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Mega infrastructure and strategic risk mitigation: planning, management and outcomes

E. John Ward

Bartlett School of Planning, University College London, London, UK

ABSTRACT

This paper presents the findings of a multi-case study evaluation of megaproject decision making as it relates to the analysis of strategic risk in the planning and appraisal of mega transport infrastructure projects. The paper reviews literature on risk planning and management from a set of papers commissioned by the OMEGA Centre at University College London (UCL) focusing on the treatment of risk and uncertainty in professions and disciplines where these phenomena have long been at the *milieu* of their planning and management responses. The findings of the literature review are combined to construct an evaluative framework with specific application to mega transport projects. This framework encompasses aspects of strategic planning, contextual awareness and stakeholder management. It is then applied via a qualitative analysis to aspects of the decision-making processes of 27 megaprojects in nine advanced economies of the world. The key findings of this evaluation suggest that past megaproject decision making is excessively focused on short-term outcomes, with little evidence of the rigorous or systematic analysis of risk and uncertainties that befalls such projects outside of project management and delivery concerns. Drawing from the lessons of past research and practice, the paper concludes by suggesting the essential ingredients of an approach that more explicitly incorporates risks and uncertainties that arise from outside the project portfolio. The author advocates a more 'open-systems' approach to megaproject planning and appraisal for infrastructure development that is much more sensitive to changing challenges and uncertainties of new contexts, and how these can affect project outcomes and impacts over the longer term. Whilst the paper draws upon research undertaken between 2005 and 2012, the findings are deemed of continued relevance today in such uncertain times, given the global geopolitical and economic uncertainties and multiple challenges of climate change, pandemics and inequalities which underline the precarious nature of risk management and decision making which prioritises short term project outputs over long term project outcomes and impacts.

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CONTACT E. John Ward eric.ward@ucl.ac.uk Bartlett School of Planning, University College London, Central House, 14 Upper Woburn Place, London, WC1H 0NN, UK

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1. Introduction

Mega transport projects (MTPs)¹ are often presented as critical catalysts in the process of enabling strategic change, nation-building and urban and regional development with significant and wide-ranging impacts. Despite this, in terms of project management, they have been widely criticised because of their frequent failure to be delivered on budget, to schedule and to specification (see Morris and Hough 1987; Flyvbjerg et al. 2003; Samset 2012). Judging project success against these three metrics has led to a significant body of research in the project management community arguing that issues of risk are better addressed during the ‘front end’ of project planning and management of MTPs. In particular, Sanderson (2012) identifies three schools of thought seeking to explain the poor delivery performance as: strategic rent seeking behaviour (Davidson and Huot 1989; Wachs 1989; Flyvbjerg 2009); misaligned and undeveloped governance (Miller and Lessard 2001; De Meyer et al. 2002; Clegg et al. 2002; Miller and Hobbs 2005); and the outcome of mismatches between cultures and agendas (Pitsis et al. 2003; van Marrewijk et al. 2008).

More recently this emphasis on project delivery has been challenged by mounting concerns regarding the failure of projects to realise their long-term benefits as planned and promised, and sometimes the potentially catastrophic risks that megaprojects can pose to environmental, economic and social development *via* unforeseen outcomes and impacts (OMEGA 2012; Dimitriou, Ward, and Wright 2013; Sturup and Low 2019; Ward and Skayannis 2019). These issues are particularly pressing as new MTPs are becoming larger, more complicated, and more critical elements underpinning society, capable of greater negative impacts, both locally and globally (Fahri et al. 2015; Samset and Volden 2016; Söderlund et al. 2017; Lehtonen 2019).

Differently from the majority of the literature on megaprojects and risk, this paper presents a selection of findings from two academic studies, undertaken between 2005 and 2012 (see Dimitriou et al. 2008, 2011, respectively), with a particular focus, amongst others, on the treatment of risk as a response to uncertainty over the longer term, here termed ‘strategic planning risk’. The paper considers the interrelationships between the project’s context, its boundaries, the strategy employed by its promoters for its delivery and the key stakeholders involved in decision making. It also reflects how these interdependent dimensions should be approached commencing during the early planning phases of the project lifecycle, including in policy and programme formation, to ultimately improve the planning and management of long term performance outcomes and hence impacts of infrastructure developments well beyond the project delivery. The output of these studies forms a set of recommendations for infrastructure practitioners on the identification and management of strategic project risks across multiple temporal and spatial scales. Whilst today we perhaps have a greater understanding of risks and uncertainties than ever before, the findings of this research

¹MTP in the context of the research undertaken by the OMEGA Centre and as defined here are large-scale land-based infrastructure projects, such as: bridges, tunnels, highways, rail links and their related transport terminals (i.e., major airports, seaports and railway termini/stations) plus combinations of such projects with construction costs *in excess* of US\$1.0 billion. They often link local networks with global networks, and are perceived as national icons of development, and critical to the delivery of national and regional development strategies (Dimitriou, Wright, and Ward 2011).

conducted between 2005 and 2012 are still deemed as relevant because of the endurance of the seemingly short term nature of infrastructure decision making processes.

The structure of this paper is in five parts. Following this introductory section, [Section 2](#), summarises the key concepts and issues arising from a review of a body of commissioned literature regarding the planning and management of risk. From this a normative framework for potential application to mega project decision making is developed. [Section 3](#) briefly describes the methodology adopted for this paper which draws heavily from OMEGA Projects 1² and 2³ (Dimitriou, Wright, and Ward 2011). It describes how the normative framework is drawn from the former and then applied via a specific strand of the multi case study undertaken by OMEGA Project 2. [Section 4](#) summarises the findings from applying this framework to evaluate 27 MTPs in nine advanced economies with the view to identifying generic lessons for decision makers. [Section 5](#), by way of conclusions, brings together some of the key findings of the OMEGA 2 study and makes tentative suggestions for megaproject planning practices to better identify and manage strategic risk.

2. Themes for mitigation of strategic risk in megaprojects identified from OMEGA 1 project

Discussions on risk (and uncertainty) vary by field, sometimes markedly, for example, the social science and technical literature take quite different stances on the proposition of risk (Kasperson 1992), with the former seeing risk as an inherently socio-political concept, whilst the later consider risk as it relates to quantifiable aspects of safety and loss linked to a particular undertaking (Tansey and O’Riordan 1999). This paper hypothesises that to begin to fully understand how to identify, plan for and manage strategic risks for mega infrastructure development, it is important to gain a more holistic view of different perceptions and sources of risk and their relationships with the contexts in which they have been adopted. The discussion which follows considers three key themes identified as important inputs for the treatment of strategic risk from a review of the literature commissioned for the OMEGA 1 project, namely: the awareness of context, complexity and path dependency; the need for strategic planning; and stakeholder consultation and consensus building. The findings from this synthesis are then used to guide the development of an evaluative framework deployed later on in [Section 3](#) of this paper.

2.1. Context, complexity and path dependency

One of the most common themes found within the study contributions is that of risks associated with the continuation of contextually insensitive practices, including path

²The overall aim of this study was to contribute to the advancement of the art and science of planning, appraising, and delivering major projects, focusing especially on the treatment of risk, uncertainty, and complexity in decision-making outside the infrastructure sector where these features have long-time been at the heart of such decision-making with a view to learning lessons that may be carried across to the field of mega transport projects

³The overarching research question posed by the OMEGA 2 Study was: what constitutes a successful MTP in light of the aims of such projects and the anticipated sustainable development challenges presented by the 21st Century? This investigation went well beyond the conventional concerns of completing such projects ‘on time’, ‘on budget’ and ‘within prescribed specifications’ (often referred to as ‘Iron Triangle’ considerations of project management) important though these remain.

dependent decision making. There are many definitions of this concept, but here we consider it as the process by which the choice of decisions available for any given situation is restricted to those which have been made in the past, regardless that the context of the past events may no longer be relevant. In other words, decisions influenced by path dependence are vulnerable to context insensitivity and lock-in by historical events or practices (Arthur 1989; Liebowitz and Margolis 1995) leading to outcomes that can often be undesirable and costly to change.

