capital needed for megaprojects; over \$100 million (Flyvbjerg, 2012) or \$1 billion (Merrow et al., 1988). Greiman (2013) suggests relating the labelling of an endeavour as a megaproject to a country’s gross domestic product. Furthermore, megaprojects distinguish themselves from other projects by their characteristics: large-scale development projects with iconic design components, aimed to transform urban areas, and promoted and perceived as crucial catalysts for economic growth (Del Cerro Santamaria, 2013). Not surprisingly, megaprojects rarely remain uncontested, especially within a democratic political context, as they are perceived not only as costly, but also as significant threats to the local quality of life; ‘a megaproject is not only big, in terms of scope and scale and costs, it is also big in its potential for politics in and around the project’ (Pitsis et al., 2018, p. 9). Finally, complex megaprojects distinguish themselves from other projects in their structural complexity (Sykes, 1998), which is the interaction and interdependency of elements in a project, and their uncertainty, resulting from a lack of clearness and agreement over project goals and the way these goals have to be researched (Williams, 2002).

Based upon a brief analysis of megaproject literature, van Marrewijk (2015, p. 16) mentions a few additional characteristics of megaprojects. They have long, complex and critical front-end processes with new and unproven technologies and legislation with related risks of overcommitment. Furthermore, megaprojects have a non-linear project life cycle with high levels of ambiguity and uncertainty resulting in changing project scope over time. Finally, megaprojects are often unique at the national level, involving decision-making of many stakeholders with conflicting interests, with a mixture of joint organization and sub-contracting to legally separate partners.

These characteristics spell out that construction megaprojects differ enough from ‘regular’ construction projects to justify separate academic attention. Furthermore, megaprojects bring along challenges in organizing of which I have selected four key themes to discuss in this chapter: (1) (under)performance of megaprojects; (2) governance of megaprojects; (3) cross-cultural differences; and (4) leading a megaproject. The first two themes are well-known challenges and frequently discussed in megaproject literature (Brunet & Aubry, 2016; Flyvbjerg, 2017; Priemus & van Wee, 2013; Qiu et al., 2019), while the latter two are less developed but interesting. Megaprojects include project actors from a multitude of (international) organizations that have to work together and someone has to lead this extremely complex project organization. In the paragraphs below I will discuss the four key challenges and how researchers have dealt with these so far.

23.3 (UNDER)PERFORMANCE OF MEGAPROJECTS

Most visible and very frequently mentioned is the (under)performance of megaprojects, which manifests itself in exceeding budgets, falling behind in time schedules and failing to deliver project goals (e.g. Cantarelli & Flyvbjerg, 2013; Flyvbjerg et al., 2003; Merrow et al., 1988). Many evaluations of megaprojects, measured from the moment of ratification by national governments to delivery, show that the final costs of megaprojects exceed initial cost estimations by 50–200 per cent (Flyvbjerg, 2012; Flyvbjerg et al., 2003). Also, the length and scale of time delays are very visible and discussed in national media, with the ten-year delay of the delivery of the Berlin Brandenburg airport as an iconic example. Finally, changes in project specifications and scope, resulting in failing to meet project goals, are frequently mentioned in evaluations (e.g. van Marrewijk, 2017). In short, megaprojects don't seem to be the best way of infrastructure development (Flyvbjerg, 2021).

Scholars have come up with diverse explanations for the underperformance of megaprojects (see Sanderson, 2012). Flyvbjerg et al. (2003) introduced the concept of 'strategic misrepresentation', which is the practice of underestimating costs and overestimating benefits by project promoters to strategically influence the decision-making process. Their solution was to not trust the cost estimates presented by infrastructure promoters and forecasters but to develop institutional checks and balances with penalties. Some scholars explain the underperformance due to bad *ex ante* cost-benefit analysis, which is the capturing of as many pros and cons of a project (Priemus & van Wee, 2013). This may work well with clear preferences of users or consumers valuing the outcomes of a project, but is of little help when political preferences are involved. Therefore, Scott et al. (2011) see institutional and political challenges of megaprojects as the root of underperformance. Other scholars, for example Cantarelli and Flyvbjerg (2013) and Hetemi et al. (2020), see underperformance resulting from lock-ins, which is 'the over-commitment of decision makers to an ineffective course of action' (Cantarelli & Flyvbjerg, 2013, p. 340). Such overcommitment starts at an early stage, with weak alternative analysis, resulting in the continuous investing of large budgets, even when project goals are not met (Flyvbjerg, 2009). The phenomenon of lock-in is typically connected to the escalation of commitment and the sunk cost fallacy, with investments already made in the form of money, time and self-identities (Brockner, 1992).

