

MEGA PROJECTS AND MEGA RISKS:

Lessons for Decision-makers through a Comparative Analysis of Selected Large-scale Transport Infrastructure Projects in Europe, USA and Asia Pacific

VOLUME 2: SUPPORTING 'OTHER' OMEGA CENTRE STUDIES

Findings of a five year international research programme funded by the Volvo Research and Education Foundations (VREF)

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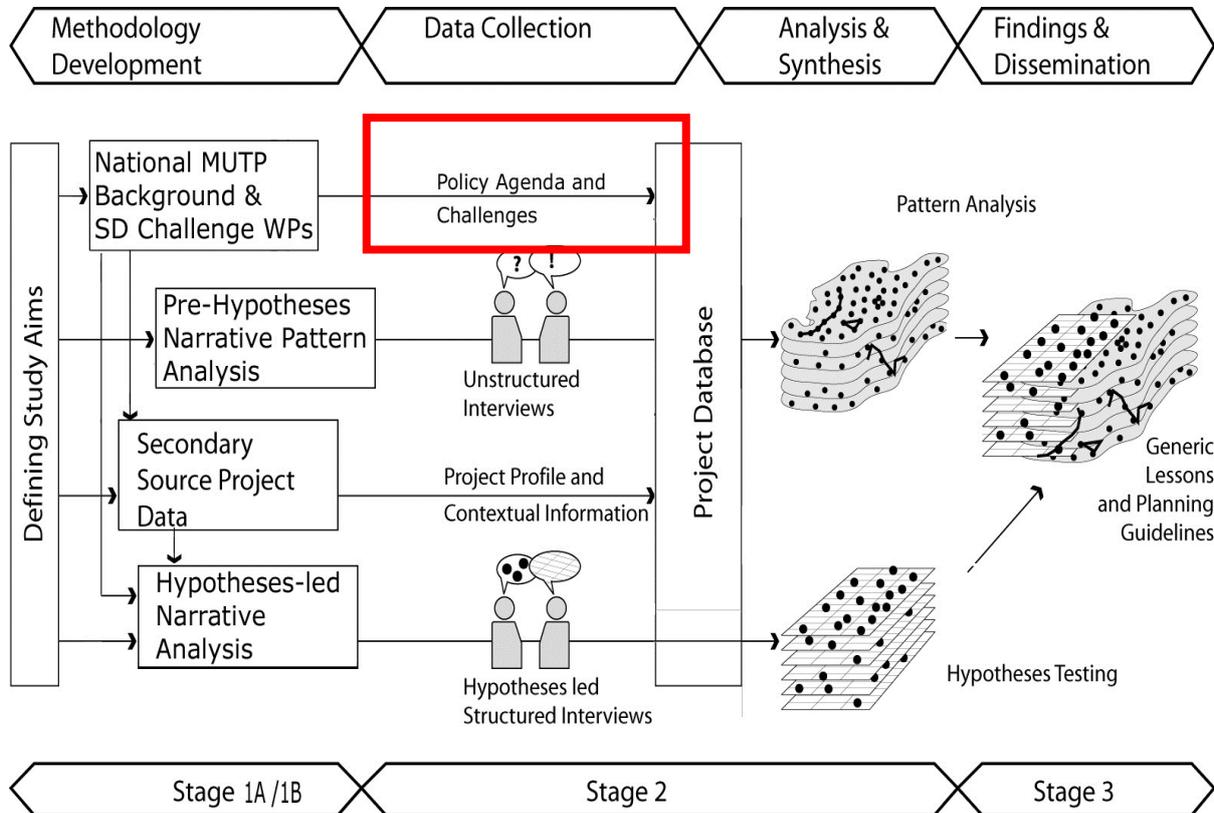
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Document Navigation Note

The figure directly below offers an overview of the overall OMEGA research programme Study Methodology. The area highlighted in red is dealt with by this volume of the report.

The OMEGA Study Methodology



1. Introduction

In the course of the OMEGA Centre's international research into mega-urban transport projects (MUTP's), numerous working papers and complementary research studies were undertaken as part of the overall programme. This work was carried out by the OMEGA Centre and its Partner Organisations in the ten countries of study, and also by associated academics and practitioners doing specially commissioned studies. (Full details of the participating organisations and individuals are given in Volume 1).

Volume 2 presents a synthesis of this supporting and complementary research work. The various studies summarised in Volume 2 describe the background and context within which the 30 case study mega-projects were conceived and implemented, and also provide insights into specific aspects of MUTP planning, appraisal and delivery.

The following summaries are presented in Volume 2:

Section 2: The OMEGA 1 Project (or 'Smaller VREF Project'), carried out by the OMEGA Centre on the treatment of risk, uncertainty and complexity by other disciplines and professions;

Section 3.1: The OMEGA 2, Working Paper 1 Series: a synthesis of ten working papers prepared by the Country Partners on 'National Planning, Appraisal and Funding Frameworks for Mega-Projects';

Section 3.2: The OMEGA 2, Working Paper 2 Series: a synthesis of ten working papers prepared by the Country Partners on different aspects of 'Sustainable Development Challenges of MUTP's';

Section 3.3: The OMEGA 2 report on 'Corporate Social Responsibility' – a study of CSR issues encountered in the three UK mega-project case studies;

Section 4: The OMEGA 3 Project, or RAMP (Risk Analysis and Management for Projects) Study, carried out by the OMEGA Centre for the UK Institution of Civil Engineers and the UK Actuarial Profession on 'how better to incorporate social and environmental dimensions of sustainability into the appraisal of major infrastructure projects'.

The next volumes of this final report on the OMEGA research programme provide the detailed analysis of the 30 mega-urban transport projects, as follows:

Volume 3 – Findings from the three UK mega-project case studies;

Volume 4 – Findings from the 27 international mega-project case studies;

Volume 5 – Comparisons, lessons and findings from the 30 mega-projects overall.

2. The OMEGA 1 Project: Treatment of risk, uncertainty and complexity in planning by other disciplines and professions (The 'smaller VREF project')

2.1 Project aims and purpose

The 'smaller VREF project' (also referred to as the OMEGA 1 Project) and its findings summarised here are the outcome of a successful research grant application to the Volvo Research and Education Foundations (VREF) submitted in 2004, commenced in 2005 and completed in September 2008. Undertaken on the premise that the treatment of risk, uncertainty and complexity (RUC) was much less well developed in the fields of urban and regional planning and infrastructure planning, and that this inadequate focus has had serious constraining impacts on mega urban transport project (MUTP) developments, this research project sought to put together a set of commissioned papers which offered a rich source of information from leading authorities (within and outside the planning arena) on the treatment of RUC in decision making as a possible source of lesson-learning. What was significant about these contributions was that the bulk of them were commissioned from parties in disciplines, sectors and/or professions *outside* the fields of urban and regional planning, and infrastructure planning, and in fields where RUC has long been seen to be at the *milieu* of their planning decisions.

The findings were derived from a review of some 15 contributions, contained in three Working Papers and summarised in a fourth, highlighting, where appropriate, generic implications for decision-making in the planning, appraisal and evaluation of MUTPs (see Appendix 13 for links to the individual reports).

2.2 Summary of project findings

2.2.1 Risk management responses

While a total of 15 individually commissioned papers on the treatment of risk, uncertainty and complexity in decision-making for planning – even with a very broad span of disciplines and professions - *cannot* claim to be representative in any way, the papers do highlight a number of significant findings with the most explicit treatment of the fields of RUC being evident in the contributions from the military analyst, the property developer, the banker, the insurance broker/ actuary, the earthquake engineer and the civil engineer/ project manager. In other quarters, the treatment of RUC was found to be much less apparent. The review of strategic and regional planning, city planning and transportation policy represented more critiques of how RUC *ought* to be treated, rather than how they were treated, suggesting that these professions/disciplines have a history of adopting a more naïve and piecemeal approach to RUC; in some cases displaying even a strong resistance to the more explicit systematic factoring in of RUC to decision-making despite early attempts in the late 1960s through to the late 1980s by Friend and Jessop (1969) and Friend and Hickling (1987/2010) to introduce a more explicit treatment of these fields in planning. This observation reinforced the starting premise of the research conducted for this project.

More specific findings included the following regarding the ensuing topics:

- **Complexity as a driver of uncertainty:** Here it was found that the properties of complex systems include: 'emergent' rather than directed outcomes. And that relationships that contain: feedback loops, 'open systems' and retrospective coherence, represent an acknowledgement that the whole is more than the sum of the parts and thus the presence of 'holonic' (hierarchical) characteristics. Also noted was a difficulty to determine: boundaries (subsequently described as 'fuzzy' boundaries), relationships

that are non-linear, human behaviour over the long term, and relationships that are non-linear with transitions occurring abruptly when thresholds are breached (at ‘tipping points’).

- **The management of risk:** Here we learned from the commissioned papers (particularly Working Paper #1) that there are five principal strategies for managing risk. These include the strategies for risk: avoidance, reduction, sharing, transfer, retention, and hybrids of these. It was found that those professions, disciplines and sectors that deal with decisions on a day-to-day basis within a context that incorporate significant levels of uncertainty, talk primarily of risk, since they are very much aware of the possibility that their decisions and subsequent actions may *not* yield the results that were intended. Uncertainty is notionally represented in all risk models – this being the probability of an unfavourable event in relation to the magnitude of its consequences. This construct remains the case whether or not each of these dimensions is actually quantifiable; which in many cases they are *not*, as uncertainty is unresolved for a variety of reasons. This is the decision space occupied by judgement. From a comparative analysis of the treatment of RUC risk by the authors of Working Paper #2 and Working Paper #3 it seems that the principle strategies for the management of risk which feature heavily in the former are *not* supported by the discussions regarding urban and regional planning and transportation planning cited in Working Paper #3. This suggests there is scope to transfer risk management strategies more widely into the fields of strategic urban and regional planning, and transport policy and planning, including for MUTPs as premised from the outset of the study.
- **Context of risk:** Here much emphasis was placed on the importance of the multi-dimensional characteristics of ‘context’ of which the following categories of properties are the most apparent: temporal, spatial, political, institutional, economic, social, attitudinal, and environmental. What was highlighted here is that the context of any individual decision is unique, if only because of its temporal context, despite common threads and similarities (particularly in standardised decision-making processes, packages and models). Context is, in other words, *never* repeated in time, even though decisions may take place on a regular basis in the same place and institution. Technological outcomes of these decisions (such as transport hardware investments and infrastructures) may be replicated in different time and geographical contexts. They are, however, *unlikely* to be successful without particular sensitivity and attention to the unique set of local conditions. Categorically, ‘one size does not fit all’ despite the rhetoric.
- **Generic attitudinal context:** From the papers commissioned for Working Paper #2 and #3, four principal categories of attitudinal contexts were identified. These include: adversarial, competitive, collaborative and mitigative contexts. The military clearly operate in an adversarial arena, while the seismic engineers’ practices are almost always mitigative in character. Each of these categories of contexts can be set against a typology of risk responses as outlined in Figure 2.1. This table illustrates the variety and pervasiveness of the treatment of risk across sectors. It does *not*, however, reveal ‘trust’ as a widely represented theme. Notwithstanding the fact that we had a limited selection of disciplines, professions and sectors represented in our contributing papers, and that we had papers that principally refer to the UK context, only a very few of the contributors highlighted the feature of ‘collaboration’ amongst companies as being important. Interestingly, this was in the delivery of large projects in the construction industry. Even here, however, it was indicated that in the face of delays or cost overruns consortia members quickly degenerated into a blame culture and adversarial relationships. This in part was attributed to the overall adversarial (legal, governmental and commercial) environments that prevail in the UK which has been widely criticised both within and outside the industry as representing an ineffective model.

Figure 2.1: Risk management responses

Generic Risk Management					
	Avoid	Reduce	Share	Transfer	Retain
Generic Attitudinal Risk	Adversarial	<ul style="list-style-type: none"> Retreat 	<ul style="list-style-type: none"> Reinforcements Recruit Technology advance Win battle Strategy 	<ul style="list-style-type: none"> Alliance 	<ul style="list-style-type: none"> Mercenaries Stand-off
	Competitive	<ul style="list-style-type: none"> Sell-out Cartel 	<ul style="list-style-type: none"> Take-over Specialisation Lobbying Strategy 	<ul style="list-style-type: none"> Joint-venture Diversification 	<ul style="list-style-type: none"> Franchise Insurance Sub-contract Market
	Collaborative	<ul style="list-style-type: none"> Cartel 	<ul style="list-style-type: none"> Trust Consortia Alignment Strategy 	<ul style="list-style-type: none"> Contract Consortia Trust 	<ul style="list-style-type: none"> PPP/PFI Trust Trust
	Mitigative	<ul style="list-style-type: none"> Relocate Reroute Abandon 	<ul style="list-style-type: none"> Protective works Resilient structures Strategy Contingency 	<ul style="list-style-type: none"> Co-operate 	<ul style="list-style-type: none"> Insurance Gamble

Source: Dimitriou, H.T., R. Oades, J.Ward and P. Wright (2008) “*Working Paper 4: Generic Lessons for Improving The Treatment Of Risk, Uncertainty and Complexity in The Planning of Mega Urban Transport Projects*” in Working Paper Series on the Study of the Treatment of Complexity, Uncertainty and Risk-taking in the Planning of Mega Urban Transport Projects for Project VREF SP2004-3, OMEGA Centre, University College London, p117.