The treatment of path dependency by each of the commissioned study papers is subtly different, but many of the perspectives offer important insights for MTPs where there is often a tendency to focus on accepted processes and procedure for decision making as a means of minimising the risks associated with new untested practices (Dimitriou et al. 2008). For example, Mumford (2008) describes how, in the agricultural sector, knowledge derived from past case studies is routinely used to identify pest import risk. However, this kind of analysis, akin to reference class forecasting (see Flyvbjerg et al. 2005) provides only a partial picture of import risk, as some species which do not cause problems in their native area but may only manifest themselves as a problem in the context of a new terrain. Such path dependent practices for risk assessment are likely to lead to inaccuracies in defining MTP risks in instances where their complexities and features are unique to their individual contexts.

Snowden (2008) highlights the general assumption held by professionals in many areas of management science of the existence of discoverable and repeatable relationships between cause and effect within systems. Such relationships, he contends, encourage the acceptance of a definition of 'best practice' as a creation of repeatable recipes for achieving organisation goals irrespective of context. However, a number of OMEGA study contributors noted that hindsight and 'best practice' are more appropriate in the context of ordered, stable systems, and perhaps most applicable during the project delivery phase but much less so in environments of high uncertainty and dynamic change such as found in the early phases of the infrastructure planning cycle.

This reasoning strikes a chord with the work of Batty (2008) in the context of city planning who considers traditional planning practices incapable of dealing with complex situations which are beyond the ability of their models. Likewise, it resonates in the context of urban transport planning and the application of the Four Stage Model, with the conclusions of Lee (1973), Dimitriou (1992) and Vasconcellos (2003), who like Batty, argue that the persistent application of simplistic models independent of context or poorly tailored to context, leads to unrealistic plans and heightens the risks of project failure. This is because city and regional systems into which MTPs are placed are so complex and evolve over time as a new order emerges from agents responding to context and their interaction with each other. Sometimes this change is abrupt, other times it is subtle and takes place gradually over a long period, making it doubly difficult to discern the magnitude and extent of such evolution. These circumstances are clearly reflective of open systems where impacts and outcomes are frequently unpredictable. If one then considers MTPs as influential components of city and regional systems, the adoption of closed system approaches to their planning all too often cannot address their fluidity and evolutionary nature. It is arguable, however,

Table 1. Evaluation themes related to project context, complexity and path dependency.

Evaluation Themes	Guidelines and Potential Evaluation Criteria
(1) Awareness of critical contexts	MTP stakeholders must identify and appreciate the critical contexts (and their interdependencies) that surround pivotal project decision making as key sources of risk. Regular and sustained monitoring throughout the project lifecycle of all contextual cultural and societal beliefs/ values; time and space.
(2) Awareness of the dynamic nature of context	'Open systems' see the project and its interaction with 'context' as exploratory and almost organic, and which allow for unexpected outcomes to become recognized and accepted as part of an 'emergent order' driven by project complexity.
(3) Avoidance of path dependent practices	MTP planning, appraisal and delivery tools and techniques should be part of a balanced decision making process and framework sensitive to current contexts and minimise risks from path dependent behaviours.

that such complex systems can never be precisely defined or even comprehended thereby denying any achievement of optimisation exhibiting instead characteristics of the kind of 'wicked problems' outlined by Rittel and Webber (1973) which represent the realities of planning and policy making rather than any 'best practice'.

It follows from the above that an awareness of 'context' or even 'the power of context' (Gladwell 2000) is thus a crucial factor in successful decision-making that addresses systemic risk - both as it relates to MTPs and related megaproject decision making for other fields operating in uncertain complex environments. On this basis, MTP planning, appraisal and delivery has had to cope with an overly broad spectrum of contextual elements which will inevitably interact and change during the various stages in the project lifecycle. Treating such projects as a closed, linear system where outcomes are thought to be predictable throughout the project lifecycle is, at best, optimistic. The study literature review suggests it is therefore critically important for MTP planners, delivery agents and operators to identify critical contexts and then constantly scan these contexts throughout their project lifecycle – both before and after key decisions are taken. And on the basis of this, subsequently analyse any decision making based upon this contextual data in a manner that is mindful of path dependent practices. Table 1 presents a framework and guidance for the evaluation of themes and criteria for the evaluation of MTPs stemming from the above analysis.

2.2. The role of strategy

A second common theme emerging from the OMEGA 1 Project literature regards the role of strategy in the mitigation of long-term systemic risks. For example, drawing from literature in military and security planning, Stone (2008), highlights the important relationship between planning and political goals, visions and strategy and subsequent actions. He presents strategy and associated policies as the instrumental link between political goals and the planning process. It is usual, he argues, for vision to precede strategy either implicitly or explicitly. However, in the context of MTPs, there is evidence to suggest that visions about shared futures can be somewhat of an anathema to many politicians when contrary to their interests. This is so because these visions typically require a long-term buy-in and may not give the room for manoeuvre that politicians desire. Typical rational planning models consider strategy as informing policies, which in-turn produce a collection of projects and/or programmes of projects.

These projects each have unique sets of objectives and technically speaking only through the successful attainment of these objectives is a project declared a success. Likewise, all projects should be completed for the programme to be realised and the strategy or policy implemented (BIS 2010). However, there is also evidence to suggest that some MTPs are not conducive to 'policy taking' in that they do not get built in response to a coherent pre-determined strategy but instead respond in a rather *ad hoc* manner to different contextual forces emerging over time, particularly those that are market-led in character (Dimitriou, Wright, and Ward 2011, Hallsworth et al. 2011). In this sense, they are often more policy making than at first realised, having large enough impacts to later dictate policy directions. Political goals can, furthermore, interfere with formed strategies either by reducing the capabilities of the project or in the worst case making major contributions to project failure.

Dimitriou and Thompson (2008) have questioned the ability of Governments to form adequate strategies in certain contexts, especially where free market forces are strongly imbedded and the advocated strategies are seen to unnecessarily constrain these. Solutions to complex problems, they argue, depend upon the ability to combine the creation of strategic long-term visions with short term actions as for example presented in the 3 Horizons of Growth Strategy (Baghai et al. 1999). This presumes government to successfully identify, design and deliver shared futures that are capable of expression in spatial forms and agreed by major stakeholders. The author points out that this situation is in fact rarely present in spatial planning. We contend this is the case in infrastructure planning also.

Summarising the findings from the study as they pertain to strategic MTP decision making, we conclude:

- A strategy needs to be owned by all key stakeholder parties who should ideally share a common set of clearly defined and goals/objectives.
- In the case of MTP planning, the strategy formulation and risk mitigation process need to not only consider relevant policies, but also have at least half an eye on what is likely to be acceptable politically and therefore engage in consensus building. Possessing a strategy of this kind that reflect the priorities of the tasks at hand and resources available, in line with the opportunities and constraints presented by the context in which the strategy is to be implemented, is seen to represent an effective means of dealing with risk over the long term.
- Since MTP lifecycles are all too often typically lengthy and perceived (paradoxically) as linear project management processes, they require regular iteration and adjustment to changes in context and consequent changes in demands in a manner that makes them more cyclical in nature.
- Finally, strategies as outlined above, furthermore, need to be sustainable in the short, medium and long-term capable of operating across the three horizons of growth, with appropriate bridging mechanisms between these different time horizons.

Table 2 presents evaluation themes, guidance and related criteria for the evaluation of MTP strategy stemming from the above analysis resultant observations.

Table 2. Evaluation themes, guidance and criteria related to risk-mitigation strategy.