Instead of seeing the inflated forecasts, delays, budget overruns and public disbenefit as occurring by malevolent design, some scholars see these as resulting from normal operating practices (e.g. Ruijter et al., 2020; van Marrewijk et al., 2008). Well-intentioned professionals, with fragmented focus and limited overview, are influenced dramatically by a range of ambiguous and uncertain external and internal forces. For example, Lundrigan et al. (2015) see the disappointing performance resulting from organizational structure developments, with new management renegotiating design choices and slippages in performance targets. Also, political tensions, role interpretations, management approaches and organizational cultures can influence the performance of a megaproject (van Marrewijk et al., 2016). Therefore, van Marrewijk et al. (2008) argue that an *emic* or internally focused, contextually grounded view of actual practice and sensemaking should be taken rather than an *etic* or outsider's, preordained view of megaprojects being condemned because they do not match an ideal where project objectives are achieved faultlessly and effortlessly.

23.4 GOVERNING THE LABORIOUS COLLABORATION BETWEEN PUBLIC AND PRIVATE PARTNERS

The second key challenge in the organizing of megaprojects is the collaboration between public and private partners. With the earlier discussed evolvement of ‘old’ into ‘new’ megaprojects (Fainstein, 2008), this collaboration has become increasingly important (Ruijter et al., 2020). ‘New’ megaprojects take the form of complex networks, characterized by a mix of uses, a variety of financing techniques and innovative contracting between public- and private-sector initiators (Klijn & Koppenjan, 2016). The construction of the Øresund bridge and tunnel (Löfgren, 2015), the Incheon bridge (Brunet, 2021) and the London Olympics (Davies & Mackenzie, 2014) are all examples of new megaprojects. In these projects, collaboration between the public client as commissioner and the private contractors executing the project is of crucial importance. However, in many countries this is an adversarial relationship, with confrontational attitudes, troubled cooperation, poor tendering practices and a lack of trust, based upon fundamental differences in interest between clients and contractors (Priemus, 2004). How to organize this troublesome relationship?

To ensure smooth collaboration of public and private partners in megaprojects, governance arrangements are required (Brunet & Aubry, 2016; Clegg et al., 2002; Miller & Hobbs, 2005; Qiu et al., 2019). In the academic debate on project governance two streams of literature can be distinguished (Ahola et al., 2014). In the first stream, project governance is understood as externally imposed systems to define and monitor standards, procedures and rules. Governance is then defined in contractual terms to ensure a consistent and predictable delivery by contractors within contractual limitations (Müller, 2012). Such an approach is expected to provide a blueprint for collaborative behaviour, and encourages actors to specify all the obligations of each party in advance, in preparation for possible future events (Benitez-Avila et al., 2018). These contractual pre-arrangements seek to address the many interests that are at stake (Müller, 2012).

In the second stream, project governance is tailored through arrangements defining shared sets of coordination, procedures, norms and rules, which together have to align the conflicting goals of participating organizations towards a joint goal (Ahola et al., 2014). Although contracts should provide a blueprint for collaborative behaviour for project partners (Benitez-Avila et al., 2018), relations between these partners can become complex and challenging when working together and conflict can arise. In this stream it is assumed that actors cannot mitigate or anticipate all such conflicts, but nonetheless maintain collaborative relationships (Latusk & Vlaar, 2018). As the relationship develops over time, assumptions about shared goals, responsibilities and actions can become increasingly vexing (Sanderson, 2012; van Marrewijk et al., 2016). Therefore, relational aspects mediate the effect of contracts (Benitez-Avila et al., 2018).