2.2.2 Lessons for MUTPs

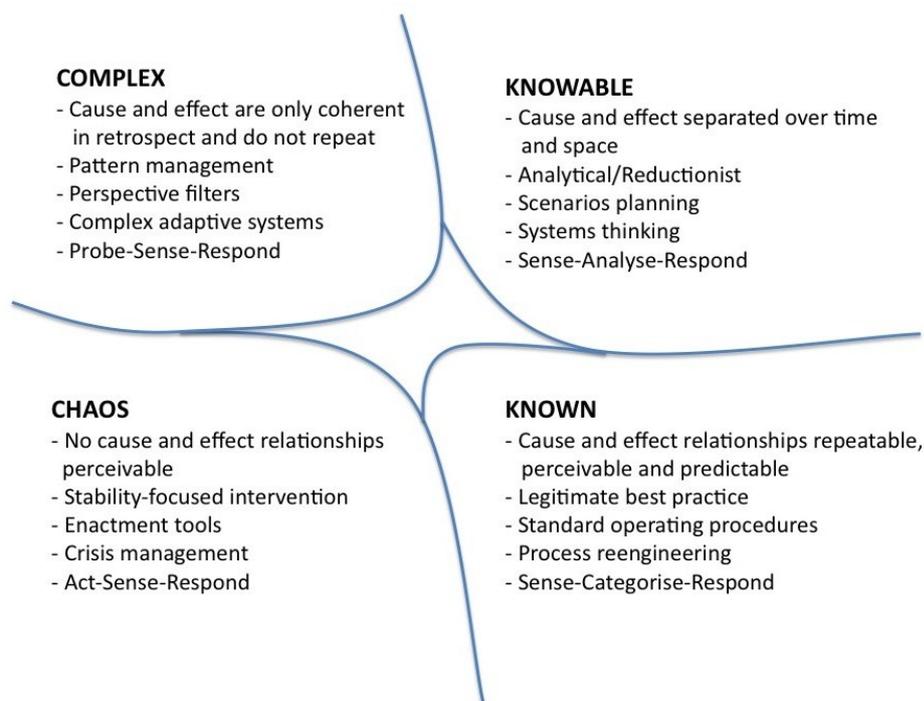
The following were the principal lessons derived from the OMEGA 1 Project considered *potentially* relevant to MUTP developments. They are summarised under the following six themes:

- Project lifecycles:** Here we highlighted some of the key insights that can be drawn from the different disciplines reviewed both within and outside the MUTP and/or related ‘planning’ fields that have demonstrable relevance to MUTP lifecycles. Most of the insights gained from our contributors have broad relevance to multiple stages of the project lifecycle. The following discussion identifies those insights which occur *most* frequently and that appear to have critical relevance to MUTP planning, delivery *and* operation. It was, incidentally, noted that whether or not one looks at MUTPs from the point of view of being instruments of public sector policy-making or private sector investment, they are *clearly* characterised by significant elements of ‘business’ *and* ‘government’. The processes/circumstances through which they are conceived, planned and delivered therefore substantially resemble the practices, techniques and approach to decision-making found in other fields such as banking, the military, public health, as well as in infrastructure planning. While there are a number of ways of defining the individual stages in a project lifecycle, depending upon which particular discipline/field is being considered, for the purposes of extracting useful lessons associated with the MUTP lifecycle, the following six ‘generic’ phases were identified:
 - Project conception:** This being the period/point when the apparent need or desire for the project is first considered by the sponsoring agent.
 - Project planning:** This being the period when action is taken to determine the scope, nature and cost of the project (including its key specifications, routing options, probable approach to funding and so on).
 - Project appraisal:** This relates to appraisal exercises that take place *prior* to project implementation (i.e., *ex-ant* appraisal). In this regard appraisal is seen as part of project planning rather than separate from it. It addresses concerns regarding financial *and* economic viability (e.g. cost-benefit or value-for-money studies) as well as having been extended to include social, environmental and

- (even) institutional concerns. This phase may include various forms of public consultation and/or participation exercises.
- **Project implementation:** This period commences when the project deliverers are appointed, contracts are awarded, financial packages are agreed, business plans are approved, any necessary land acquisition takes place, construction work is undertaken, mitigation measures are put in place and the operability of the project is tested and commissioned.
 - **Project operation:** This period is when the project is brought into full use following the appointment of agencies responsible for its operation, management, maintenance and control and the provision of adequate funding.
 - **Project evaluation and monitoring:** This period is a post-project implementation appraisal exercise (i.e. *ex-post* appraisal) when project assessments are made either as 'one-off' exercises and/or as part of on-going monitoring of performance against pre-set targets/measures/indicators designed to assess/monitor the performance of the project against pre-set objectives.
- **Square pegs into round holes:** It was here emphasized that the above project lifecycle definitions are neither exhaustive nor totally mutually exclusive – as phases do 'flow' into each other and there is a constant iteration of project processes within and between these phases, made necessary as new issues and problems come to light. In certain respects, this emphasises the typical cyclical character of the project lifecycle. In other respects it provides contradictions with the linear treatment of the sequential stages of the phases of MUTP developments that are often observed. Lessons gleaned from the preceding analyses included the following:
 - **MUTP lifecycles are typically fraught with concerns about risk, uncertainty and complexity:** These concerns were found to be essentially associated with (*inter alia*) their size, cost, long gestation and implementation periods, as well as controversy, extent of impacts, and uniqueness. To date they (and sometimes their contexts) have largely been treated as 'closed systems' for the purposes of managing their planning and delivery against the background of an essentially linear (sequential) framework and logic of the type where certain components of the MUTP are 'frozen' during different phases (to make implementation more comprehensible) often for longer periods than is desirable irrespective of the downstream ability to respond to changing contexts.
 - **MUTPs are frequently considered as 'closed systems':** This is the case where outcomes are expected to be both controllable and in accordance with pre-determined plans, schedules and programmes. Reality suggests, however, that MUTP planning, appraisal and delivery are subject to manifold contextual influences that make detailed control on *all* fronts difficult if not impossible to achieve. It has been argued as a result that MUTP planning, appraisal and delivery exercises should be treated as 'open systems' which see the project and its interaction with 'context' (in its broadest sense) as exploratory and almost organic, where unexpected outcomes become recognised and accepted as part of an 'emergent order'. Here it was felt that the domains associated with the *Cynefin* framework offered a pragmatic way of considering both the nature of these systems and the RUC associated with MUTP decision-making (see Figure 2.2).
 - **Regular and sustained monitoring throughout the project lifecycle of all contextual influences is of utmost importance:** This was especially considered to be the case if MUTP planning, appraisal and delivery is to be effective in responding to changing circumstances. It was concluded that particular importance needs to be paid to 'contextual change' resulting from a sense-making of the interplay of ideas, beliefs and values associated with different stakeholder groups and individuals. Appreciating that this is often a most difficult exercise to undertake and discern because fully comprehending the complexities of context owes much to personal, group and institutional perceptions and experiences, where (for example)

- values change, new agendas form, new allegiances and networks wax and wane, and new imperatives come and go, this insight was seen to be critically important.
- **The changing demands placed on MUTPs can make it excruciatingly difficult to judge project successes and failures.** Changing demands placed on MUTPs (often *during* the project lifecycle) as commodities, services and instruments of public policy change make it exceedingly difficult to establish what should be the actual criteria for judging whether projects are 'successful' or not at any point in time. This calls into question: who should set the criteria for success?; what weight should be given to different stakeholder perceptions of 'success'?; what information should be used to measure success against such criteria? and for how long do these judgements remain valid?
 - **A pre-requisite for successfully dealing with RUC in decision-making in MUTP planning, appraisal and delivery is the possession of a well thought-out strategy:** Possessing a strategy that reflects the priorities of the tasks at hand and the resources available, in line with the opportunities and constraints presented by the context in which the strategy is to be implemented, were seen to represent the *most* effective means of dealing with RUC in decision-making throughout a MUTP's lifecycle. Given the constant interaction with context by an MUTP, strategies need to be clearly articulated, realistic, shared with all stakeholders, and sufficiently robust/flexible to cope with changing circumstances (including changing contexts). Since MUTP lifecycles are typically perceived as lengthy (paradoxically) linear processes, subject to changes in context and consequently changes in demands, all strategies employed require regular iteration and adjustment (sometimes wholesale change). Such strategies it was concluded need to be sustainable in the short, medium *and* long-term, i.e. be capable of operating across the three horizons, with appropriate bridging mechanisms between these different time horizons.

Figure 2.2: The Cynefin Framework



Source: Snowden, D. (2000) "Cynefin: a sense of time and space, the social ecology of knowledge management". In Knowledge Horizons: The Present and the Promise of Knowledge Management ed. C Despres & D Chauvel Butterworth Heinemann October 2000

- **Importance of context to project lifecycles:** The awareness of 'context' as the *key* factor in successful decision-making that addresses RUC is clearly recognised (either explicitly or implicitly) by all contributors to the OMEGA 1 Project within and outside the MUTP/planning field. It was argued by many contributors that while we may not *consciously* account for all of the individual contextual matters being considered at key project decision-making points, there is much evidence that we are nevertheless (perhaps subconsciously) very 'context aware'. Others claimed, arguably, that context awareness is a characteristic possessed by the most effective politicians, entrepreneurs and managers; with such awareness being more intuitive than systematic which nonetheless makes it no less powerful as an agent of change. It was concluded that if we accept that context awareness is a vital pre-requisite for effective decision-making for MUTPs then it is clearly critical for *all* phases in the project lifecycle. On this basis, MUTP planning and delivery has to cope with a very broad spectrum of contextual elements which will inevitably change during the various stages in the project lifecycle and that, therefore, it is unsurprising that treating such projects as a closed, linear system where outcomes are thought to be thoroughly predictable throughout the project lifecycle is, at best, wildly optimistic. This view is shared by Batty (2008) who points out:
 - **City and regional systems into which MUTPs are placed are extremely complex** and evolve over time as order emerges from agents responding to context and each other - sometimes change is abrupt, sometimes it is subtle and takes place over a long period, making it doubly difficult to discern the magnitude and extent of such evolution. These then are clearly open systems where impacts and outcomes are frequently unpredictable.
 - **MUTPs as complex systems can never be precisely defined, or perhaps even comprehended.** If one considers MUTPs as influential components of city/ regional systems, then closed system thinking *cannot* adequately address their fluidity and evolutionary nature. Indeed, it is arguable that such complex systems can never be precisely defined or perhaps even comprehended.
 - **The absence in reality of the presence of an 'equilibrium' in city/ regional systems as the context(s) of MUTPs** makes the adoption of any premise about optimality more a feature of modelling convenience than anything else.

In light of the above, it was concluded that it is critically important for MUTP planners and delivery agents to *constantly* scan the many different elements of context throughout their project lifecycle - *both* before and after key decisions are taken, and that the gathering and analysis of such contextual data (both top-down and bottom-up, involving manifold stakeholders) is a first, very necessary step in strategy formulation. It was also concluded that outputs from these broadly based scans need to be widely disseminated to stakeholders so as to receive input on their validity and to discern the often subtly different 'weight' that groups, individuals and institutions attribute to individual aspects of context. Other key selected findings regarding the importance of context on the project lifecycle drawn from the review of contributions include the importance of:

- **Understanding the reasons why MUTPs evolve as they do:** This it was concluded can offer vital clues to MUTP planners and delivery agents (and operators) of how to plan/deliver future projects, notwithstanding lessons from past history having validity *only* when context is taken fully into account – since history does not fully repeat itself.
- **Appreciating that stakeholder contexts can be especially fluid and are therefore a major source of RUC:** Stakeholders and stakeholder groups/networks change in response to different perceptions about the nature, scale and impacts associated with MUTPs over the course of the project lifecycle. New foci and agendas also emerge over time resulting in the need for the project to evolve.
- **Defining 'winners and losers' and the attendant different perceptions of MUTP 'success or failure':** This was deemed a *very* significant task in understanding

context. Today's winners may be tomorrow's losers and today's successes may become tomorrow's disasters (and *vice versa*).

- **MUTP planners and delivery agents needing to be fully aware that 'change' is gathering increasing pace due to technological improvements and globalisation:** These forces, it was concluded, are highly important contextual factors. Also important it was observed is that MUTPs *themselves* may positively contribute to the pace of change. This is particularly important given the likelihood that inadequate sense-making of context leads to dysfunctions later - both in relation to later phases of the project lifecycle and in respect of changes that occur in city and regional systems *after* MUTP implementation.
- **Interconnectedness between different elements of context leads to RUC that are particularly difficult to identify or analyse successfully:** Here the consensus was that there is arguably, no amount of detailed context scanning that can successfully identify and analyse RUCs that arise in this way. The lesson here perhaps, using Peter Hall's words, is to "make haste slowly" (Hall 2008) by allowing MUTPs to evolve gradually in response to changing contextual forces and be given 'the time and space to breath'.
- **Complex adaptive systems do *not* return to a state of equilibrium after being disturbed:** This conclusion was deemed to have particular significance for plans for the implementation of MUTPs and any attendant city/region restructuring initiatives. It was also seen to pose particular implications for decision making in regard to the choice of distinct moments in time when to draw the consultation period to a close and in effect 'freeze' the MUTP proposal as a basis for implementation, since, from that point on, it can be seen to becomes resistant to change.
- **Importance and nature of 'Strategy' in coping with emerging order and combating complexity:** Building on earlier observations and comments made by the various contributors it was concluded that planners, delivery agents and operators need to consider MUTPs 'strategic' vehicles which have different needs, outputs and impacts at *different* stages in their project lifecycle across different times scales and spaces of impact. In these terms, it was further concluded, MUTPs consequently need to be seen *not* as 'projects' *per se* but instead as agents of change that represent a bundle(s) of projects and accompanying plans/programmes which require strategic thought both at the outset and on an on-going basis. This requirement to comprehend the complexity of fuzzy boundaries of many if not most MUTPs reinforces the notion that MUTPs are demonstrably *not* 'closed systems' nor are they commodities with closed market systems (though they may encompass elements of commodity provision) but 'open systems. This is the case, notwithstanding the fact' that on specific occasions (for practical purposes alone) such projects need to be analysed and treated akin to 'closed systems'.