Evaluation Themes	Evaluation Criteria and Guidance
(1) Clarity of objectives	In order to facilitate a shared understanding and help formulate an effective strategy there should be a clear statement of MTP goals and high-level objectives, linked to appraisal and evaluative criteria with clarity on input assumptions and potential impacts. Objectives should be SMART (Doran 1981) and of a manageable quantity (Labovitz and Rosansky 1997; Ordóñez et al. 2009).
(2) Project objectives linkages to national and international policies and political priorities	MTPs are best considered as 'strategic change agents' that have far-reaching spatial, social, economic, environmental and other impacts at different phases of the project lifecycle. Evidence, measures and indicators of such contributions - especially in the context of internationally approved Sustainable Development Frameworks (SDFs) offer important guidelines for assessing these contributions at different levels.
(3) Call for flexible, robust and adaptable strategies	Changes in context - brought about by such influences as changing stakeholder positions in response to changing international, national and local policies and enforcement legislation - are also critically important. Highly prescribed templated 'blueprint' approaches to MTP planning, appraisal and delivery are too inflexible, contextually insensitive and are rarely appropriate.
(4) Balance between strategies and tactics deployed at different stages of project lifecycle and time horizons	Strategies for mitigating risks in MTP decision making need to balance requirements for implementing a vision for the project and its accompanying spatial and temporal contexts with the practical requirements associated with the efficiency of services offered, their cost ceilings etc., and of course the resources (including institutional and regulatory support) available to deliver the project.

2.3. Stakeholder consultation and consensus building and the role of trust and transparency

A third common theme identified by the analysis of OMEGA 1 Project literature is that of stakeholder engagement. The involvement of different types of stakeholders in MTP developments, their relationships among themselves and the role of trust and transparency have all been identified as important themes for decision making, with some commonality amongst many of the study contributions. In particular, the building of effective relationships amongst stakeholders to facilitate consensus building and risk sharing are seen as important factors in reducing project risks.

Regarding trust, transparency and stakeholder consultation, findings from the study highlight the importance of trust and transparency in decision making between parties as important contributory factors towards building effective stakeholder relationships. Drawing again from the agricultural sector, Mumford (2008) considers trust as an essential ingredient in effective risk assessment of major challenges which in turn requires stakeholders being fully transparent with information fed in to these processes. However, in the context of MTPs, the willingness to disclose information may not be universal, with only those stakeholders involved in the promotion of such projects being fully incentivised to do so; other competing stakeholders may not be so forthcoming. Perry (2008), drawing from the real estate industry, like Mumford believes organisations tend to hold onto the notion that 'knowledge is power' and see collaboration as a potential threat or weakness, especially with stakeholders external to the project. This is damaging to the build-up of trust amongst stakeholders. Dimitriou and Thompson (2008) likewise allude to this weakness, and the importance of transparency amongst stakeholders for all phases of the project lifecycle in the context of spatial

planning, arguing that it is a prerequisite to developing effective 'change responsiveness', vital for success.

Consensus-building was also identified by findings of the study as important. Observations from the corporate world offered by Sparrow (2008) who revealed that consensus building among stakeholders was critical to business relationships and ultimately the success in dealing with risk and uncertainty. Ideally, Sparrow (2008, 164) argues: 'all parts of (one) organisation should have adopted the same set of values. If different parts of an organisation inhabit different parts of the value space, then they may have difficulty in finding common ground, insofar as they cannot agree on what an acceptable outcome will look like'. This point is reiterated by Snowden (2008), also from the corporate world, who similarly attested that shared contexts (and values) are critical for decision-making in the mitigation of risk and uncertainty.

Mumford (2008) reports that risk assessments in the UK agricultural sector are open to consultation with stakeholders and that in this way 'acceptable' risk are defined after reaching an agreement with the stakeholders. This is in contrast to evidence offered by Dora et al. (2007) in the public health sector and the medical profession where acceptable risk is defined by experts. Rossetto (2008), drawing from decision-making experiences of treating risk and uncertainty in the earthquake engineering profession internationally discusses the difficult balance between costs and benefits required to decide the level of seismic protection to be afforded to a building. In order to set this level of protection, she explains that the level of risk which is socially acceptable must be identified by discussion with stakeholders to reach consensus. Ideally, she goes on to explain "socially acceptable risk is the probability of failure of infrastructure that is acceptable to governments and the general population in view of the frequency and size of natural hazards, and the infrastructure use, importance and potential consequences of its damage ... In most cases constructing buildings and infrastructure that can fully resist the largest earthquake is uneconomical (and often unjustified due to the rare nature of some natural hazards). Hence a limited risk is accepted" (Rossetto 2008, 33). The critical question here is who determines this acceptance?

Deciding what an acceptable risk involves in the use of an acceptable decision making process Paté-Cornell (2002) lists a number of elements of an 'acceptable' decision making process to better mitigate against risk and uncertainty in the context of government safety decisions. Amongst other things, these include a sound legal basis being in place with a clear understanding of both individual and societal risks, and a capacity to:

- treat the economic effects of outcomes,
- offer a communication/dissemination system in support of agreed actions,
- provide a public review process to attend to and reflect on contested issues, and
- offer an effective conflict resolution, monitoring and feedback system.

We conclude that many of these points not only resonate with concerns about how best to address risk and uncertainty challenges confronting the major players within the MTP industry but also beyond this, for example, at the time of writing,

Table 3. Evaluation themes, guidance and criteria for stakeholder engagement.

Evaluation Themes	Evaluation Guidance and Criteria
(1) Stakeholder consultation, trust and transparency	Sustained flows of information need to be provided by MTP promoters, planners and deliverers to those impacted to enhance trust and transparency amongst stakeholders, build reputations and develop support for the investment.
(2) Shared understanding and consensus building	MTP promoters, planners and deliverers need to establish an ability and capacity to better identify and understand the motives, beliefs and values of the wide range of stakeholders involved in or impacted by MTPs and on the basis of this to build consensus upon this knowledge.

with the challenges confronting the world’s public health community as regards to how governments globally should mitigate risks associated with the Covid-19 pandemic.

Two overarching key themes emerge from the above discussion. Firstly, the criticality of transparent flows of information between stakeholders to build trust and reduce project risk. Secondly the importance of arriving at shared understandings and consensus amongst stakeholder groups on which to base decision making. Both of these themes are alluded to in Table 3 which presents evaluation themes, guidance and criteria for the evaluation of MTP risk mitigation decision making strategies that stem from the preceding analysis.

3. Summary and implications for mega infrastructure

From our examination of the OMEGA 1 Project literature we conclude, therefore, that three fundamental ingredients of strategic risk mitigation need to be considered in decision making for mega infrastructure development:

- recognising, categorising and directly responding to different contexts,
- signposting appropriate ways of identifying and handling uncertainty for each context, and
- acknowledging the multiple perspectives on risk likely to be held by invested parties in each problem space.

Planners, including many infrastructure planners, have persisted with the use of rational decision models and aleatoric approaches to risk mitigation both for the management and planning of risk in the face of mounting evidence of their inappropriateness for complex, open, uncertain and adaptive environments which can yield significant and long-term risks of an epistemic nature. Whilst strategic thinking is recognized as a pre-requisite to the effective handling of project risk, we contend that strategic risk mitigation paradigms for both the planning and appraisal of major infrastructure projects and their delivery need to fully embed the importance of context, enduring uncertainty and multiple stakeholder perspectives at their core to improve long-term project outcomes and impacts.

4. Study methodology

In this paper, we present selected findings concerning elements of the OMEGA 2 Project study methodology (Dimitriou, Wright, and Ward 2011; OMEGA Centre 2012) that sought to respond to the overarching study question: What constitutes a 'successful' MTP when success is redefined in light of the aims of such projects and the anticipated challenges presented by the 21st Century, foreseen by a growing body of scholars and scientists to reflect a rising tide of global and local inter-connected uncertainties and associated risks (see Beck 1999; Taleb 2007; Renn and Walker 2008; Beddington 2009; Kay and King 2020).