In particular, the development of trust is a major challenge for the governance of public-private collaboration in megaprojects (Maurer, 2010; Ruijter et al., 2020; Vukomanović et al., 2021). Trust in a megaproject context can be defined as ‘the willingness of a party to be vulnerable to the actions of another party based on the expectations that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party’ (Mayer et al., 1995, p. 712). When trust is present, project actors are willing to proceed without defending, buffering or protecting themselves against risks (Latusk & Vlaar, 2018). Acting on trust thus becomes an ‘organizing principle’ of governing the interactions between organizations, which is constituted by a set of practices that (re)produce trust as

a meaningful pattern of interaction (Sydow, 1998). In their study, Ruijter et al. (2020) show that trust building between public and private partners, which was done through reflective workshops, is a laborious process. In this process, reciprocity was negotiated in practice, thus buffering the potential loss of trust through conflicts between partners. When seriously organized, trust building has the transformational potential to improve the collaborative behaviour of project partners.

23.5 THE SOCIAL CONSTRUCTION OF CULTURAL DIFFERENCES IN MEGAPROJECTS

A third challenge for organizing megaprojects is the wide diversity of organizations involved, all with their own professional, organizational and national cultural backgrounds. Consequently, megaprojects ‘may expect to encounter substantial differences in cultural-cognitive belief systems carried by varying types of participants’ (Scott et al., 2011, p. 58). For example, if employees are unable to cope with diverse management styles and national cultures, decision-making processes in megaprojects may slow down and tensions may emerge (Smits, 2014). Therefore, it is now widely acknowledged that cultural differences are a challenge for international construction megaprojects (Orr & Scott, 2008).

Unfortunately, project studies on cross-cultural collaboration (see for example Staples & Zhao, 2006; Zwikael et al., 2005) are dominated by cultural value models, for example the cultural dimensions of Hofstede (1980). The basic argument of scholars using a cultural value model is that national cultures can be measured and typified by means of a set of predefined dimensions, such as power distance, masculinity, temporality and uncertainty. The national scores on these indicators define the ‘fit’ between organizations. These cultural value models have received critics over time (Jacob, 2005; Smits, 2014). Scholars claim that cultural heterogeneity, local management concepts and cultural imperialism make cross-cultural collaboration too complex to be understood with the help of cultural value models (Smits, 2014).

Indeed, cultural differences in megaprojects are not entirely fixed and determined but can be negotiated by project partners (Brannen & Salk, 2000). For example, in their study of cross-cultural collaboration in the Sakhalin megaproject, Van den Ende and van Marrewijk (2015) found that Gazprom’s entry accelerated the strategic emphasizing of Russian culture, which impelled particularly Shell to strategically emphasize ‘western’ culture practices to secure their influence. Therefore, it is particularly relevant to adopting a power-sensitive understanding of managing cross-cultural differences in megaprojects (van Marrewijk et al., 2016). For example, in her study of the Panama Canal expansion programme, Smits (2014) found employees working in the Spanish, Italian and Belgian partner organizations were labelled as ‘southerners’, while the American consultancy firm were labelled as ‘northerners’. In sum, differences in professional, organizational and national cultural backgrounds are manifested in megaprojects as socially constructed.

23.6 MEGAPROJECT LEADERS

The fourth and final challenge is the leading of a megaproject, as a great deal of responsibility lies on the shoulders of leaders of this type of project (Müller & Turner, 2010). Recently, the

attention of megaproject scholars has turned to the topic of leading megaprojects (Drouin et al., 2021; Söderlund et al., 2017). Söderlund et al. (2017, p. 9) ask for research ‘on the ongoing practices of managers getting the megaproject in place’. The requirements for such leaders are challenging. Megaprojects ask for leaders who are in control, are able to make decisions, have the ability to integrate diverse disciplines, engage with various stakeholders and adhere to decision-making processes (Greiman, 2013). Furthermore, leaders have to be team players; able to create, lead and inspire a team that fosters the autonomy of the project but, at the same time, strengthens the relationship with stakeholders and thus prevents the project’s isolation (Willems et al., 2020). In sum, leadership in megaprojects can be understood as a complex interactive dynamic from which adaptive outcomes emerge (Uhl-Bien et al., 2007).