Also noted by some contributors is that not only do MUTPs themselves possess the potential to change contexts and contribute to a new emerging order, they are *themselves* changed by context. This strategic function of MUTPs is reflected in the fact that they often have public service objectives and are employed (implicitly or explicitly) as a means to effect strategic change in city and regional systems (through for example, regeneration and economic restructuring efforts) even though they may utilise aspects of the market in the financing and funding of these public services. On the basis of the preceding discussion and taking into account the various contributions to the OMEGA 1 Project Working Papers, the following observations (in no particular order of priority) were made regarding what were considered the broad characteristics of an effective MUTP strategy:

- **Achieving desirable (political) effects *without* incurring disproportionate costs:** An effective MUTP strategy *must* produce acceptable cost solutions in the face of perceived RUCs. In so far as it is able to do this, MUTP strategies need to balance the requirements for implementing a vision for the project and its accompanying spatial and temporal contexts, with the practical requirements

associated with the efficiency of the services offered, the various cost ceilings adhered to, and of course, remain within the limits of available resources (including institutional and regulatory support) to deliver the project. In this regard, it was suggested that it is important to acknowledge that for PPP/PFI projects, private sector goals and objectives (generally short-term and accompanied by the need for 'certainty' on the part of public sector delivery) may well *not* align precisely with those of public sector sponsors whose expectations are often more longer term in respect of desired outcomes. Achieving consensus in this context, it was emphasised, while difficult is invaluable.

- **MUTP planning and delivery strategies need to identify which forces of change they are trying to influence or harness:** This is linked to the need for MUTPs to be clear and consistent about matters of project definition given how such projects interact with wider agendas such as those surrounding 'sustainability' and 'regeneration' (terms which are subject to widely differing interpretations). Without such clarity it was argued, projects are vulnerable to the use/misuse of rhetoric and possible project cost escalation.
- **Consensus-building at the preliminary strategy formulation stages is likely to be essential:** Here the ability to scan and understand stakeholder frameworks and the positions adopted by stakeholders over time is imperative. The prevailing influence of adversarial versus collaborative cultures is also highly relevant. So too is the ability to build trust through transparency across (and between) organisations and individuals, so as to achieve a solid foundation of project support.
- **Strategies typically need to be flexible/adjustable and robust, paying due attention to short, medium and long term consequences simultaneously.** Changes in context brought about by such influences as changing stakeholder positions are also important. Highly prescribed 'blueprint' approaches are seen as inflexible and contextually-insensitive as they rarely remain appropriate over the project lifecycle.
- **In the early planning stages of a MUTP strategy, there should be a clear statement of goals and objectives, roles and functions, evaluative criteria, key input assumptions and potential impacts:** These ideally need to be properly disseminated and thoroughly discussed with all impacted stakeholders identified in an open and transparent manner. Such dissemination needs to be characterised by effective community engagement with inclusivity and an understanding that there will be many differing views about how to make best use of the project as an agent of change. In light of this, there may well be a need for several iterations of such matters as the development of project objectives, scale and scope, and related evaluation criteria.
- **All strategy components need to be constantly monitored and analysed during the different phases of the project lifecycle:** This is to be done in order to assess their continuing validity (i.e. to examine whether the strategy as a whole remains effective, appropriate and deliverable) in the face of changing contextual elements. However, faced with the 'emergent order' (as opposed to 'structured order') that accompanies open systems, strategy formulation for MUTPs need to consider the nature of the responses it proposes. It is acknowledged here though that, in many instances, particularly when faced with genuine (or perceived) imminent issues and problems, it is simply untenable to continuously avoid taking action, especially when faced with political imperatives.
- **Any strategy needs to take a practical and realistic view of when the MUTP design work is to be 'frozen':** At some point 'certainty' about the size, scale and nature of the project is clearly required if costs/revenues and impacts are to be identified and programmes proposed to enable the appointment of a constructor/funder. Such decisions need to be preceded by a *full* analysis of when is the 'right' time to freeze the project design as a basis for its implementation. Once frozen, MUTPs become distinctly contextually-insensitive until such time they are

completed, when they then have the capacity to adapt (or be adapted by) their environment. Significant errors made through premature freezing are likely to be costly to rectify (through retrofit action, for example) and distinctly represents a sub-optimal outcome.

- **Although perhaps unpalatable, it is important to concede that many components of the MUTP planning and delivery strategy (and of the project itself) are very difficult to quantify, even identify:** This is true *both* at the outset and throughout the project lifecycle as a result of the complexities associated with open and complex systems. Impacts, in particular, may only emerge over time and are frequently difficult to discern, as are 'tipping points' when new ideas and methods for project planning and delivery emerge. This is especially true when changing contexts result in unforeseen impacts since what seems like a 'safe' decision/ choice now may ultimately be costly later. MUTP planners and managers will be well aware that conceding the unknown/unknowable is somewhat of an anathema to many project sponsors and traditional closed system thinkers who pay scant regard to the existence of the type of 'wicked problems' that are often associated with the dynamic nature and fluidity of 'context'.
- **Systems need to be in place to enable thorough post-project institutional learning of MUTPs:** This is not currently undertaken in the UK for MUTPs in any systematic manner to enable outcomes and the associated occurrence of RUC factors to be evaluated. It would prove particularly valuable in efforts required to identify impacts that were *not* discernable previously. How post-project institutional learning is practised internationally (outside of in-house private sector organisation practices) remains unclear without a systematic review of such practices and yet potentially invaluable for future MUTP developments.
- **MUTP planning tools, techniques and methods:** While it has been earlier argued that the employment of models and other analytical tools for MUTP developments (including 'case histories') that are firmly based on 'closed system' thinking do pose major limitations, it was also found from the contributions reviewed that in reality they do have an important role to play in attempting to sense-make a MUTP during its different lifecycle phases. This is so, however, on the *proviso* that detailed attention is paid to their impact(s) on context, and the way in which context impacts on the project, and *not* merely in terms of meeting traditional project management criteria of completing the project within budget, on time and in accordance to specifications. Many contributions to the OMEGA 1 Project suggest that many traditional planning and appraisal tools, techniques and methods are *ultimately* fundamentally flawed by virtue of their inability to cope with the complexity associated with *all* aspects of context, including the nature of MUTPs as open systems and the evolutionary fluidity that accompanies their development.

Many MUTP sponsors (including politicians and business leaders) are acutely aware of this, with the result that many technical forecasting and appraisal outputs (for example) are used or discarded *depending* upon whether they support or negate previously held views, visions, even 'gut feelings' of investors and politicians. This practice, it should be noted, frequently places the techno-rationalist professional at odds with those pursuing other (political and business) agendas. To understand these dynamics, many of the contributors to the OMEGA 1 Project Working Papers emphasised the importance of case history and the existence of a body of 'good (*not* 'best') practice' as *essential* to the identification and handling of RUC in both business and other fields. This attention to case study experiences was especially noted among the military, in earthquake engineering, in civil engineering as well as in insurance and banking.

A similar body of systematic data does *not* appear however exist within the public domain for MUTPs. This would seem to suggest that there is little evidence of systematic institutional learning and knowledge-learning in this area from past projects that go beyond personal and in-house exchanges of experiences and the employment

of common international handbooks and standards that can have the effect of standardising MUTP solutions, reducing innovation and increasing path-dependency. Regarding this latter concern, there was much to suggest that evidence-based learning *alone* has its limitations, especially where past contexts are *not* fully identified or understood. This is so, it was argued, since it may sustain (even reinforce) path-dependent practices and contribute to the 'templating' of solutions based on previous experiences perceived as successful from a singular point of view and/or from one point of time/place. Many contributors further noted that hindsight and best practice is *only* appropriate in the context of ordered, stable systems (and perhaps most applicable during the project construction).

- **Understanding the motives, beliefs and values of key project stakeholders:** As already acknowledged the ability to identify and understand the motives, beliefs and values of the wide range of stakeholders involved in or impacted by MUTPs is *extremely* difficult, but nonetheless *vital* important. Arguably, stakeholder perceptions about 'the project' and any accompanying developments, including restructuring and regeneration initiatives, represent the most powerful contextual force for MUTPs and will undoubtedly impact over the whole project lifecycle (albeit to differing degrees). For this reason, it was concluded that the constant scanning of the motives, beliefs and values of stakeholder groups, organisations and networks over time (to determine their willingness, ability and capacity to exert effective influence) remains critical both before *and* after key decisions are made. Against this background and reflecting on many of the contributions from different fields in the Working Papers commissioned for the OMEGA 1 Project, the following insights were deemed highly important:
 - **Stakeholders often perceive RUC in a highly individual way:** As already indicated on numerous occasions, perceptions may change over time as a MUTP passes from one lifecycle phase to another, or as policy and political agendas change. This calls for the *constant* updating and recalibrating of judgements of the related parties within affordable limits to retain an element of robustness in determining the planning response to MUTPs.
 - **The building (and sustaining) of reputation and trust is vital in all aspects of stakeholder relations:** Early and sustained flows of information from MUTP planners and deliverers will, it was concluded, enhance trust, reputations and support among parties – so vital to the viability of MUTPs where joint ventures are critical to the success of the project.
 - **Risk may be shared through consensus building between stakeholders:** Here it was noted that that imposed risks are often seen as less tolerable than voluntary ones in consensus building and known risks preferable to unknown risks.
 - **Certain stakeholders have extensive faith in the ability to manage risk:** While this feature was observed in some cases, notably in the insurance and banking fields prior to the recent global banking crisis and the on-going ramification still underway, others (in other fields - for example in urban and regional planning) are less trusting of market forces (and failures) and their ability to manage the risks they pose.
 - **There are limits to adopting a comprehensive approach:** The desire emanating from comprehensive analyses to identify *all* potential stakeholders that might impact on, or be impacted by, MUTPs *must* clearly be tempered by an appreciation of the practicalities involved in doing this, especially given that many potential impacts of such projects are likely to remain unknown or unknowable for some time after their completion.
 - **Transparency and information-sharing within and between stakeholder groups can become problematical when issues of 'commercial sensitivity' are involved:** In MUTP planning and delivery this is frequently an issue here where projects are pursued as PPP/ PFI initiatives and where knowledge about what is considered 'best practice' has commercial advantage for the private sector.

- **It is important to examine inter-personal, group and organisational trust not as a snapshot but in a way that demonstrates how it has evolved:** In the context of MUTP planning and delivery this will enable a 'trust record' to be built-up and maintained among the various project stakeholders. MUTP planners and deliverers need to identify which key decisions require a high level of trust to be implemented successfully. This calls for the identification of trustees and trustors – i.e., clarification *of* whom to trust and *by* whom. In this context, it was noted that the contention that success reinforces trust (and *vice versa*) and that the higher the RUC associated with a particular action or decision, the higher will be the need for trust, are all important lessons.

The ardent reader of this Section who has taken the trouble to read the summaries extracted from the various contributions to the OMEGA 1 Project Working Papers will readily appreciate that the focus offered here is ultimately on a selected number of themes/lessons for MUTPs and probably does *not* do justice to the fact that others could also have legitimately been included. All that can be presented here in defence of this focus is the excuse that the OMEGA Team were ultimately defeated by the constraints of time, space and its capability of articulating the various complexities identified in (essentially) the written word.

The team, nevertheless, remains confident that what has been discussed and summarised sheds invaluable light on the international case study research work of the OMEGA Centre's as summarised in the subsequent sections of this report, whereby the highlighted themes and suggested generic lessons are to some degree tested against the evidence afforded by the case study analysis and synthesis which follows. Together with the findings associated with the two sets of Working Papers for the OMEGA 2 Project on 'National Planning, Funding and Appraisal Frameworks for Mega Projects' and on 'Sustainable Development Challenges of MUTPs', the OMEGA Team is hopeful that they have offered useful foundations for the investigations into future MUTP developments and some modest advancements that will encourage further fruitful research and enhanced MUTP practice in the fullness of time.

3. The OMEGA 2 Project: Supporting commissioned working papers

3.1 Working paper #1 Series: National planning, funding and appraisal frameworks for mega projects

3.1.1 Aims and purpose of working papers

The Working Paper #1 series of reports for the OMEGA 2 Project on 'National Policy, Planning and Funding Frameworks' was prepared by OMEGA Academic International Partners in each of the ten countries of the study. It represents the first of two sets of supporting Working Papers prepared with the intention to better inform the OMEGA 2 research programme over-and-above the starting point provided by the contents of the successful UCL bid to VREF.

The aim of the first series of Working Papers was to provide an overview of some of the main factors influencing the planning, funding, appraisal and delivery of mega (transport) projects in the case study countries since the Second World War, and on this basis, extract any generic and context-specific observations and lessons that may be observed (see Appendix 12 for the titles of Working Papers and links to access the individual papers). The broad framework for the working papers included:

- A review of the main socio-political and economic eras of the country in question that formed the contexts for MUTP planning, funding and delivery;
- Key legislative and policy frameworks in the above eras;
- The identification of new initiatives and emerging issues over the period of review; and
- The presentation of generic and context-specific observations.

3.1.2 Summary of findings

The following section summarises some of the key findings from the ten working papers on 'National Policy, Planning and Funding Frameworks for Mega-Projects'. While it is recognised that this review is not exhaustive and does not provide a comprehensive review it is felt to be of sufficient value as illustrative of the major themes and issues in the field. It is presented with the following structure:

- Main historic periods and themes: 1945 to present day;
- Governance and policy frameworks;
- Funding for MUTP's: some lessons and examples;
- Processes for choosing and appraising projects;
- Importance of political priorities and significant events;
- Environmental concerns, and stakeholder participation; and
- Conclusions and emerging issues.

3.1.3 Main historic periods and themes

1945 to Mid-1950's: Post-war recovery, and national planning

The immediate post-War period was dominated by recovery and reconstruction, particularly in countries which had suffered major devastation. There was also a wave of reforming zeal, as people sought to build better and fairer societies. In several European countries, large sections of the economy were nationalised or turned into semi-public corporations. Hence the role of the state in the planning of major infrastructure and urban development increased enormously, though less so in the USA and Australia.