Whilst the full methodology adopted for the project is available elsewhere in this paper, we specifically focus here on two elements of the research, namely:

- ***Inputs used to identify a normative evaluative framework for the planning and management of strategic risk:*** The normative framework presented in Section 2 of this paper was developed from the synthesis of 15 papers⁴ commissioned for the OMEGA 1 Project. These papers contain a rich source of information from leading authorities on the treatment of risk and uncertainty in decision making as a possible source of lesson-learning. The bulk of the papers were commissioned from parties in disciplines outside the fields of infrastructure planning, where risk has long been seen to be at the milieu of their decision making. This study presented an innovative framing for the case study evaluation undertaken for the OMEGA 2 Project in that it provided 'lenses' through which to examine the case study material and the country-based findings (see Dimitriou, Wright, and Ward 2011).
- ***The analysis of project 'achievements' relative to identified principles and practices of strategic risk mitigation.*** The OMEGA 2 Project study methodology sought to evaluate a set of 27 case studies (see Appendix 1 for a list of these projects) in terms of how well they performed with regards to more holistic measures of project success. In this paper we present the findings related to strategic risk via the evaluation of these project using the normative framework developed above. The data for the evaluation was taken from the OMEGA 2 Project study databases, comprising project profiles compiled from secondary data and interview data derived from interviews with key stakeholders of case study projects, with the latter reliant on pre-hypothesis and hypothesis-led interview techniques (see Figure 1). Evidence of adherence to the normative themes and criteria was sought through a qualitative analysis of the case study database using narrative analysis techniques and supporting software. Key findings from the analysis are presented in Section 4.

4.1. Treatment of risk, uncertainty, complexity and the power of context

This section presents the findings from applying the evaluation framework(s) developed in Section 2 across 27 completed mega transport project (MTP) case studies undertaken for the OMEGA 2 Project. Section sub-headings correspond to each of the

⁴See Dimitriou, Wright, and Ward (2011) for a full list of the commissioned papers.

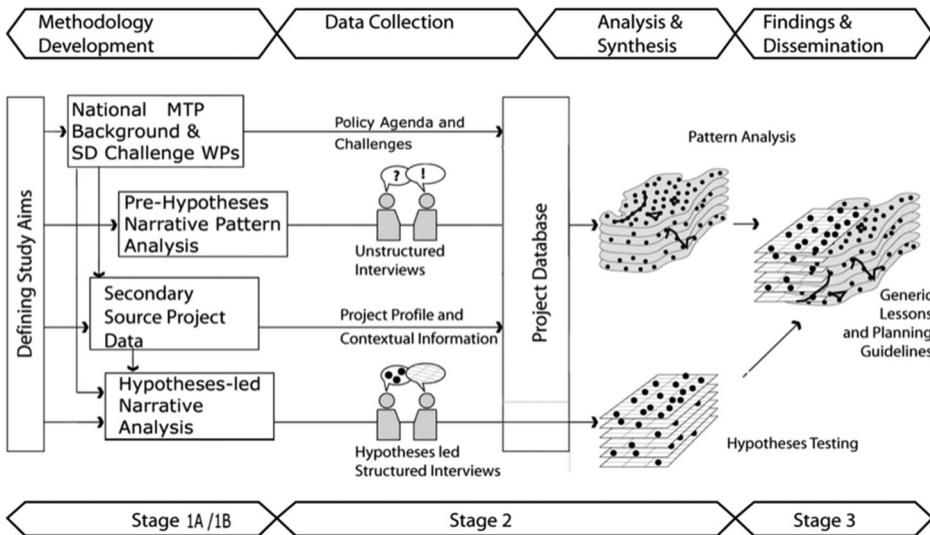


Figure 1. OMEGA 2 research methodology.
Source: OMEGA Centre (2012, 11)

three dimensions of the evaluation framework, with individual evaluation themes nested under each of these sub-headings⁵.

4.2. Context, complexity and path dependency

4.2.1. Awareness of critical contexts

Unsurprisingly, project contexts were found to be sources of much project risk for all the case studies reviewed with some being more markedly impacted by this than others. Figure 2 highlights the nine categories of contexts found to be most frequently associated with risk during pivotal project decision making. The most prevalent of these (i.e., political influence; economic climate and prevailing institutional structures) are discussed to illustrate how such forces interact with project decision making and affect their outcomes.

4.2.1.1. Examples of political contextual influences. Political contexts were found to be either critical or highly important for decision-making and risk mitigation for the majority (twenty-one) of the case studies reviewed for the OMEGA 2 Project. It was revealed that the preferences and motivations of the most powerful politicians have direct impacts on project viability. In some instances, such involvement was seen by the more technical parties to appear irrational or idiosyncratic, often focused solely on short-term political objectives.

The extension of the Athens Metro was, for example, delayed on account of an influential minister in the Greek Government possessing a long-standing scepticism

⁵The OMEGA 2 project studied 30 case studies across 10 countries, with 27 of these yielding data containing a comparable depth of insight.

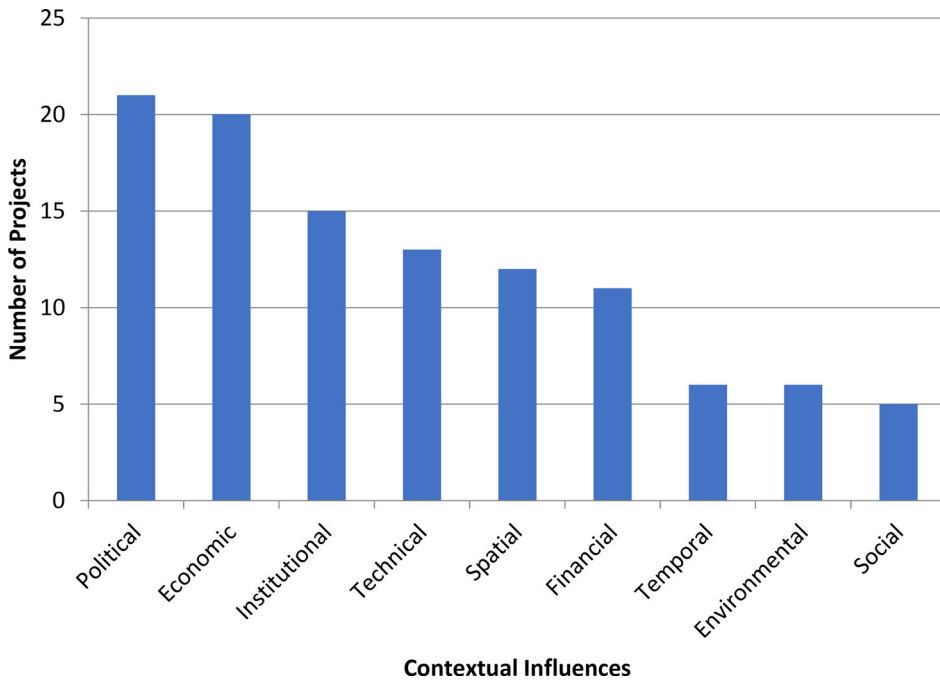


Figure 2. Key sets of contextual influences affecting case study outcomes.
Source: Dimitriou, Wright, and Ward (2011)

about metros as a major mode of urban transport in Athens. An interviewee of the case study explained that in the view of this minister a tramway would be more ecologically sound. In the case of the Melbourne City Link Project, a number of interviewee respondents suggested that the newly elected Liberal Government of the time had to politically demonstrate it was capable of delivering a major project more successfully than its predecessor, and that the project was seen by the powers that be as an inevitable way for a new government to make an impact. As regards the development of the Sydney Cross City Tunnel Project, some interview responses reported that at the time 'Within government, there were factions seeking to prevent the Minister for Roads becoming Premier, and on this basis the Treasury refused to fund projects for roads on account it would entrench the Minister's success as a politician' (Dimitriou, Wright, and Ward 2011, 46).

4.2.1.2. Examples of economic contextual influences. The nature and state of economic contexts was reported across the nine OMEGA case study countries as critical to the outcomes of the MTPs reviewed for a variety of reasons. One important factor raised is the strong two-way link associated in MTP developments between national economic health and project finance and viability. In some instances, as in the case of the Perth to Mandurah railway in Australia which was planned and built at a time when Australia's economic fortunes had been greatly enhanced by the country's new and important place in the global economy supplying raw materials to the fast growing economies of China, India and the Asian 'tigers', according to one interviewee this

'...created a context by which the public sector could finance the much needed project' (Dimitriou, Wright, and Ward 2011, 47), whereas in earlier economic circumstances, this would not have been the case. Similarly, in the case of the Greek MTPs reviewed for the OMEGA 2 Project, it was noted that '...increased EU funding was available which permitted public-private partnerships to go ahead, despite the "questionable" sustainability benefits they (the projects) were seen to offer' (Dimitriou, Wright, and Ward 2011, 47).