Müller and Turner (2010) identified critical thinking, influence, motivation and conscientiousness as four important capabilities for leaders of complex projects. Carlsen and Pitsis (2020) add the ability of leaders to reflect upon their personal styles of leading and managing (mega)projects as they attribute narrative elements from their projects to enrich their own professional life story. This capability helps leaders to construct meaningful narratives on behalf of their megaprojects, which help project members to engage in and make sense of the complex endeavour. For example, the leader of the Korean Incheon bridge megaproject explained that the project fulfilled the dreams of his father and grandfather (Brunet, 2021). In another example, the leader of the Panama Canal expansion megaproject used the historical narrative of ‘One team – one mission’ to revitalize the century-old Panamanian–American collaboration (van Marrewijk et al., 2016). The creation of a narrative that makes sense to project employees, stakeholders, but also to citizens helps the legitimization of megaprojects (Van den Ende & van Marrewijk, 2019).

To better understand the persons leading the multifaceted aspects and social dimensions of megaprojects, Drouin et al. (2021) focused upon the personal biographies of leaders of infrastructure megaprojects. They collected the life histories of 16 megaproject leaders from ten different countries and found them to be shaped by values in their families, by important turning points and by significant others. The biographical findings draw the focus away from administrative authority and technological expertise, showing that leaders of megaprojects are no ‘super engineers’, but people that have acquired a wide set of skills, capabilities and experiences (Drouin et al., 2021).

23.7 CONCLUSIONS

In this chapter I have discussed four key challenges of managing megaprojects and how researchers have dealt with these so far: (1) the performance of megaprojects; (2) the governance of megaprojects; (3) cross-cultural differences; and (4) leading a megaproject. A cultural perspective on construction megaprojects emerged from this discussion, which positions megaprojects to be as much the object and outcome of social interactions as any other form of organizing that occurs within a multiple context of socially interdependent networks. Such a perspective takes an emic or internally focused, contextually grounded view of actual practices and sensemaking of project actors. Consequently, with such a lens, less obvious challenges of managing megaprojects are found, such as rituals to guide the transition between megaproject phases (Van den Ende & van Marrewijk, 2014), or the symbolic value of megaprojects (van Marrewijk, 2017).

Future avenues for research using a cultural perspective on megaprojects are diverse and include interesting topics of which a few will be discussed here. First, such a perspective can help to better understand the dynamic organizing of megaprojects. Increasingly, megaprojects are being selected as change interventions to stimulate, for example, energy transition (Priemus & van Wee, 2013). The planning of renewable energy megaprojects, such as solar power plants, wind parks and mega-dams, has become a worldwide phenomenon (Schindler et al., 2019). Given their long time frame from planning to execution, renewable energy megaprojects have high risks of technological, social and political lock-ins. Consequently, megaprojects often continue to be developed with limited changes, despite the emergence of better technologic alternatives during their planning and establishment processes. The question is how the internal dynamics of megaprojects influence megaprojects' role in the transition towards a sustainable urban world.

A second avenue of the cultural perspective is the theoretical exploration of values in and of megaprojects. This perspective views megaprojects as vehicles for defining, creating and delivering value (Martinsuo et al., 2019). Project success, thereby, cannot merely be assessed in terms of reaching goals at the time of project completion, but also in terms of benefits compared to costs and the value achieved over the project life cycle compared to the original value expectations of various stakeholders (Martinsuo et al., 2019). The question of how we can measure the value of megaprojects is therefore also relevant.

Finally, I hope that the closer collaboration of academics and megaproject professionals results in a better understanding of the 'inside' of megaprojects, their multilevel dynamics, tensions, practices, values, trust, change and power. By reflecting on these issues, both academics and practitioners together can help to improve the performance of megaprojects.

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