Mid-1950s to the early-1970s: The boom years, and advent of motorisation

By the mid-1950s, most of the countries under study were entering a period of rapid and sustained economic growth, reflected in widespread urban development and increasing motorisation. Railways went into decline, as motorcar ownership and road building increased dramatically with most of the road funding coming from public funds, even in the USA. Urban congestion over the years subsequently became a major issue, and in the 1960's and early 1970s, most countries responded with major urban road schemes (with the exception of Greece and Hong Kong both of which were latecomers to the urban highway era). Many cities also reduced or removed their tram systems to create more room for motorcars (only to re-introduce them in some cases 20-30 years later). London and Stockholm made grand plans for motorway ring-roads (though the plans were only partially realised). In West Germany "cities were rebuilt to accommodate as many motorcars as possible" (Peters, 2008: 6), and in the USA, "cities around the country believed the key to their economic future lay in modern highways, while their interest in mass transit (with exceptions like New York) was negligible." (de Cerrano and Nobbe, 2008: 5). Japan too built inter- and intra-urban highways, though unlike most Western countries, it also invested heavily in metros and heavy new rail systems, including the 'Shinkansens' (the world's first high-speed trains, which entered service in 1964). Today Japan has subway networks in nine cities, nearly all constructed since the 1960s.

1970s and early 1980s: Oil shocks, and emerging doubts about motorisation

The early optimism about the state's ability to shape economic and physical development with, among other initiatives, mega infrastructure projects, began to diminish by the late 1960s. Although the 'mixed economy' remained the norm for many Western countries and spatial planning become more advanced (as new institutions were introduced to co-ordinate metropolitan and sub-regional development), new issues were emerging. Firstly, opposition to major new infrastructures in urban areas (particularly roads) grew, as their negative impacts became apparent. In the Netherlands, for example, the Amsterdam Metro project faced serious opposition and was drastically cut back. A similar reaction occurred with the Netherlands' motorway programme, which virtually halted in the 1980s. Similar reactions occurred in other countries, including the UK, USA and Japan. In Sweden, a 'noticeable shift in ideology' took place "...from a general planning optimism and a positive outlook on the effects of the car-centred society during the 1950's, to a decidedly more negative view of planning and the consequences of motoring during the 1970's." (Petterson, 2008: 14).

In the 1970s the world economy faltered, with the oil crises of 1973/74 and subsequently in 1979/80. Countries became (for a while) more energy-conscious, major highways investment was cut, and there was renewed interest in urban mass transport. With the exception perhaps of Greece and Hong Kong (for different reasons), the 1960s and 1970s also saw the first real growing concerns about the environment and the limits to growth with the publication of Meadows's seminal book *The Limits to Growth* (Meadows et al., 1972). The environmental concerns were wide-ranging – pesticides, CFC's, air quality, lead in petrol, noise, loss of species, habitats, landscapes, to name some. In 1965 a report by an advisory committee to the US President included a warning about atmospheric CO2 levels (Environmental Pollution Panel of the President's Science Advisory Committee, 1965) The various concerns led to the setting up of national and international environmental agencies.

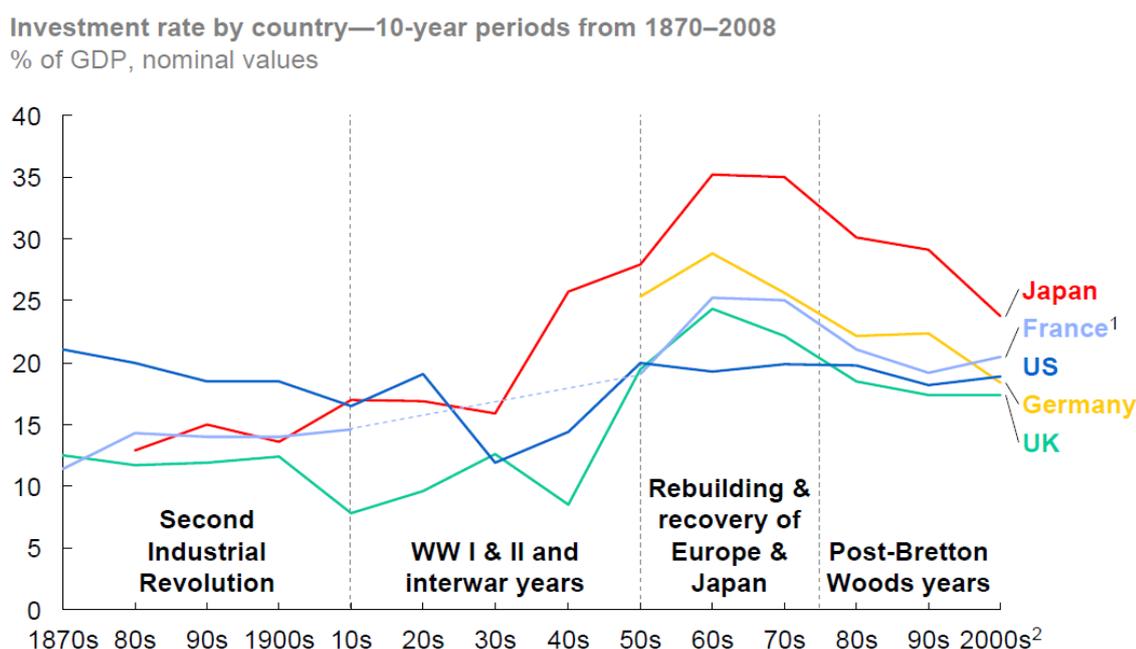
One specific consequence of the above developments for mega-infrastructure projects was the growing importance of environmental issues in project appraisal (again with the exception of Hong Kong and Greece). In 1969, for example, the USA had made the production of Environmental Impact Statements (EIS's) a requirement for all public projects seeking Federal funding (including highway and transit projects). Other countries

subsequently adopted this approach to varying degrees, and in 1985 a European Community directive promoted EIS's throughout the Community Glasson et al., 2005: 2).¹

1980's and 1990's: Economic and political uncertainties and the 'free market' agenda

The economic fluctuations of the 1970s have continued ever since - a major downturn in the early 1980's was followed by rapid growth in the late 1980s, then a major recession in the early 1990s, followed again by growth in the late 1990s and then in the 2000s until the economic downturn in 2008 (see Figure 4.2). These economic cycles affected the rate at which mega-infrastructure projects were taken up, and also – more recently – on how they were financed (with a growing reliance on private sector funds – see Figure 4.3). In most countries, public investment in major infrastructure slowed during the periods of recession, as governments faced budget deficits;² and more recently governments have explored other sources of funding (particularly the private sector) to make up the shortfall. Japan and Hong Kong proved the exception to these trends on account of the former seeking to rely on its construction industry to lead it out of economic downturns, and the latter using its massive territorial port and airport development scheme (PADS) as a means to stimulate its floundering economy in face of the uncertainties of the territory's hand-over to the People's Republic of China in 1997.

Figure 3.1: Declining investment in developed economies reflects the ebbing of a post WWII investment boom in Western Europe and Japan



Source: Madisson (1992): McKinsey Global Economic Growth Database; McKinsey Global Institute

¹ In the UK, it was originally anticipated that about 20 projects per year would be subject to EIS's, but by 2004 this had grown to 600 per year, and this was 'only the tip of the iceberg'.

² Investment in infrastructure and levels of economic activity are, of course, inter-connected.

Figure 3.2: Global nominal investment rate (as a % of GDP, by year)



Source: Adapted from McKinsey Global Institute (2010: Exhibit E1)

- Notes:*
- 1. The Investment Rate is nominal gross capital formation over nominal GDP;*
 - 2. The peaks and troughs illustrate global economic cycles over the 40-year period;*
 - 3. The graph's downward trend indicates that global investment as a percentage of GDP has steadily decreased, after increasing steadily in the 1950's and 1960's. According to the McKinsey Global Institute (op cit, 2010: 10), this reflects (i) the end of post-World War II rebuilding; (ii) the slowing of GDP growth in mature economies; (iii) a fall in the cost of capital goods;*
 - 4. Information was obtained from (i) McKinsey Global Economic Growth Database; (ii) World Development Indicators of the World Bank; (iii) Havers Analytics. 2009 data is based on 53 countries.*

The 1980s saw major changes in the international political landscape. The arrival of right-leaning governments such as the Thatcher administration in the UK and the Reagan Presidency in the USA led to the scaling-back of the state's role in public infrastructure and the promotion of the private sector's involvement. In the UK "...there was a decisive ideological shift against planning in all its forms, this being seen as restrictive of private enterprise and contrary to free market principles... Strategic planning across the board – not only in transport – was out of favour and out of fashion, as 'good government' became synonymous with less government and lower public expenditure." (Terry, 2008: 8). At the same time the UK government looked to the private sector to finance urban development and major infrastructure with similar policy shifts taking place in other countries at varying times, for example in Greece, Australia, Sweden, Hong Kong and Japan.

As the international economic situation improved in the late 1980s, road building came back into favour in most countries. In 1989 the UK government announced the largest-ever highway investment programme, and also the first major Private Finance Initiative (PFI), the M6 Toll Road (an OMEGA case study). Japan also joined the road-building boom in the late 1980's and early 90's, as its economy boomed once again, although the boom period was short-lived, and later the Japanese economy entered a long period of stagnation (Ohta and Muromachi, 2007: 14).

Other countries also promoted major road programmes once again. Australia is one example, and France another – the latter's motorway construction rising to a peak in the late 1990's. In Sweden the growth-promoting effects of major transport infrastructure came back into fashion in the early 1990's, and infrastructure investments "...were embraced as a miracle medicine that would cure the ailing Swedish economy..." (Pettersson, 2008: 17). The Öresund link (an OMEGA case study) was one of the Swedish mega-projects

developed in the 1990's, and "...was the first time alternative ways of financing was used for a major transportation project [in Scandinavia] ...thus marking a clear shift in the political attitude towards financing infrastructure projects" (Pettersson, 2007: 18).

Germany: The collapse of the Eastern Bloc in the late-1980s marked a new era in international relations. East and West Germany were re-united in 1990, and integration was given the highest political priority. In 1991 the Federal government approved a special transport infrastructure investment programme for 17 road, rail and water projects worth around €38.5bn, to re-connect the east and west wings, as well as boost the east's infrastructure. Two of OMEGA case studies (the *Bundesautobahn 20* – also known as the BAB 20 or 'Baltic Sea Motorway' – and the Berlin *Tiergartentunnel*, part of the long-distance rail connection from Berlin to Leipzig/Halle) were part of this programme. Europe's political map was also meanwhile changing with the expansion of the EU to 15 member states by 1995, including Greece (1981) and Sweden (1995).³

Greece: Membership of the EU had a major impact on Greece's politics and planning. Historically, infrastructure development in Greece had been "characterized by serious delays...and also serious budget overruns and quality deficits [due to]...a combination of state bureaucracy and [poor] management capacity of the big firms involved." (Skayannis and Kaparos, 2008: 14). When the Greek government faced financial crisis in the 1980's, it turned to the EU for a rescue package (or 'stabilisation loan'). In return, it had to adopt a neo-liberal stabilisation programme, with strict austerity measures and other measures facilitating private capital. With history repeating itself in 2011 – but with much greater severity – it is unclear what the outcome will be. EU membership brought Greece substantial regional development funds, but the government's plans prepared for the EU's Community Support Frameworks (CSF) "...became the new form of national and regional planning." (Skayannis and Kaparos, 2008: 18). In other words, the CSF's became the dominant factor in the planning of Greece's infrastructure. However, this had some good effects in making the planning process more rigorous and forcing the government "to approach the transport sector development in a more strategic way". The Athens Olympics of 2004 also made politically possible the completion of major transportation projects in Athens at a scale never seen before within such a short period of time. Included within these projects were two OMEGA case study projects – the Athens metro and the Athens ring road. This mega-sporting international event *forced* the various agencies to deliver the infrastructure on time but also contributed to significant escalated costs; a not uncommon feature of such 'pressed' circumstance when infrastructure deliverers have the opportunity to hold governments to ransom. The simultaneous delivery of multiple major infrastructure projects also greatly tested Greece's institutional capacity; a challenge that remains to this day.

The 2000's: Globalisation and global warming risks

The world economy experienced sustained growth in the 2000s – with some significant national and regional variations – until 2008, when the worst economic crisis since the 1930s engulfed Western countries. In the words of the International Monetary Fund (IMF), the world financial system teetered on the "brink of systemic meltdown" (BBC, 2008), and the effects are still being felt today. This new context of the global economy has seen rapid growth in the emerging economies. Above all, China has emerged as the world's second largest economic power after the USA (surpassing Japan), and today holds considerably more foreign exchange reserves than any other nation. The effects of this new emerging global order are felt in many ways, in terms of international trade; financial markets; growth of conglomerates; division of labour on a global scale; de-regulation of commodity, capital and labour markets; and – most importantly in terms of this report – growing investment in

³ The EU currently has 27 member states.

mega infrastructure projects, especially highway and fast train projects but also port and airport developments.

What is significant about these new developments is the extent that path-dependent technologies have and will continue to lead the way, and the extent that these new contexts will yield new technological developments that will make such path-dependency a source of immediate technological redundancy if not amended to the new 21st Century challenges of sustainability, particularly those associated with climate change. In Australia, for example, "...mega-projects of all types have been seen as a way of facilitating competition of the [Australian] States on the global stage and with each other, something perceived as beneficial for economic growth. Globalisation is the underlying rationale for the current obsession with the 'infrastructure deficit' whose solution seems to be exclusively more road building. (Low and Sturup, 2008: 14).

In the 2000s, the issue of global warming really came to the forefront; a development that potentially has tremendous implications for mega transportation projects (see later, Section 4.2.2). There have been numerous attempts to reach international agreement for reductions in greenhouse gases, particularly the Kyoto Protocol, adopted in December 1997 which formally entered force in February 2005. Despite the failure to agree internationally, some individual countries are now taking global warming much more seriously, and this is slowly beginning to influence the way that all activities (including mega-infrastructure projects) are viewed. Some countries have also set themselves ambitious targets – for example, in 2008 the UK passed the Climate Change Act, making it a requirement to cut the UK's emissions of greenhouse gases by 80% below 1990 levels by 2050. Australia has set a target of a 60% reduction in greenhouse emissions by the same date (Low and Sturup, 2008: 13), while Sweden has set a target (amongst others) of its car fleet being free from fossil fuels by 2030. (Pettersson, Khan, Sundberg and Holmberg, 2010: 16). The economic crash in 2008, incidentally, led to a slight fall in global emissions, but these soon returned to previous rates of increase. What is significant, however, is that the economic crisis has given many nations an opportunity to re-examine their growth strategies, though so far it appears that this opportunity has not been realised. What implications such a re-think might have on mega transport infrastructure investments remains open to speculation.