Research findings also noted, however, that during more uncertain economic periods, MTPs are often positioned as important agents of strategic change to effect major transformational economic recovery. Reports from the Swedish case studies suggest that this was indeed the case for the Stockholm Southern Link Project where it was presented as a stimulus investment backed up by '...political assertiveness (of the Swedish Government) ... motivated by soaring unemployment figures and the continuing recession. Here, the traditional Keynesian role of employing new infrastructure investment as a stimulus in times of economic difficulties played an important part in making the project happen' (Dimitriou, Wright, and Ward 2011, 47). Among the most notable examples of MTPs being employed as an economic stimulus to uncertain economic events (in the face of uncertain political prospects) was the programme of megaprojects embarked upon the British colonial administration prior to Hong Kong's return to the People's Republic of China (PRC) in 1997 of which three such projects were reviewed in the OMEGA 2 Project.

There are also examples of significant negative impacts on MTPs from economic downturns which according to some case study interviewee reports were managed much less successfully. A case in point was during the collapse of the Japanese bubble economy in the 1990s which negatively affected the process of land acquisition during the Tokyo Metropolitan Expressway Project. Here, it was reported that the poor economic climate of the time resulted in some landowners being unwilling to sell their land to the project promoters, thereby threatening the viability of the project. Information collected for the UK case studies revealed that the 1992 Global Economic Crisis was a major contributory factor to the 18-month moratorium of London's Jubilee Line (JLE) Project during its early implementation stages, essentially due to a cascade of failures concerning private sector contributions to project funding (Dimitriou, Wright, and Ward 2011).

4.2.1.3. Examples of institutional contextual influences. A wide selection of themes, issues and situations were reported by the OMEGA 2 Project findings which can be classified as being relevant to the institutional context(s) of such investments and how these can impact outcomes in all phases of the MTP lifecycles. The importance of strong institutions (accompanied by good governance) as an essential contextual ingredient to successful mega project development has long been reported as essential to the success of such investments by innumerable reports and published papers. A case in point is the Athens Metro where it was reported by one case study interviewee that '...institutional weaknesses make projects vulnerable to political whims (and that) institutions in Greece are not considered to be strong enough to secure a long-term robust and rational planning regime and vision that is followed by all actors.

(Dimitriou, Wright, and Ward 2011, 47). Another example cited among the case studies is that of the Øresund Link connecting Sweden with Denmark, where it was revealed that the strong institutional architectures of the two countries and traditions of good governance were given as the reasons why the project were deemed by all key involved parties to be generally handled successfully. Reinforcing this message, one of the case study interviewees reported that 'Given the nature of the project, involving two nations as well as being a combined road and rail project, it is clearly the case that no (single) agency existed (to deliver the project). The trans-national aspect of the project did, however, mean that much of the initial planning and the appraisal phase were carried out by The Oresund Delegation⁶ - a group of experts and bureaucrats with close ties to the relevant ministries and national road and rail agencies in the two countries' (Dimitriou, Wright, and Ward 2011, 48).

In summary, regarding the case studies awareness of critical context, the evaluation found that whilst some contextual changes, such as economic downturns, were evidently on the radar of some project sponsors when they made the case for the fundamental demand for the project, project sponsors were seemingly less aware of how these critical issues could impact on the deliverability of the project. It followed that decision making was generally reactionary to such changes rather than pre-emptive. This was especially the case when, for example, the interdependency between political posturing and sub-optimal decision making or the link between economic downturns and budgetary squeezes only became apparent in relatively late phases of the project development cycle, when there was little scope for the successful adoption of risk avoidance or mitigation strategies.

4.2.2. Awareness of the dynamics of context and projects as open and closed systems

Regarding evidence of an awareness by key project promoters and stakeholders of the dynamic nature of context and its impact on decision making, the OMEGA 2 Project findings revealed that over half of the case studies examined were seen to be adopting a 'closed systems' approach which were relatively insensitive to context dynamics, whilst only one third were considered to have employed a more 'open systems' approach. The study revealed that projects adopting a closed systems approach were more likely to be associated with the problematic management of broader and more long term project impacts.

The Tokyo Metropolitan Expressway project, essentially initially adopted a closed systems approach which was subsequently obliged to adopt a more open approach as a result of changing contextual circumstances due to stakeholder pressure resulting from objections from local residents to the project. Similarly, the decision making surrounding the Millau Bridge in France was seen to change over time from 'a closed systems (approach) to an open one under the influence of two main movements: the increasing public sensitivity to environmental issues; and globalisation, in particular

⁶The Øresund Delegation set up in 1984 was made up of representatives of the two governments. Over seven years the delegation studied and reported on options for a link and their environmental impacts (primarily effects on water flow, increased traffic and land use issues). The option of a combined road/rail bridge gained the support of Swedish and Danish parliaments in 1990 (Dimitriou, Wright, and Ward 2011).

through the impact of EU regulations (to encourage) trends to open up (France) to competition' (Dimitriou, Wright, and Ward 2011, 50).

The OMEGA 2 Project also found examples, however, of applications of closed systems approaches to decision making which were deemed successful, albeit from a narrower delivery perspective. A case in point was the Perth to Mandurah Railway which, as one case study interviewee explained: 'was in no sense driven by a desire to create land use and transport integration. This project was about reducing congestion on the freeway. It was planned as a closed and carefully bounded system which, following best practice of contracting in Australia, was carefully protected from outside interference and scope creep' (Dimitriou, Wright, and Ward 2011, 51).

As might be expected, there were also examples of where an open approach to decision making had caused issues with project delivery. The HSL-Zuid project in the Netherlands, for example, appeared to have a decision making approach that was open during its early phases of development but subsequently closed down for implementation to proceed. As one interview of this case study explained: 'Some project leaders are purely oriented around engineering and construction, and want to keep the project as simple as possible with a narrow set of goals and objectives. The HSL-Zuid did not have this kind of project leader. The first leader was primarily concerned with a (open) decision-making process and his organization became a knowledge generator, looking at alternatives. But as the later project leader noted, it was not organized for project management, and was not able to do things in parallel - i.e., generate knowledge and get things done at the same time' and so it moved to a closed-systems approach for project delivery (Dimitriou, Wright, and Ward 2011, 50).

In summary, research findings from both OMEGA Projects collectively suggest there needs to be a balance between adopting an openness for the alignment of strategic objectives) and a transition to project closure for project delivery.

4.2.3. Avoidance of path dependency

As regards path-dependent practices, the findings of the OMEGA 2 Project suggest that forty per cent of the case studies examined cited methods/tools employed to forecast user demand as significant source of risk given their dependency on past trends and/or on predict and provide principles. Not only was it revealed that the forecasts were frequently inaccurate (often based on outdated premises) but that there was evidence to suggest in some cases that they were manipulated for political reasons/gain. Early attempts, for example, to proceed with Line 2 of the Athens Metro were reported to have been blocked by objections to what were considered 'poor forecasts concerning traffic jams (predicted) during the construction phase – this was one of the reasons that the politicians were hesitant to decide to build the metro (line extension)' (Dimitriou, Wright, and Ward 2011, 52). The research also found examples of the desire to retain project teams with specific experience in previous megaprojects leading to the reinforcement of path dependency practices. In the case of the Australian case studies, for example, it was noted that there was an '... existence of project teams already established (with members) from previous projects from (the same) merchant banks ... and construction companies ... which tends to lead to the desire to keep these teams together and employed' (Dimitriou, Wright, and Ward 2011,

48). This, it was alleged by the case study team, led to the support of projects in Australia with teams in place that already knew how to plan, appraise and deliver future MTPs but in a templated manner that had a potential for the production of projects that are more insensitive to contextual forces and which may not be successful as a result.