Globalisation: Neo-liberalism, and private sector financing

Concurrent with the above developments, in the past two decades the 'neo-liberal' agenda has been largely adopted by national governments of all shades, both right and (ostensibly) left. The policy impacts have included the privatisation of transport infrastructure previously reserved to the public sector, and increasingly, the introduction of private finance in transportation (and other infrastructure) projects. In the UK, for example, the election of a Labour government in 1997 saw a continuation and expansion of the previous (Conservative) government's Private Finance Initiative (PFI) programme, first introduced in 1992. Although the Labour party had opposed PFI when in opposition, after 1997 it promoted it enthusiastically. Re-branding it as Public-Private Partnerships (PPP), by October 2007 the total capital value of PFI contracts signed throughout the UK was £68bn, committing the British taxpayer to repaying £215bn over the life of the contracts.⁴ About one-quarter of this was for transport infrastructure projects. (Timmins, 2009). The UK has been Europe's biggest PFI supporter, with two-thirds of the EU's total investment (by value) being made between 2001-2008; this is fifteen times larger than the next biggest country, Spain (€4.1bn) during this same period. (IFSL, 2009: 3). The USA, interestingly, has not (yet) adopted PFI to anything like the same extent: most of its mega-projects still rely on traditional public financing (with federal support of up to 90% for inter-state highways and 80% for other highways), but the use of private finance is growing. (Capka, 2006: 2)

⁴ By November 2010 the UK's future bill for PFI/PPP projects had risen to £267bn. (Monbiot, 2010).

With regards to PFI, Europe has followed Pacific-bordering countries such as Australia and Hong Kong. Australia's first PFI transport project was in 1986 (the Sydney Harbour Tunnel, an OMEGA case study), and during the next 21 years (1986 to 2007) privately-financed toll roads and tunnels accounted for A\$12 billion of infrastructure in the three states of Queensland, New South Wales and Victoria. Today Australia represents an A\$18 billion market for PFI / PPP projects. (Black, 2008: 1).⁵

Hong Kong is perhaps the pioneer of private sector partnerships. Its first 'Build-Operate-Transfer' (BOT) project was the Cross-Harbour Tunnel in 1972, and subsequent BOT projects include the Eastern Harbour Crossing, Tate's Cairn Tunnel, Western Harbour Crossing (an OMEGA case study), and the Route 3 Country Park Section. Hong Kong's early interest in BOT reflects its particular circumstances. According to Ng and Pretorius (2009), public-private partnerships (PPPs) originated in the 19th Century when land shortages encouraged Chinese entrepreneurs to reclaim land, under the direction of the Public Works Department. Other possible influences may have been Hong Kong's position as a city-state (lacking recourse to central government funding for mega-projects), and – in the late 20th Century – the approaching handover to the Chinese Government in 1997, which may have increased the attractiveness of a private sector-led approach for long-term infrastructure investment.

Japan, by contrast, has been a relative late-comer to PFI, with its first PFI law enacted in July 1999. On the other hand, it has actively promoted private involvement in the transport sector – for example its national railways were privatised in 1987 and similarly the motorway network in 2005.

Globally, Europe (especially the UK) has dominated the PFI / PPP market during the past twenty-five years, with nearly half (45%) of all projects funded during this period. (Table 3.1). The roads sector has similarly dominated the PFI/PPP market (with 50% of projects, by value), followed by the rail sector (20%, by value). (The other infrastructure sectors are water and buildings, with 16% and 14% respectively of total PFI/PPP funding during this period – see Table 4.1).

Table 3.1: Total number and value of PPP projects globally, 1985-2010

Region	Roads		Rail		All Infrastructure (incl. road and rail)	
	No. of Projects	Value, \$ bn	No. of Projects	Value, \$ bn	No. of Projects	Value, \$ bn
Europe	200	177	57	47	667	317
USA	43	23	20	13	362	59
Asia / Australia	192	64	49	63	384	171
Rest of World	188	87	32	18	454	165
TOTAL	623	351	158	141	1867	712

Source: Public Works Financing, Vol. 253 (2010: 2)

Experiences with private funding: The experiences with private funding have been mixed in most of the countries studied. One of the **UK's** first privately financed projects, the

⁵ Examples of major Australian PFI projects implemented between 1986 and 2007 include North-South Bypass (Brisbane, Queensland); Sydney Harbor Tunnel, Eastern Distributor, M2, M4, M5, M7 motorways, Cross City Tunnel, Lane Cove Tunnel (Sydney, New South Wales); and Citylink, Eastlink (Melbourne, Victoria).

Channel Tunnel, encountered major financial difficulties and the private company, Eurotunnel, has been in constant negotiations with its creditors to re-schedule its debts. Other major financial 'disasters' in the UK include Railtrack, the private company set up to run Britain's rail infrastructure following privatization in 1996, which collapsed in 2001; and the London Underground PPP (Public Private Partnership) – here one of the two consortia (Metronet) collapsed in 2007, and the other (Tube Lines) was bought out by Transport for London (TfL) in 2010 following major contractual disputes. As Terry concludes, "it seems that the appeal of private finance for railway infrastructure [in the UK] has been severely dented and perhaps in the light of these experiences, the private sector has shown a marked reluctance to tackle new transport projects except on the most favourable terms." (Terry, 2008: 25).

Such difficulties with PFIs have *not* been confined to the UK. In **Germany**, the first for-profit toll road project (the *Warnow* tunnel) opened in 2003 but turned out to be a 'financial fiasco'. (Peters, 2008: 23). A second, partially privately financed tunnel, the *Herrentunnel* in nearby Lubeck, was supposed to be a 'pioneer' of PPP in Germany, "but has not provided a good example for others to follow." (CEE Bankwatch Network, 2007: 48). In its first year of operation (2006), traffic demand and toll receipts were significantly below forecasts, and the concessionaires were looking to renegotiate the contract terms and also save money through reducing some public services (e.g. free night time buses). (op cit, 2007: 48).

In **France** and the **Netherlands**, as in the UK, private finance has *not* filled the infrastructure funding gap to the extent originally hoped for by its advocates, and private investors have proved reluctant to take on projects except on very favourable terms. (See Zembri, 2009: 41; and Giezen, 2007: 12); a conclusion arrived at by Terry earlier. In **Sweden** too, PPP has failed to take off: the Arlanda Link (an OMEGA case study) remains the country's only PPP infrastructure project, "...which seems to indicate that the outcome of the project was perhaps not totally satisfactory," and as of 2010 no further PPP's were being considered (Pettersson et al., 2010:19).

Hong Kong's first BOT project (the Cross Harbour Tunnel, in 1972) achieved a very high rate of return and was considered 'a successful example of BOT development,' encouraging the government to adopt the BOT approach in subsequent road tunnel projects. (Ng and Pretorius, 2009: 11). However, a later BOT project (the Western Harbour Crossing, which opened in 1997), has not been an economic success due to below-forecast traffic levels, which has placed the Hong Kong government in a 'lose-lose' situation (unable to lower tolls to increase use and relieve congestion elsewhere due to the contractual agreement with the private operator). (Hong Kong 4 Tests Report, page 10 (Section on 'Winners and Losers').

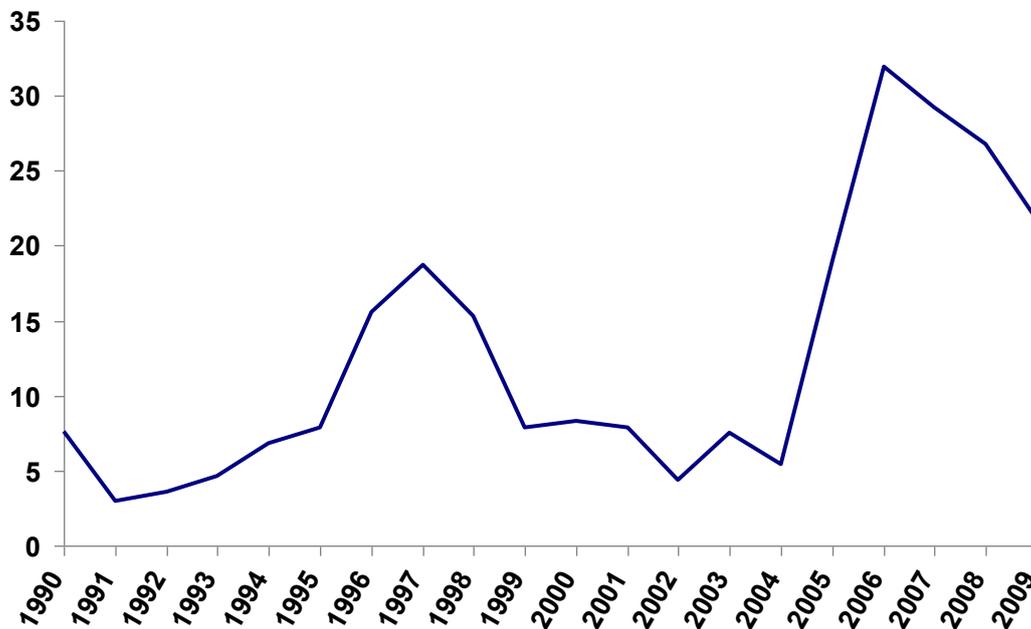
In **Australia**, while some PPP projects have proceeded smoothly, others have been highly controversial, including the Sydney Harbour Tunnel, the Airport Rail Link and the Cross City Tunnel (all in Sydney). The latter two projects, completed in 2000 and 2005 respectively, both suffered from lower-than-forecast traffic / user levels and went into receivership (in 2000 and 2006 respectively).

A major study of transport infrastructure investment carried out for the OECD (Transport Research Centre, 2008) noted that "...PPP's...are a relatively new phenomenon. This, combined with the relatively long time-horizons of these arrangements, means that there is very little – if any – thorough *ex post* analysis available regarding the functioning of existing instruments, and the extent to which they have been successful in delivering value for money compared to other options." (Transport Research Centre, 2008: 60). An earlier study of PPP's (by Virtuosity Consulting, 2005) noted that "...following initial enthusiasm, many countries came to terms with the realities of PPP's, realising that private financing came with a cost, that appropriate regulatory reforms were required, and that PPP's did not necessarily increase users' willingness to pay charges. This does not imply a rejection of

PPP's as an option, but rather a more cautious approach.” (Transport Research Centre, 2008: 56).

Nevertheless, in many countries the trend towards private financing has continued (see Fig. 4.4), and some lessons have been learned from earlier experiences. In **Australia**, for example, a National PPP Forum was established in 2004, comprised of representatives (typically the Treasurer or economic development Minister) from all States, Territories and the Federal Government. The aim was to harmonise a diverse stream of PPP projects in a national market. Contractual arrangements for PPP projects have also been tightened – for example, in New South Wales “the latest transactions in road and tunnel infrastructure show the private sector accepting more risk and the Government obtaining better value for money – full transfer of traffic risk, contractual mechanisms to control benefit sharing (higher traffic volumes, refinancing) and the inclusion of key performance indicators (such as, safety, and the environment). (Black, 2008: 1)

Figure 3.3: Investment in transport projects with private participation, 1990 – 2009



Source: World Bank, Private Participation in Infrastructure Database, (<http://ppi.worldbank.org/>)

3.1.3.1 Governance and policy frameworks

Government structures, from national to local level

This synthesis looked at the different levels of government in the ten countries studied, to identify key themes. Comparisons are difficult because of the differences between the countries, ranging in size from the USA (with 308 million people) to Hong Kong (with just 7 million people). The largest countries (the USA and Australia) have strong state governments. Germany too has a federal system, with 16 *Länder* (federal states) which pass laws within guidelines formulated by the Federal government; they also formulate legally-binding state development programmes, and approve or reject the local land-use plans prepared by the municipalities (Peters, 2008: 17).

In the UK, France, Netherlands, Sweden, Greece and Japan, three or four-tier systems of government (national, provincial and local) exist, though their functions and powers (and

even existence) have varied over time and between countries. Hong Kong is very different – it is basically an ‘administrative state’ (at one time of the British Commonwealth and currently of the People’s Republic of China). Its government is not elected by universal suffrage, but by an 800-member electoral college which elects a Chief Executive, who in turn appoints the Executive Council (Ng and Pretorius, 2009: 2).

As Terry noted, “MUTP’s, almost by their nature, deserve to be planned in a regional context. Their economic and social impact is typically regional in scale, and insofar as they rely on public funds, the resources can often *only* be justified on a regional basis.” (Terry, 2008: 13). The review of local government structures in the ten countries suggests:

- A contrast in the level of decentralisation between some of the countries – for example, Germany (with its 16 elected federal states), and England, without a regional tier of government (apart from London);
- The growing importance of regional-level government institutions in many of the countries studied (France, Greece, and now possibly Sweden), and
- Steady reductions in the numbers of local authorities at the lowest level, as their structure is ‘rationalised’ (e.g. Greece, Netherlands, France, UK).

The above suggests a shift in the ‘centre of gravity’ of local government institutions towards higher levels and larger scale units – particularly in Europe, but not in the UK which (after the 2010 national election) has moved in the opposite direction with ostensive support of ‘localism’. However, it is difficult to generalise, due to the variation from one country to another. For example, in Australia “...the federal government has [historically] steadily enlarged its powers relative to the States with each successive administration. (Low and Sturup, 2008: 3), whereas in Japan, central government controls over local governments were weakened in 1999 with the passing of the Integrated Decentralized Governance Law, (Ohta and Muromachi, 2007: 14).

The growing impact of the European Union

Six of the countries studied in the OMEGA 2 Project are members of the European Union (EU); this is significant as the EU’s influence over their mega-infrastructure projects has steadily increased over the years, as described below.

The European Union has grown from 6 member countries in 1957 to 27 countries today. In its early years, the EEC (as it then was) had little impact on mega-infrastructure. There was some regional funding for infrastructure in poorer regions, though usually less than ‘mega-project’ in scale. However, as the EU expanded, its role in the planning and operation of mega-urban transport projects has grown, particularly during the past two decades. The impacts are felt in many ways, particularly through: EU competition laws, (leading to restructuring of national railways), reduction of subsidies (including for road toll operators), open tendering and more widespread privatisation and multi-national ownership; EU-wide fiscal policies and rules, affecting public sector borrowing and investment in different sectors; EU investment funds for trans-Europe transport networks; and other forms of EU-wide harmonisation, for example in environmental legislation, safety standards, and other areas.

EU competition laws and liberalisation/privatisation

Rail Liberalisation: In 1991 EU Directive 91/440/EC opened up national railways to competition, and required member states to separate rail infrastructure organisations (track, signals, etc.) from the operators providing services (trains), and run them on a commercial basis. In addition, member states had to allow access to other operators, to encourage competition. Subsequent directives have further developed this process. The impact has varied from country to country, but in general, many have privatised part or all of their rail service providers, or are working towards privatisation.

Procurement Liberalisation: Another area profoundly affected by EU legislation has been public procurement of services, particularly infrastructure ‘concessions’. EU laws have sought to open up public procurement to competition, and Directive 1993/37/EC has had a major impact on motorway concessions. In France, the regulations forced the government to change the way that the national network of toll motorways is financed and operated. Previously (in the 1980’s), the toll motorways were leased to semi-public companies, and toll receipts were redistributed from profitable companies to non-profitable companies, to equalise tolls between different areas and use the receipts to accelerate construction of less profitable sections (Zembri, 2009: 23).

However, there was virtually no competition between toll concession companies, and the French government appeared to support the concessionaires. Directive 93/37 obliged the French government to introduce open competition for new or renewed concession tenders (though France was given a 5-year exemption period before the Directive took effect). The motorway concessions were, therefore, privatised. There have, however, been some negative consequences of these developments, including (after Zembri, 2009: 33):

- the profits from paid-off motorways are no longer available for investment in other parts of the transport system;
- toll prices now vary from place to place, and have risen faster than inflation; and
- the government has lost some control over the envisaged calendar for investments (such as road widening).

Public sector borrowing and debt ratios

The 1992 Maastricht Treaty was a major stage in the EU’s development, leading to the creation of the Euro (in 1999) and closer integration of the members’ economic and financial policies (note: the UK, Sweden and Denmark remained outside the euro-zone). Among the rules of convergence agreed at Maastricht were national limits on the ratio of public debt relative to GDP. This has had a significant impact on some member countries’ infrastructure policies and projects, as follows:

- **UK:** According to the UK’s National Audit Office (NAO), one reason why the Labour government between 1997-2010 so strongly supported PFI projects was that these projects did *not* appear on government balance sheets as ‘public sector borrowing’, and therefore the UK did *not* appear to exceed the public debt limits imposed by the Maastricht Treaty.⁶ By 2010, the UK public sector had incurred debts of £267bn through PFI/PPP projects, (Monbiot, 2010), with transport accounting for the largest share⁷ (compared with other sectors such as health, education and defence), due to the very large scale of some mega-transport projects such as the Channel Tunnel Rail Link (CTRL), the Jubilee Line Extension (JLE), the London Underground PPP initiative and the M6 toll motorway. (IFSL, 2009: 4) Indeed, the PPP concept has been more widely adopted in the UK than anywhere else in the world.
- **France:** The Maastricht Treaty rules have also influenced the French government’s approach to MUTP financing. In 1997, EC Directive 91-440 (on national railways) led to the separation of France’s railway infrastructure management from the operating management. RFF (*Réseau Ferré de France*) took over the track assets and SNCF (*Société Nationale des Chemins de Fer Français*) the train operations, including track maintenance, stations and the TGV (high speed train). About €3bn of infrastructure debt was transferred to RFF. “The French Government did not want RFF’s debt to be assimilated into its own debt as this would have worsened the ratio set by the Maastricht

⁶ Until April 2009 most PFI’s in the UK were off-balance sheet in the Government’s public sector financial accounts, because it was deemed that the private sector carried the balance of risk in the projects (and therefore according to the Government’s accounting rules did not need to be included as a public liability). (House of Lords, 2010).

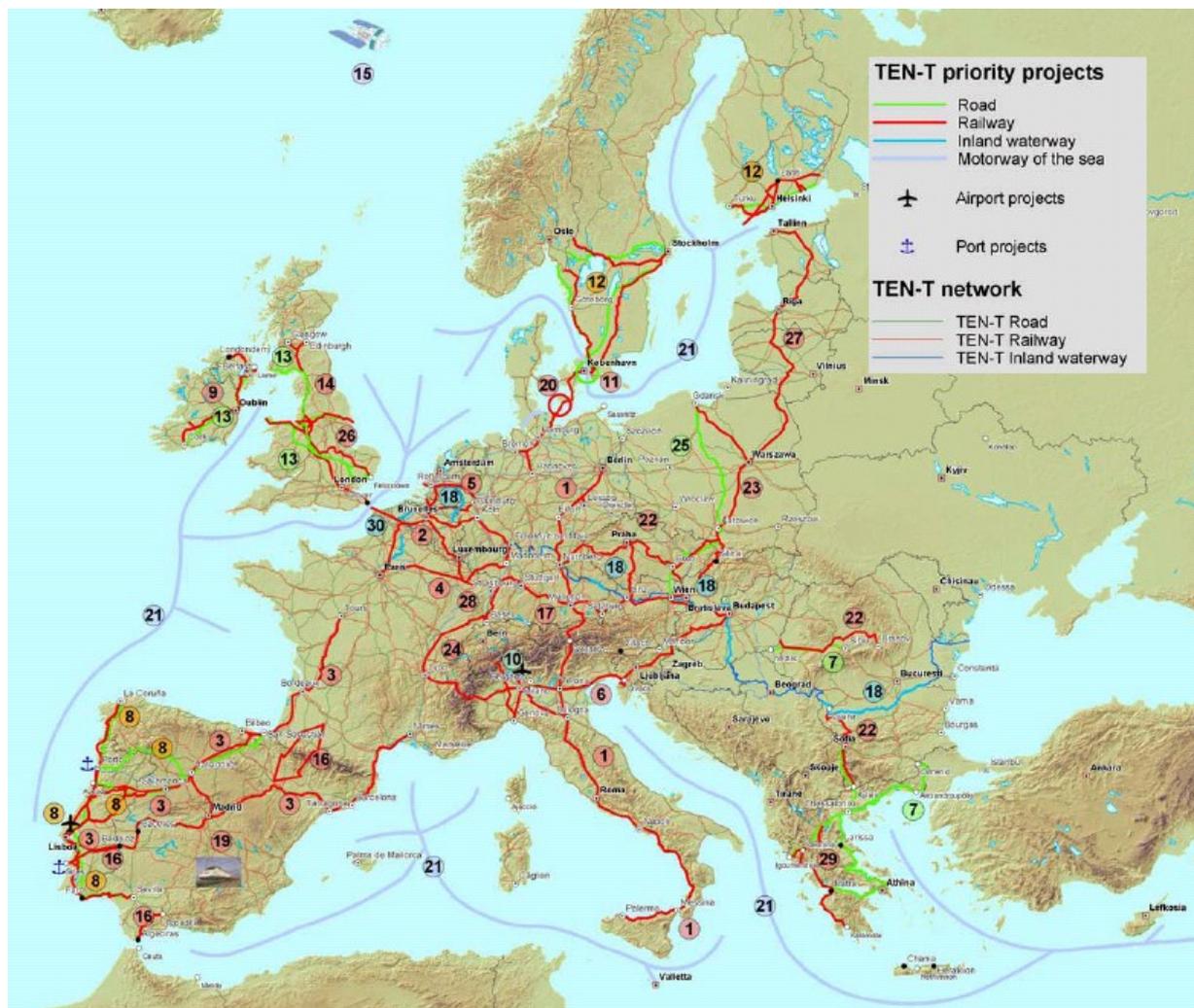
⁷ 25% (by value) of total UK PFI/PPP contracts between 1987-2008 were in the transport sector.

treaty. It was therefore essential that State financing did not exceed 50% of RFF's resources." (Zembri,2009: 28) Subsequently the government reduced its contribution to rail infrastructure by 42%, (this included annual debt servicing and a proportion of programmed investments). State financing was essentially reserved for the high speed train network (TGV), with only a little set aside for the rest of the network.

The Trans-European Transport Network

Another result of the 1992 single market project was the EU programme for a Trans-European Transport Network (TEN-T), covering railways, roads, waterways and a few sea links and airports. EU support was offered for up to 30% of the project cost (about half as loans and the remainder as grants), while member states provided the rest (mostly through government funds, with some private sector funding). Between 1996 and 2006 some €408bn was invested in the TEN-T network, of which about 28% came from the EU (grants and loans), and a further €390bn is scheduled for the period 2007-13 (EC, 2010, 41). Within the overall network, a 'priority' network of 30 major projects has been identified (see Figure 3.4).

Figure 3.4: The TEN-T Network



Eight OMEGA case studies are part of this TEN-T priority programme, including:

- The **Berlin Tiergarten Tunnel** (part of the TEN-T Project 1, Berlin-Verona/Milan-Bologna-Naples-Messina-Palermo rail axis);

- The **Channel Tunnel Rail Link**, the **HSL-Zuid link** and the **Cologne–Rhine/Main line** (all part of the TEN-T Project 2, Paris-Brussels-KÖln-Amsterdam-London high speed rail axis (PBKAL));
- The **TGV Med** (part of the high speed railway axis of south-west Europe, between Paris-Madrid-Lisbon, and Lyon-Barcelona-Madrid – TEN-T Project 3);
- The **Öresund link** (TEN-T Project 11); and
- The **Attiki Oddos** (Athens ring road) and the **Rion-Antirion** road bridge (both part of the Igoumenitsa/Patra-Athina-Sofia-Budapest motorway axis – TEN-T Project 7).

Despite the impressions to the contrary, in practice the European Commission's influence over the planning of the priority network has been *limited*. A review in 2010 noted that the planning "has essentially meant adding together significant parts of national networks for the different modes and connecting them at national borders" (rather than being driven by genuine European objectives). Member states have also given priority to national transport sections which link up centres of national interest (EC, 2010: 30-31). However, a TEN-T Executive Agency was established in 2006 to manage the programme, and further expansion and integration is likely, particularly with the accession of the East European states.

Other areas of EU harmonisation:

There are many other areas where European integration is having a major impact on the planning and delivery of mega-transport projects. One area is in the harmonisation of safety standards (for example, road and rail tunnel safety). Environmental legislation is another: in the Netherlands, for example, the EU'S air quality standards for particulate matter has required planners and developers to design to higher standards, or else face delays from legal action by environmental campaigners. (Priemus and Schutte-Postma, 2009).

USA rail and metropolitan transport planning

- **Rail passenger traffic in the USA** is mostly concentrated in a few metropolitan areas.⁸ Over a dozen metropolitan areas have commuter rail systems in, but the New York area dominates the national total, with two-thirds of all US rail passengers and one-third of all mass transit users. The four largest transit systems (New York, Boston, Chicago, and Philadelphia) are publicly owned, having been taken over from private operators after the latter went out of business in the late 40's/early 50's (de Cerreño and Nobbe, 2008: 5).
- **Metropolitan transport planning:** In 1962 the Federal-Aid Highways Act made it a requirement, for the first time, for urban transportation plans to be prepared as a *condition* for obtaining federal funds. By 1970, 276 metropolitan areas had organizations capable of such planning and coordination, but the state highway departments still provided the funds and most of the staff, and the organizations were very much highways-dominated (de Cerreño and Nobbe, 2008: 6). Metropolitan transport planning, however, received a substantial boost in the 1970s through new laws and increased federal funding. In 1975 the Federal Highway Administration (FHA) and the Urban Mass Transit Administration (UMTA) issued joint regulations requiring the establishment of a Metropolitan Planning Organization (MPO) in each urban area with a population of over 50,000, to develop a unified planning and transportation improvement programme. Federal funding for metropolitan transit systems also increased dramatically, by 15-fold during the decade – "faster than virtually any other federal

⁸ It should be noted that rail freight in the USA is very important, and has grown considerably in recent decades. Between 1980 and 2007 freight ton-miles on USA railroads doubled, to reach 39% of national freight ton-miles, (USA Bureau of Transportation Statistics, 2011: Table 1-50), compared with just 18% in the European Union (EU-27). (Eurostat, 2011: Ref. tsdtr 220 – EU figures refer to 2008).

budget category” – to reach \$6bn per year by 1980 (de Cerreño and Nobbe, 2008: 7). However, the aspirations of the 1970s have not been fulfilled: the MPOs have proved to be “generally weak, diffuse assemblages of local officials. The real lobbying muscle [for choosing state transport projects] almost invariably occurred outside their framework...” (Altshuler, 2008). Moreover, federal funding for urban mass transit was cut by the Reagan administration (down by 23% between 1980-90), and during the past twenty years “US funding for public infrastructure has trended sharply down overall...when adjusted for the growth of GDP.” (Altshuler, 2008).

- **Obstacles to developing MUTP’s in New York:** De Cerreño and Nobbe (quoting Munoz-Raskin and Lapp, 2007) cited four main obstacles to successfully pursuing MUTP’s in the New York area:
 - Institutional obstacles - due to the lack of effective inter-agency coordination;
 - Methodological obstacles - “projects with no plans, no sense of priorities, and no criteria for judging one project over another” prevailed. There was also, a tendency to look for consensus among member agencies, resulting in a listing of important projects rather than undertaking any true prioritization;
 - Financial obstacles - with the continuous underestimation of costs (through optimism bias) and a lack of innovation in trying to leverage funds; and
 - Cultural and political obstacles - in terms of their being a lack of sustained leadership, political commitment, and a sense of societal importance accorded to such projects.