4.3. The role of strategy

4.3.1. Clarity of objectives

Whilst it was possible to identify high level objectives for all the case studies reviewed by the OMEGA 2 Project, findings reveal that related project appraisal and evaluative criteria were seldomly meaningfully stated beyond standard cost benefit analysis (CBA) metrics. Concerning clarity of project objectives, there was little evidence amongst the case studies of the explicit use of what Drucker (1955) called SMART frameworks (later formalised by Doran (1981)) to guide the formation of effective objectives. Regarding the number of high level project objectives per project, Labovitz and Rosansky (1997) suggests that too many detailed objectives can create barriers between achieving stakeholder alignment, while Ordóñez et al. (2009) note that these can also lead to inattentive blindness⁷ and other negative outcomes. The OMEGA 2 Project found half of its case studies had eight or more high-level objectives (see Figure 3), in excess of the six objectives that more recent guidance in the UK suggests should be the maximum (HMT 2020) which may have had some impact on project clarity and alignment.

Regarding objective achievability, the mean achievement rate of the original project objectives was 57% across the case study projects. Within this analysis, the research found a distinction between objectives that were internal to the project or within the sphere of responsibility of the project promoters/managers and those that involved an impact upon the external environment of the project. Here, objectives associated with the former tended to have a higher achievement rate than those associated with the latter. Levels of achievement were also found to be significantly higher (70%) for 'emergent objectives', which arose over the course of the project planning and appraisal periods rather than for objectives set at the outset of the project. This suggests that, if new objectives are set during the conception and planning of an MTP, they are more likely to reflect a new understanding of the prevailing project contexts or an enhanced level of commitment between parties to achieving the newly adopted objective. This finding indicates that the narrative about the failures of many/most MTPs on account of them not adequately delivering on their original objectives can (often) be insufficiently reflective of the realities of project outcomes.

4.3.2. Objectives' links to national and international policies

Linkages between project objectives and regional, national and global policy guidance were found to be poorly expressed across the case studies. They were instead more generally attuned to a rather narrow focus on delivery due in part to the more siloed perspectives of project promoters and delivery agents whose concerns for meeting

⁷Inattentive blindness or perceptual blindness (see Mack and Rock 1998) occurs when one fails to note an unexpected stimulus in plain sight due to a lack of attention rather than any other reasons.

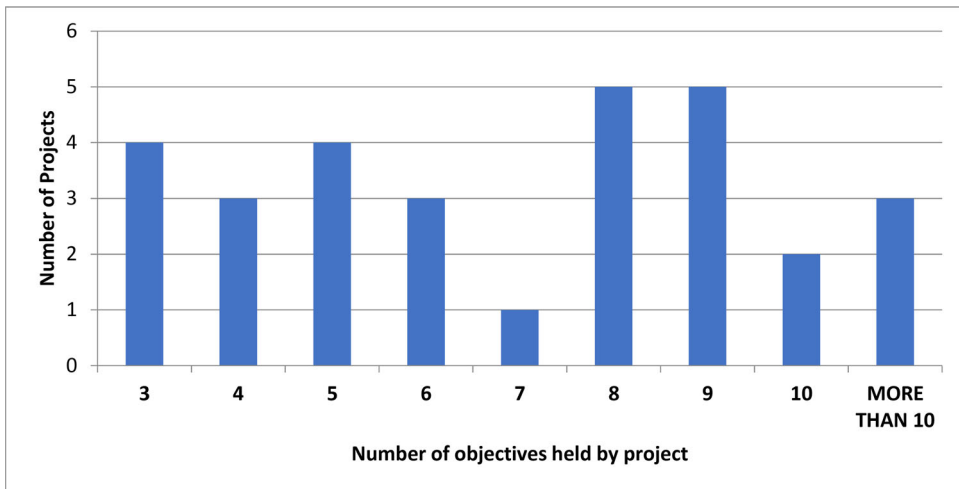


Figure 3. Number of OMEGA case study high level objectives per project.

pre-specified targets were far more pressing and immediate. An analysis of the principal stated objectives of the 27 MTPs reviewed revealed that the most common (featuring in 18 of the 27 projects) were the aims to ‘improve network efficiency’, ‘relieve traffic congestion’ or ‘increase transport capacity’. It should be noted that all these principal objectives are tied to aspirations of increasing transport operations efficiency rather than enhancing transport development impact, including providing any broader and longer-term agent of change aims. Achieving travel time saving was presented as an explicit objective for 12 of the 27 MTPs reviewed and were also implicit within other stated objectives such as those aspiring to improving network efficiency or relieving traffic congestion. Whilst some of the case study project objectives did emphasise the relationship between transport and land use, and indirectly inform their impact on sustainability outcomes, overall, the most frequently cited objectives addressed concerns of transport operations efficiency that often ultimately collided with other more strategic objectives or aspirations, especially of enhancing sustainability.

4.3.3. Flexible, robust and adaptable strategies

OMEGA 2 Project findings suggest that a significant percentage of the MTPs studied were adaptable in their decision making either during their planning or delivery phases (sometimes both) in the face of contextual change, although this was not always from the outset, or by design. [Figure 4](#) shows the distribution of case studies against a classification of issues related to the adoption and adherence to project strategies. It was noted for almost half of the case studies that a ‘strategy’ emerged over time, rather than selected from the outset, revealing an adaptability to some extent, alongside unpreparedness. In contrast, only 30% of the projects were observed to have a co-ordinated strategy from the start.

For projects such as the Channel Tunnel Railway (CTRL) in the UK, apart from the strategic intention to provide a rail link from London to Europe via the Channel Tunnel, there was no clear commonly shared strategy for the planning and

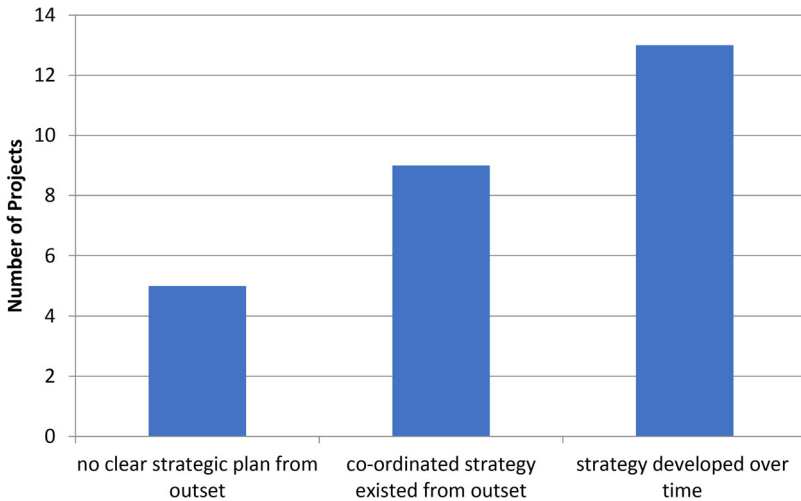


Figure 4. Common characteristics of strategies adopted by case studies.

development of the link beyond route engineering and funding considerations until very late in the planning phases. It was initially not even planned as a high speed railway link. Reflecting this, one of the parties interviewed reported that there appeared at first to be a strong element of ‘muddling through’ explaining: ‘... it (CTRL) was more usually characterized by ad hoc decision-making in response to new and changing contextual elements’ (Dimitriou, Wright, and Ward 2011, 49).

Other findings from the case studies reveal similar strong evidence of projects developing or adapting their strategies over time in response to changing contexts and resultant challenges as they emerged. In the case of the Japanese case studies, for example, there was evidence to suggest that these developed a series of context-led strategies, including the use of technological responses to side-step social problems that developed around issues of option selection. This was particularly visible in the case of the Tokyo Metropolitan Expressway project. MTPs of this kind, employing more piecemeal and evolving strategies overshadowed the minority of other case studies which in contrast adopted very defined positions from the outset, such as the Sydney Cross City Tunnel. An interviewee commenting on this project described its decision-making process as one based on ‘decide, announce and defend’ (DAD), criticised by the study team reviewing this project as a model that ‘... reinforces the tendency to be inflexible, once the decision is made and to place less emphasis on rational and objective analysis prior to decisions’ (Dimitriou, Wright, and Ward 2011, 49).