On the above basis, De Cerreño and Nobbe are sceptical how far New York will be able to move towards constructing its much-needed programme of MUTP’s with these prevailing conditions (De Cerreño and Nobbe 11-12).

Australia: strategic transport planning

In Australia, the federal government is primarily a funder rather than a provider of transport infrastructure and services. Also, since 1996 the federal government “has taken no part in any form of intervention in urban and regional (land use) development or planning.” (Low and Sturup, 2008: 7). In 2005 the federal government enacted the AusLink (National Land Transport) Act for the national network – i.e. major road and rail links between each state capital and also Canberra, the national capital. AU\$9.3 billion was allocated for the first five years – this included a few rail freight projects, but was overwhelmingly comprised of roads proposed by the state governments.

The Australian states undertake their own strategic planning for transport, and metropolitan regions have their own strategic metropolitan plans, such as Sydney’s Metro Strategy (2005) that includes transport requirements from which specific mega transport projects are derived. With regards to infrastructure delivery, the state governments are responsible for maintaining and improving the metropolitan road and rail infrastructure, but this is done mostly in a piecemeal fashion. One notable exception (to this piecemeal approach) was in Melbourne, where the government of Victoria made a concerted effort to upgrade the regional railway network extending from Melbourne to the surrounding country towns. (Low and Sturup, 2008: 3). In Perth, “...the government of Western Australia has gone furthest of any State towards creating an integrated system by bringing public transport, roads and land use planning under a single Department of Planning and Transport. Yet even here the separate [silo] cultures of the agencies have been hard to change.” (op cit, 2008: 4).

A consequence of this ‘silo’ effect is that integrated transport development based on land use restructuring, economic growth and urban regeneration observed in other countries “is virtually unknown in Australia. For example, the recent state strategic planning document for Melbourne is based very loosely on the idea of ‘transit oriented development’ (integrated land use and transport planning attempting to generate intensive development around

existing transport nodes) – without contemplating any real integration of the transport system itself.” (Low and Sturup, 2008: 4)

3.1.3.2 Funding for MUTP's: Some international example

Fuel and vehicle taxes

In all of the countries studied, the public sector still provides much or most of the funds for large-scale transport projects, and this is mainly derived (directly or indirectly) from fuel and vehicle taxes. (Transport Research Centre, 2008: 62). In **Japan**, for example, various automobile and fuel-related taxes together provided over 9% of national and local tax revenues in 2007, whereas road expenditure was only one-tenth of the total tax income, with about 17% of this allocated for new toll roads (Ohta and Muromachi, 2007: 17). In the **USA**, the inter-state highway system was built with Federal grants of up to 90%, funded directly from fuel and vehicle taxes. In the **UK**, the income from fuel duty is more than double the Department for Transport's (DfT) total annual expenditure (capital and revenue). (HM Treasury, 2011: Table 2.4).⁹

In a few countries the fuel and automobile taxes are 'hypothecated' – i.e. dedicated to transport purposes. In **Japan**, for example, 24% of vehicle and fuel tax revenues in 2007 were earmarked in this manner to the prefectures (regional local authorities), and most of this was specifically for road programmes. This has led to criticisms that “the toll road system and the earmarking of gasoline tax were self-sustaining and might induce unnecessary road projects.....” (Ohta and Muromachi, 2007: 16). The **USA** is another example: “Revenues from federal fuel charges are earmarked to go into the Highway Trust Fund. State governments combine these federal allocations with revenue from other sources, including both state fuel taxes and general tax revenue, in order to build and maintain the network.” (Transport Research Centre, 2008: 67). The funds from the Highway Trust Fund are also invested in public transport, and also used to lever private investment for specific infrastructure needs. In most countries, however, the majority of fuel tax revenues are used for general (i.e. other than transport) purposes.

Toll road revenues

Like Japan, **France** has used tolls to finance its motorway construction. In 1955 (almost the same time as Japan) the first law providing for the payment of tolls to concession-holders was passed in France, though there were doubts about how the public would react, and the arrangement was only permitted 'in exceptional cases' and in partnership with local communities or public bodies. Since then, the system of toll motorways in France has evolved from a largely public (and temporary) arrangement to a private (and permanent) system, and by the late 2000's, most finance for new auto-route projects was derived from private sources (including toll road revenues). (Zembri, 2009).

Greece (and also Spain, Portugal and Italy) are other European countries where road tolls are widely applied. In **Greece**, the entire motorway network (916 km in 2004) is under tolls levied by publicly-owned concessionaire companies, and this provided approximately 26% (in 1998) of national revenues from road-related taxes and fees. (For France, Spain, Portugal and Italy the corresponding proportions (tolls to total motoring revenues in 1998) were 15%, 8%, 9% and 8% respectively). (Transport Research Centre, 2008: 62 – quoting Lindberg and Nilsson, 2005).

In the **USA**, numerous states have tolled expressways (Florida, Texas, Pennsylvania are particular examples), and many states have highways that were 'de-tolled' after construction

⁹ In the UK, fuel duty for 2011 was forecast to yield £26bn, while the DfT's spending limit for 2011/12 was £13bn. Note: this does not include income from VAT on fuel, or from other vehicle taxes.

costs had been recovered (e.g. Connecticut, Kentucky, New York and others). In addition, there are numerous toll bridges and tunnels and ferries. However, while more toll roads are planned, they still represent only a small proportion of the USA's overall interstate highway system.

Special infrastructure funds

In the **Netherlands**, funds for major infrastructure projects are allocated primarily through the Infrastructure Fund, introduced in 1993 to create an integrated approach to infrastructure financing. It enables finances to be shifted between projects over time, to avoid budgetary bottlenecks. The Fund is mainly financed from the budgets of the Ministry of Transport and Water Management and the Fund for Economic Structure enhancement (FES). The latter come from profits from the sale of natural gas and shares owned by the state. In 2007, the Infrastructure Fund had a planned budget of about €7 billion (Giezen, 2007: 12). The acclaimed advantages of the Infrastructure Fund are that it has enabled greater flexibility in project financing and permits money to be transferred to the projects that most need funding at the time, though they must be on the 'MIT approved list'.¹⁰ For a while, it was expected that public-private/partnerships would become common and that this would reduce the call on the Infrastructure Fund. However, to date, unlike the UK, France and Hong Kong, there have been very few public-private partnership involvements in large-scale infrastructure projects in the Netherlands with the result that this premise has yet to be tested (Giezen, 2007: 12).

National infrastructure plans

In **Germany**, all MUTPs are listed in the Federal Transport Infrastructure Plan (FTIP) (the *Bundesverkehrswegeplan*). This is Germany's key master plan for transport infrastructure, and provides an integrated 5-year investment framework for federal roads, rail and inland waterways, (but not airports or ports, which are not a Federal responsibility). The FTIP contains detailed financial information and evaluation for each project, on a state-by-state basis. It is a valuable investment plan which clearly prioritizes funds for projects for which construction can begin. For the period 2006-2010 the FTIP identified €82bn of transport infrastructure investment for maintenance, on-going and new projects (Peters, 2008:14, 21).

The German Federal government funds all approved FTIP projects, and the beneficiaries are the *Länder* (states) and also the *Deutsche Bahn* (railways). In the 1990's there were serious concerns about looming shortfalls in infrastructure funding, due to the demands of the re-unification programme. In 1999 an independent expert commission was set up (the Pällmann Commission), which recommended reforming Germany's transport infrastructure finance, including greater use of private sector capital and wider application of user charges for federal infrastructure, particularly a new distance-based trucking charge on freeways. The latter is now in operation, (also in Switzerland and Austria), and there are calls to introduce it EU-wide.

In **Japan**, national infrastructure proposals are set out in the 'Comprehensive National Development Plan', of which there have been five since World War II. The most recent was in 1999, looking forward to 2010-2015. This is a statutory nationwide land development plan, and provides a framework for public investment at the national and regional levels, including mega urban transport projects such as inter-city expressways, *Shinkansens* (inter-city high-speed railways), and other inter-city railways and international airports. However, the Comprehensive National Development Plan does not provide a detailed infrastructure

¹⁰ The *Meerjarenprogramma Infrastructuur en Transport* (MIT) is a list of projects that are on the agenda or that are already being constructed. It has a scope of four years and is updated annually as part of the State Budget. Since 2004 it has an outlook till 2020.

programme like Germany's Federal Transport Infrastructure Plan – these are contained in the Regional Development Plans, which have three components: (i) the Basic Plan, which sets out planning policies and guidelines; (ii) the Development Plan, which sets out land development and transport (and other) infrastructure projects for the next five years; and (iii) the Project Plan, which sets out the specific projects to be implemented for each fiscal year under the five-year Development Plan. (Ohta and Muromachi, 2007: 6-7).

The **UK**, by contrast, has only recently (2010) adopted a National Infrastructure Plan. This is a (short) policy document, setting out the government's 'vision' for major infrastructure investment in the UK over the next few years (though no target date is specified). The plan covers energy, water, transport, digital communications and intellectual capital, and will be further elaborated in 2011, though the process "is not designed to produce a detailed list of projects setting out the location or timing for each piece of infrastructure that needs to be developed." (HM Treasury, 2011). Also in contrast to Germany and Japan, England now has no regional plans (apart from London), the previous regional organisations and strategies having been abolished in 2010.

Under-investment (states of 'infrastructure anorexia')

UK: Compared with other major EU countries, the UK has had a weak record of investment in MUTP's. Transport has received a modest share of total public spending, even when the economy was booming. For example, in the period 1990 to 1995, Germany and France invested 66% and 50% more respectively in transport infrastructure than the UK (Terry, 2008: 29). Terry suggests the following reasons for the UK's comparatively poor performance:

- **The transport sector received lower priority than other sectors**, and the Transport Minister's "lack of political weight ... was, for several decades, reflected in relatively low levels of resource allocation...."
- **Railway modernisation and most of the motorway construction programme were paid for from annual public expenditure allocations.** "As such, they were subject to the vagaries of stop-go economic policies, cash limits and short-term financial planning," and took no account of the potential returns on investment. Consequently, some important transport schemes (such as rail electrification projects) were *never* started;
- **At times of economic downturn, major projects were seen as an unacceptable drain on the public finances**, and were cut back or postponed. Local government's financial freedom to fund major transport projects was also substantially curtailed, resulting in less collaborative funding (between different levels of government) in the UK compared with Germany, France or the Netherlands; and
- **Related to this narrow view of economic benefits was "an excessive concentration ...on the pre-decision phase**, whereas once the project was approved, the funding "was [often] pruned to the point where it risked undermining the project's success, or was hedged with restrictions that caused lasting operational difficulties".
- Other countries (covered in this review) that have experienced under-investment in MUTP's include the USA and Greece. In the **USA**, federal funding for urban mass transit was cut by one-quarter during the 1980's, and since then the funding for public infrastructure has "trended sharply down overall...when adjusted for the growth of GDP." (Alshuler, 2008). In **Greece**, there was substantial under-investment in public infrastructure in the 1960's and 1970's, though since 1981, EU membership has led to a substantial increase in the funds available for mega-infrastructure.

Private finance initiative (PFI), build-operate-and transfer (BOT) and the rail-cum-property development (RcPD) model

UK: In a partial response to the above acknowledged under-investment in infrastructure nation-wide, PFI was launched in the UK in 1992 as part of the political priority for reducing the cost of the public sector and stimulating private enterprise. Since then there has been a consistent UK government bias towards private sector funding. As Terry explains, “for a time it became compulsory for public bodies to make a comparison between private funding and management of any new capital project with the alternative public sector option. Rules issued by HM Treasury had the effect of weighting the choice of options in favour of the private sector, *even though* in the longer term this might cost considerably more than using public funds. The argument was that gains in technical innovation, efficiency and speed of delivery would more than compensate for the additional cost” (Terry, 2008: 24). However, according to Monbiot (2010: 2), public bodies were given *no* choice in so far as “...if they wanted new projects, they had to use the private finance initiative. In some cases private companies weren’t interested, so the schemes had to be reverse-engineered to attract them..... The system was rigged to show that PFI was cheaper than public procurement. [Public bodies] could choose their own value for “optimism bias” in public procurement.....But, by official decree, optimism bias was deemed not to exist in private procurement. They could also attach *whatever* price they wanted to the risk (which was ostensibly) being transferred to the private sector.....These valuation exercises were notional anyway, because as soon as a preferred bidder for the contract had been chosen, the agreed prices were ‘junked’.” (Monbiot, 2010: 2).

What is important to note is that despite the emphasis on PFI projects - both by Conservative and Labour governments – “they (the governments) were disappointed to find that private investors usually [had]...more attractive propositions than investment in urban transport...” They (the governments) also discovered that “substantial delays resulted while project promoters explored the possibilities for private sector participation, notably in connexion with light rail schemes, and where this has eventually been achieved the extent of risk-transfer has been relatively small.” Terry claims that such experiences suggest that “the sunk costs involved in transport projects mean that a long-term view of benefits needs to be taken” and yet “in the UK context, a political consensus on this seems difficult to achieve, or sustain”. He concludes that this may explain why (unlike other governments in our country review, with the possible exception of USA, Australia and Greece), the UK governments over the past 50 years have been strongly reluctant to invest in urban transport infrastructure and where they have done, the investment was pared to minimum. (Terry, 2008: 28).

Hong Kong: Hong Kong is often seen as a model for other countries in terms of how best to invest in/fund urban transport infrastructure and related developments, on account of its employment of numerous ‘Build-Operate-Transfer’ (BOT) projects and its ‘rail-cum-property development’ (RcPD) model, which part-finances rail projects from the enhanced land values created by rail development. According to Ng and Pretorius (2009), Hong Kong’s pioneering role in public-private partnerships (PPPs) originated in the 19th Century (developed perhaps from “a refugee society with a ‘borrowed time, borrowed place’ mentality” when land shortages encouraged Chinese entrepreneurs to reclaim land under the direction of the Public Works Department. Hong Kong’s first BOT project was the Cross-Harbour Tunnel in 1972, which has been a commercial success. Since then, other BOT projects include the Eastern Harbour Crossing, Tate’s Cairn Tunnel, Western Harbour Crossing, and the Route 3 Country Park Section. Hong Kong’s interest in BOT projects may partly reflect its particular circumstances – i.e., not only its history of public-private partnerships, but also as a city-state it did not have recourse to a central government funding for mega-projects; and with the approaching handover to the Chinese Government in 1997 which may have increased the attractiveness of a private sector-led approach for long-term infrastructure investment.