4.3.4. Balance between strategies and tactics

Of those case study projects adopting what were referred to as ‘defined strategies’, these tended to relate more to project procurement and delivery plans and programmes than expressions of the longer term strategic goals. In this sense, there was little evidence of attempts being made to strategically balance long term goals and short/intermediate term targets. This made it harder to differentiate between longer

term strategies designed to mitigate risk and uncertainty, and those employed during the delivery phase and to trace the links between them.

Regarding procurement strategies, the OMEGA 2 Project found a prevalence of two particular types: the first is the use of specific procurement models such as PPPs and the second, the disaggregation of the megaproject via splitting it up into smaller deliverables. Of the 27 case studies: 30% used PPP contracts as a strategic means to mitigate risk, although the outcome of this was deemed as mixed. The review provided by the Greek study team for the Rion Antirion Bridge, for example, stated: '... the project lifecycle risk rationale of a PPP had (for this project) a positive role in the treatment of risk, uncertainty and complexity in decision making' (Dimitriou, Wright, and Ward 2011, 49). By contrast, the HSL-Zuid in the Netherlands was reported to have encountered a number of risks in using the PPP approach as the following quote from a case study interviewee suggests: '... Because the PPP construction route was adopted, a private company was hired to build the project and it was kept within the Ministry of Transport. The project group had a budget many times greater than the Rijkswaterstaat and direct access to the minister, and seemed to get everything they desired from the minister' (Dimitriou, Wright, and Ward 2011, 49) which according to the respondent caused a great deal of friction and eventually led to a power struggle that was ultimately lost by the project group.

Regarding the disaggregation strategies, 14% of the case studies adopted a strategy of dividing the project into parts, as for the Paris Meteor metro project and the Tokyo Metropolitan Expressway project. In the case of the latter: '... The Corporation (promoter) strategically divided the project into smaller parts, and implemented (its) planning and construction from the easiest to the most difficult part of the project' (Dimitriou, Wright, and Ward 2011, 49). The Attiki Odos road project in Greece was likewise split: '... in six different parts with separate financing so that if the project was halted they could be financially viable if re-tendered differently' (Dimitriou, Wright, and Ward 2011, 49).

4.4. Stakeholder engagement

4.4.1. Stakeholder consultation, trust and transparency

Trust and transparency were identified as key issues for approximately half of the case studies both internally between project stakeholders and externally between the project stakeholders and the public. Many cited poor levels of public participation in projects as a transparency issue. Confirming this, the study team investigating the Greek case studies reported: '... The lack of public participation creates risks – (if) formal public participation is confined to consultation on the Environmental Impact Analysis (EIA) alone which includes (only) a short period for comment and objections. There is, generally, a reluctance on the part of authorities to adequately inform the public if there is limited pressure to do so' (Dimitriou, Wright, and Ward 2011, 57).

Other transparency issues include those focused on private sector negotiations and the lack of transparency afforded to some key project stakeholders concerning such negotiations. For example, in the case of the JLE in London, an interviewee explained: '... I would say that there are various degrees of transparency, not that there was

“insider trading”, but various degrees of transparency’. Regarding the Sydney Cross City Tunnel project, more widespread transparency and trust issues were reported. The Australian study team investigating MTPs in this country alleged that: ‘... The lack of transparency is so deeply ingrained that many believe the contract for the project is not available on the public record. (Whereas) in fact it was released as part of the Joint Parliamentary Inquiry process but remains buried in a series of boxes held by the Parliamentary Office, and is as yet unlisted in any public record’ (Dimitriou, Wright, and Ward 2011, 57).

Some case study interviewee respondents reported that they consider transparency itself can be a source of risk. In the context of the HSL-Zuid rail project, for example, the study team reporting on Dutch case studies contended that while financial transparency was required by politicians, in reality: ‘... the financial transactions and negotiations were difficult and too much openness could give an undesirable advantage to private sector counterparts’ (Dimitriou, Wright, and Ward 2011, 57). The same source explained that: ‘for the tender of this project, members of parliament wanted to know how much everything would cost and to hear it in a public hearing. The project leader asked to have a closed session, but the MPs refused. So all the contractors were present at the hearing to hear how much money there would be before they submitted their tenders’ (Dimitriou, Wright, and Ward 2011, 57), thereby giving an undesirable advantage to the private sector counterparts.

4.4.2. Shared understanding and consensus building

One of the most commonly cited challenges related to risk mitigation concerning MTP stakeholder decision making is consensus building among multiple stakeholders. This issue was cited in 50% of the case studies where many of the interview respondents linked consensus building of this kind as a key means of removing obstacles to project development - both regarding short term objectives and long-term project success. Dealings with multiple stakeholders was also seen as a potential source of project complexity that itself raises risk levels in decision making, especially where/when the stakeholder groups involved were fragmented and held silo-oriented views.

The Dutch study team reviewing case studies in Holland reinforced this position that consensus building was highly significant for the *Randstadrail* project which was deemed a success despite significant financial pressures. The study revealed that the budget for this project was reduced from EUR 6.0bn to EUR 1.5bn, but was still able to proceed as a result of consensus building. This meant that many aspects of the project’s initial aspirations had to be substantially diluted. This outcome, however, was facilitated by the fact that it involved a number of important stakeholders ‘... who, concerning political power, were reasonably all equal which made the compromise arrived at by the regions of Rotterdam and The Hague, and the Ministry of Transport much more achievable’ (Dimitriou, Wright, and Ward 2011, 47).

It should be noted that in the case of the Øresund Link, the Scandinavian culture of conflict avoidance (Schramm-Nielsen 2002) also greatly aided the perceived success of the project via the considerable consensus building achieved. In the case of France, less likely perhaps than Scandinavian countries to adopt conflict avoidance in negotiating (Sverdrup 2003), the study findings observed that the Paris Meteor project also

made considerable progress in its legal planning aspects as a result of consensus building. Reviewing this case, the French study team elaborated on this observation by explaining that a: '... Consensus was finally achieved between the public financiers and the *Régie Autonome des Transports Parisiens* (RATP) in 1989 which considerably simplified the incorporation of the project into the State-Region planning contract (*contrat de plan Etat-région*) and its financing programme. RATP anticipated the interest of the Region and the State in the competing the EOLE project and proposed a complementary rather than competing route' (Dimitriou, Wright, and Ward 2011, 54). The same source reported that the stance of each financier involved had been well anticipated by RATP, with the latter clearly appreciating it was vital to convince the State (the main decision-maker in the Ile-de-France region at that time) of the benefits of consensus building.

The OMEGA 2 study findings also revealed that approximately 40% of its case studies highlighted the negative nature of some project impacts due to professional and institutional silos. Reinforcing this point, the US case study team noted that the type of complexity that heightened risks occurred where it was '... rooted in the (complex) organizational context of the US transportation system ... characterized by modal silos in which single modes of transportation are handled by separate agencies; and (thus making) planning and funding across the agencies extremely difficult' (Dimitriou, Wright, and Ward 2011, 55).

Other findings, however, reveal examples of where the adverse impacts of professional and institutional silos were overcome. Cases in point were the Athens Metro - where it was reported that '... the urgency of the project and the autonomous management team allowed traditional silos to be overcome' (Dimitriou, Wright, and Ward 2011, 55). Similarly, in the case of the New York Airtrain it was reported that '... The organizational complexity associated with building a project required crossing silos' separating air, rail and highway modes (a feature specific to the USA) was successfully handled only by having a high-level political champion (in place to promote the project), critical inter-agency cooperation and coordination at both executive and working levels and, when required, (the deployment of) skilful negotiations by a designated official' (Dimitriou, Wright, and Ward 2011, 55).

Likewise, in the UK, the study team reviewing the CTRL project noted that '... it would seem that the establishment of close working relationships within and between organisations greatly helped to overcome barriers and silos' which in turn fostered a mutual understanding of the organisations' motives and positions. This finding resonates with experiences reported from the Athens Metro where the '... lack of coordination started at the top in the public sector' (Dimitriou, Wright, and Ward 2011, 58).

The Netherlands experience, on the other hand, highlight political decisions that actively fragmented the key institutions charged with project delivery. This was recounted by the Dutch study team reviewing MTPs in Holland as the following statement suggests: '... In the 1990s it was seen as necessary to introduce the market into the public transport sector because the EU would want that. For the national railways, this meant the company was split into several pieces, including an engineering department (as well as) the infrastructure provider/supervisor (agencies) and the transport

operators. This caused a great deal of friction between the Dutch national railways and the national government, which made it difficult to integrate any (major rail) project within the national transport system. (Instead) it had to be pursued on a separate track that could be put out to tender, which made the entire project planning and delivery processes far more complicated' (Dimitriou, Wright, and Ward 2011, 58).

5. Conclusions

This paper set out to achieve two primary objectives. The first, was to present a framework for the evaluation of MTP decision making as it relates to important elements in the mitigation of strategic planning risk. The second was to document the findings of applying this framework to a multi-case study of MTPs, with a view to extracting a set of lessons for decision makers on potential improvements to practice for MTPs in general and perhaps also for other sectors of mega infrastructure development.

Regarding the first objective, key findings from a synthesis of the literature from the OMEGA 1 Project provided a normative evaluation framework formed from three pillars: the importance of context, strategic planning and stakeholder engagement, as a basis for mitigating against risks. It is expected that such a framework could also be adapted for use in ex-ante appraisal to assist in the assessment of strategic planning risk and also as a monitoring tool. The author contends that the framework as proposed presents some fundamentals which, if established early in the project planning stage and then maintained during the following stages of project development through to delivery, they are better able to support the management of strategic risk in the longer term.

Concerning the second objective, the qualitative evaluation of 27 OMEGA MTP case studies set against the normative framework, developed in [Section 2](#) of this paper, yielded a number of high-level observations regarding the presence (or otherwise) of good practice in the identification and mitigation of strategic planning risk as follows:

- **Projects need to be aware of the changing nature of context, and in particular those related to the political, economic, and institutional aspects of the project which are often sources of significant risk:** It is apparent from the above evaluation that MTP planning, appraisal and delivery agents all too often fail to undertake effective sensemaking of changing contextual influences *throughout* the project lifecycle. This leads to the inadequate identification and mitigation of the risks such contexts pose to long term project objectives. This is surprising given that such influences frequently play a pivotal role in determining project outcomes and long-term success, for example, where short term political cycles and the resulting abrupt changes to political agendas can make or break projects. This regularly leads to situations in which MTP planning, appraisal and delivery processes simply have to react to contextual change 'after the fact' which leads to significant mismanagement of risks over both the short and long term. A formal and sustained scanning of significant contextual forces is therefore seen as a means to anticipate and/or provide an 'early warning' of the need to adjust MTP planning, appraisal and delivery systems/approaches. Part of the process of enabling would be to put the necessary institutional frameworks in place, but also to locate and

reduce the path-dependent practices which are seen to promote a myopic focus on internal risk.

- **Projects need effective, flexible strategies to better consider long-term outcomes and impacts:** In certain cases the case studies exhibited an ability to respond to important changes in project context(s) and that these changes frequently served to mould projects during their development. However, the projects appeared to accomplish this more by muddling through than by design, which risked compromising their long term outcomes and impacts. Many case study findings point to the fact that strategizing, when observed, tended to focus on short term delivery goals, with longer term relationships between MTPs and broader spatial/sectoral planning frameworks neither fully understood nor properly exploited through meaningful institutional structures or objectives properly linked to policies and programmes. This may lead, on the one hand, to missed opportunities for MTPs to effect beneficial change and, on the other hand, a serious under-estimation of the short and longer-term impacts of such projects. There remains a need to put robust, adaptable strategies in place, with align with relevant policies and form a bridge between these and the tactical operations of the project. The latest revisions of the UK's HMT Green Book (HMT 2020) resonate with these study findings, where deficiencies in these respects have come to the fore.
- **Stakeholders need to be consulted early, and in a way to facilitate consensus building:** The case studies revealed that effective consultation, thereby building up trust, credibility and transparency, was not widespread amongst the projects studied. Of those projects which did openly engage, such engagement was much less effective if undertaken after project objectives have been firmed-up by the project promoters, where it could serve to increase confrontation in certain instances. Also, there were some specific issues where key public sector stakeholders become highly suspicious about matters that become opaque in the decision-making of its private sector partners as a result, for example, of their declared need for so-called 'commercial sensitivity' in cases of PPP/PFI projects.

Finally, regarding consensus building, the picture was also mixed, with some very good examples of diverse stakeholders reaching agreements to proceed in extremely difficult circumstances. However, consensus building issues were identified with close to half the case studies. There is a need to recognise that the complexity associated with the planning, appraisal and delivery of MTPs involve confronting many professional and organisational 'silos' and closed system thinking observed in a number of the OMEGA Case studies. This is important as the full ranges of anticipated strategic benefits are unlikely to be met as a result of delivery alone. Projects need to be accompanied by dedicated and sustained political, policy, financial, institutional and other supported resource commitments/programmes of a more integrated kind.

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ORCID

E. John Ward  <http://orcid.org/0000-0001-6756-8432>

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Appendix 1. 27 OMEGA centre case studies

Country	Mega Transport Project	Date Finished	Final Costs US\$ (billions)	Project Type
UK	Channel Tunnel Rail Link (CTRL)	2007	9.6	High speed rail
	Jubilee Line Extension	1999	6.8	Metro rail (subway)
	M6 Toll Road	2003	1.7	Inter-urban toll motorway
France	Météor Rail: Saint Lazare – Olympiades, Paris	1998	1.8	Metro rail (subway)
	TGV Med: Valence – Marseille	2001	6.6	High speed rail
	Millau Viaduct: Millau, South France	2004	0.5	Road bridge (on motorway)
Greece	Rion-Antirion Bridge: Rion – Antirion	2004	1.3	Road bridge
	Athens Metro: Sepolia – Dafni and Monastiraki – Ethniki Amyna, Athens	2003	4.6	Metro rail (subway)
	Attiki Odos, Athens	2004	5.4	Inter-urban toll motorway
Netherlands	HSL Zuid: Amsterdam Zuid to Schiphol Airport, Rotterdam and Connections to Antwerp, Brussels and Paris.	2009	9.8	High speed rail
	Randstadrail: The Hague to Rotterdam and Zoetermeer,	2007	1.6	Light rail and bus
	Beneluxlijn: Extension of Rotterdam Metro Network.	2002	1.0	Metro rail (subway)
Sweden	Øresund Road, Rail, Bridge/Tunnel Link: Malmo-Copenhagen	2000	4.1	Road and rail, bridge and tunnel
	Sodra Lanken Road Tunnel: Stockholm	2004	1.3	Urban motorway tunnel
	Arlanda Rail Link: Stockholm Airport to Stockholm	1999	1.1	Airport express rail link
USA	Airtrain: JFK Airport: New York City	2003	2.2	Light rail airport link
	Alameda Rail Link: Los Angeles (Port – downtown)	2002	2.8	Freight rail line
	Big Dig Road and Tunnel Links: Boston	2007	15.5	Urban road tunnel and bridges
Australia	City Link, Melbourne	2000	2.5	Urban toll motorway
	Metro Rail, Perth	2007	1.7	Inter-urban rail line
	Cross City Tunnel, Sydney	2005	1.1	Tolled urban road tunnel
Hong Kong	Western Harbour Crossing: Hong Kong Island – Kowloon	1997	0.9	Tolled urban road tunnel
	Airport Rail Links: Hong Kong Central – Chek Lap Kok International Airport	1998	4.4	Airport express rail link
	KCRC West Rail Link: Tsuen Wan – Yeung Long,	2003	5.9	Urban rail line
Japan	Metropolitan Expressway: Nishishinjuku Junction – Kumanocho Junction, Tokyo	2007	5.5	Tolled urban road tunnel
	Shinkansen High Speed Rail Link: Kagoshima - Chuo – Nakata	2004	7.5	High speed rail
	Oedo Metro: Hokomae – Hikarigaoka Tokyo	2000	11.4	Metro rail (subway)

Source: OMEGA (2012, 4).