Hong Kong has also been a role model for using property development to part-finance rail development. Prior to 2007, there were two railway operators: the Kowloon-Canton Railway Corporation (KCRC) founded in 1888, and the Mass Transit Railway Corporation (MTRC), opened in 1979. Both have been actively involved in the property business, co-operating with developers to develop residential and commercial properties above stations and depots. Up to 2007 (when the two operators merged under one organisation, through retaining their original names) they had completed 31 property development projects, which provided up to 20% of MTRC's total revenues.¹¹ In 2010 property development and recurrent income from its investment property portfolio contributed some 41% of MTRC's operating profit. In 2007, when KCRC effectively merged with MTRC, income from property services contributed some 20% of KCRC's total revenues. Following their merger, the new organisation generates some 14% of its total revenue from property development sources (Ng and Pretorius, 2009: 14). These achievements have been facilitated by Hong Kong's high population density and the strong revenue-based railway catchments areas the territory offers. Partly because of these developments the railway operators have been able to operate *without* subsidy, and property development has helped to significantly generate investment funds.

Japan: It should be noted that Japan also uses property development to support its rail development (both metro and heavy rail). Part of the cost of urban rail and metro construction is subsidized by national government, and complemented by passenger fare revenues, as well as special assessments or other local government taxes. The land for the infrastructure right of way is also generated through land adjustment projects, often organised by City Planning departments. Most private rail companies also internalize the benefit of the construction and operation of railways by residential and commercial developments along the lines. This is facilitated by the fact that they are branches of a common Trading Company with interests in real estate, retailing, railway and construction, which allows cross-subsidisation of major transport (especially railway/metro) projects. Because of these interests, the Trading Companies exert considerable leverage over Japanese Government investment and subsidy decisions in infrastructure development nation-wide. Another source of funds for investment in new transport systems such as urban monorails, guided buses, etc., is a special law for the Promotion of Urban Monorail Construction, which is funded from general road revenues (i.e. fuel and vehicle taxes).

France: The financing of the TGV system has, in the past, benefited from access to multiple development budgets beyond the budgets of the Ministry of Transport and SNCF. Without this broad platform of financing/cross-subsidy, the French TGV network and related stations could not have been built on the scale and in the manner they have. The PFI/BOT/PPP plus (RcPD) model for the TGV network has made France a leading light in this respect.

Alternative approaches to public funding

Sweden: In recent years Sweden has looked increasingly at alternative methods of funding infrastructure investment as against through traditional budget grants. The reason for looking for alternatives was "a growing awareness in the late 1980's that the supply of state financed infrastructure was inadequate for meeting the demand in the near future." (Pettersson, 2008: 17). The main alternatives have been:

- loans from the National Debt Office;
- state guaranteed loans;
- advancement from municipalities or private interests;
- financing by fee-charging; and
- public-private-partnerships (PPPs).

¹¹ Approximately 80% of MTRC's revenues came from fares, and there is also income from advertising, station rental and granting franchises for communication services within the railway. (Ng and Pretorius, 2009: 14).

In some cases a combination of alternatives has been used for one project (for example, the Öresund-link and the Arlanda air-rail link – both OMEGA case studies). The introduction of these alternative financing options has resulted in the existence of two parallel systems for infrastructure planning: one based on the ten year plans (revised every four years) for investments financed via the state budget; and the other outside the state budget. In 2006 approximately €6 billion of MUDP investment was planned under 'alternative financing', roughly one-quarter as much as the ten-year infrastructure plan. Loans from the National Debt Office are, however, the most common form for alternative financing. This has increased substantially during the last decade. It has, however, also spawned some problems, including: reducing parliament's control over the planning process, and the 'hollowing-out' the national road and rail administrations future budgets as they are used as a source for paying-off of loans thereby causing problems for maintenance as well as delaying new projects (Pettersson, 2008: 18).

USA: Several alternative methods of financing public investment are used in the USA which are less common in other parts of the world. These include:

- Grant anticipation revenue vehicles;
- State infrastructure banks;
- Tax increment financing.

According to the Transport Research Centre (2008: 188), "the *Grant Anticipation Revenue Vehicle* (GARVEE) allows state governments and other public authorities to issue debt financing instruments, such as bonds, for the construction of transport infrastructure, and then repay this debt from future federal contributions. However, the reimbursement of the construction costs need occur only when the debt service is due." Thus projects can be started without waiting for government funds to be available, and the costs of providing the infrastructure can be spread over the project's life.

According to the same source, *State Infrastructure Banks* "...allow states to enter into co-operative agreements with the federal Secretary of Transportation to establish revolving funds capitalised by federal contributions. These could then be used by the states to attract additional and non-federal public investment." (op cit, 2008: 188).

Another (widely used) method of raising finance for public projects in the USA is *Tax Increment Financing*. TIF uses anticipated future gains in taxes to finance current improvements. It works on the basis that new or improved infrastructure will bring new development and also increase the value of existing properties, which in turn leads to increased property tax revenues. The local government can therefore issue (sell) bonds to fund new infrastructure, with repayments based on the anticipated increase in property taxation (the "tax increment"). (Burgess Salmon, 2009: 1). Most states in the USA have laws enabling TIF – some were passed recently, and others have been in place for several decades. They are mostly associated with area regeneration and redevelopment, and became more widespread as the federal government reduced central funding for these activities. By 2008 California had over 400 TIF districts yielding \$10bn annually in revenues. (California State Controller, 2009). Tax increment financing is now being adopted in other countries – for example, in 2010 the **UK** government announced that it would be introducing enabling legislation for TIF's (HM Treasury, 2010), and this is now being considered as a funding mechanism for the extension of London's Northern Underground Line to Battersea Power Station. However, the funding model is not without its disadvantages, including: (i) long timescales of 20-25 years for repayment; (ii) the risk that anticipated rises in property values may not materialise; (iii) residents in non-TIF areas could lose out – through blight or failure to obtain benefits from the expenditures; (iv) the tax powers of local authorities may be too limited and in need of broadening (in order to recover the increment); (v) local authorities may not have the organisational capacity for managing such projects and funds. (Burgess Salmon, 2009: 2).

3.1.3.3 Technical and political processes for choosing projects

As earlier indicated, only some of the countries reviewed have detailed 'national plans' for infrastructure, (e.g. Germany, Japan, Netherlands), nonetheless, most countries follow broadly similar approaches in the way they prepare their lists' of projects, and prioritise them.

Infrastructure shopping lists

Typically, the 'shopping lists' of major infrastructure projects greatly exceed the resources available. By way of illustration, in Germany, for example, the highly ambitious 1992 re-unification infrastructure plan costing an estimated €38.5bn for 17 major transport projects was said to have eventually led to a national 'funding crisis' (Giesen, 2007: 12). In the Netherlands, infrastructure plans worth €130 billion were submitted for the period 1998-2002, while the available budget was less than one-tenth of this amount (€12 billion for 2010-15) (Priemus, 2007). Similar experiences could be quoted for the UK, for example, the Conservative government's 1989 road building programme costing £18bn (in 1997 prices) was highly over-optimistic about available funds; and the Labour government's Ten-Year Plan for Transport in 2000 – which anticipated a private sector contribution of £30bn – was similarly over-optimistic, so much so that "it rapidly lost all credibility" (Terry, 2008: 26). This trend of excessive expectation from infrastructure development, especially for transport, makes the way projects are appraised, prioritised and ultimately selected, highly important.

Prioritisation of projects

Notwithstanding the considerable diversity in the countries reviewed, they appear to follow broadly similar processes for prioritising infrastructure projects. The differences (between countries) tend to be more in the detail than in the overall approach. Typically projects are grouped into three categories:

- entry level (i.e. approved for inclusion in the broad 'shopping list' of potential projects);
- detailed planning and prioritisation (i.e. projects that have been taken forward for detailed planning and appraisal);
- implementation (i.e. projects that are approved, planned and funded).

Germany: In Germany, projects are proposed by the *Länder* (and also by the now privatised *Deutsche Bahn* Railways) for inclusion in the FTIP. Since the funding comes from the Federal Government, "the submitting organisations have an obvious interest to present long lists with overly optimistic cost estimates..." (Peters, 2008:16). The proposed projects then undergo cost-benefit analysis (CBA) and environmental, spatial and habitat assessments, which help narrow the list down to a more manageable list. The CBA exercise is the main mechanism for prioritising projects, but despite numerous attempts in Germany to improve it, there remain major criticisms, particularly (after Peters, 2008: 19):

- The environmental and spatial assessments are carried out *after* the CBA has been undertaken with the result that the costs of any additional mitigation measures that might be needed do *not* appear in the CBA ratio;
- 'Secondary status' is assigned to the non-monetary (environmental, social and habitat) assessments. This is demonstrated "by the fact that the individual *Länder* is invited to comment on the results of the CBA *before* the other methods are applied."
- Even if a project has a very high environmental risk or habitats impact, this does *not* preclude its inclusion in the FTIP, especially when the conflicts are deemed manageable.

After the (above) evaluations, negotiations take place and "...the different government ministries, state governments, the national parliament and other stakeholders *all* exert their

influence....” (Peters, 2008: 15). “[Hence] even Germany’s apparently very sophisticated federal infrastructure assessment methodology leaves ample room for political manoeuvring. At the end of the day, the first and most crucial instance of political negotiation re: infrastructure priorities is the consultation between the Federal government and the states (*Länder*), where many economically and environmentally undeserving projects *can* be reinstated and reappear on the list of priority projects, if local pressure to include it is strong enough. Once such a project has made it to the top of the list, it is *very* difficult, if not impossible, to remove it from the list later on.” (Peters, 2008: 19) Hence, despite all the rhetoric about sophisticated appraisal processes, Germany’s infrastructure evaluation processes, although seemingly thorough, still ultimately depends on political priorities and is open to political manipulation. The same occurs in other countries as the following discussion suggests.

Netherlands: Concerns about past cost over-runs and time delays of major infrastructure projects led to a Dutch parliamentary commission in 2003 to look into the causes and remedies for such trends. The Parliamentary Commission on Infrastructure Projects (*Tijdelijke Commissie Infrastructuurprojecten* (TCI) reported in 2004. Its investigations noted ‘systemic flaws’ frequently observed in large projects both in the Netherlands and elsewhere, including (after Priemus, 2007):

- A general trend towards underestimating the costs and overestimating the benefits of major projects.
- Disputed information and (sometimes) misinformation, due to the different interests and perspectives of the many players involved in the project preparations.
- A tendency to jump to premature conclusions instead of starting with a solid problem analysis.
- Absence of clear and unambiguous ‘go/no-go’ stages. Political commitment exists at an early stage and cannot be easily turned around with the result that there are no explicit stages where alternatives can still be considered or the proposal called off.
- In the preparatory run-up to large infrastructure projects, a strong tendency to treat the approach as a technocratic process with the result that Parliament tends to be marginalized and its involvement is too late, *after* the project has already been committed-to, with the result that the subsequent political interventions push up the (already overrun) budget still further.

Since the late 1990s, infrastructure projects and other spatial-economic investments in the Netherlands have been scrutinised by the Interdepartmental Commission for Strengthening the Economic Structure (ICES),¹² consisting of the secretaries-general of various ministries. According to Priemus (2007: 77), however, the process has numerous shortcomings:

- The national planning offices conduct only a ‘quick scan’ evaluation of each submitted project proposal, and the criteria which projects must meet to be considered by ICES are far from clear.
- Most evaluations by the Netherlands Bureau for Economic Policy Analysis (CPB) and other planning offices “lack an adequate grounding and substantiation, while the procedure itself is primarily an official (or officious), rather technocratic undertaking”.
- The ICES does not publish reports of its proceedings. In effect, the Lower House [of Parliament] has no part in the prioritization whatsoever.”

The Dutch Parliamentary Commission recommended that there should be a definite stage at which potential large projects were considered one against the other, leading to an ‘Admission Decision’ on whether they should proceed to the second stage for further detailed investigation and development. The Commission also recommended earlier involvement of the Lower House of Parliament, including the power to approve / ratify the

¹² The ICES advises the Dutch government on infrastructure priorities about once in every four years. (The committee is currently known as the Interdepartmental Commission on Spatial Economy [ICRE]).

government's 'Admission Decision'. In Priemus's view, "Dutch practice ...seems to be not exceptional. By and large we observe the same problems in all modern countries." (op cit, page 92).

UK: In the UK, as in most other countries, planning approval for MUTP's is treated separately to the normal planning process. Before 2008, projects were submitted to the Secretary of State for approval under powers delegated by parliament. However, delays often occurred while each case was prepared for ministerial decision by the *small* team of civil servants in the Department for Transport (Terry, 2008: 17). Dissatisfaction about such delays contributed to the need for new procedures with the result that the 2008 Planning Act established a new system of planning approval for nationally significant infrastructure projects. It provided for:

- National Policy Statements for various sectors (energy, water, waste, ports, etc), which integrate environmental, social and economic objectives and provide clarity on the need for infrastructure; and
- A new independent body – the Infrastructure Planning Commission (IPC) – to implement a streamlined process for deciding nationally significant infrastructure projects (or making a recommendation to the Secretary of State).

The IPC was established in 2009, but the following year the new Conservative-Liberal coalition government announced that it would be abolished and its duties transferred to a Planning Unit within the existing national Planning Inspectorate. National Policy Statements, however, would be retained, and both Houses of Parliament would have an opportunity to vote on these. However, the Secretary of State would make the final decision on each project thereby transforming the MUTP planning approval procedures from a supposedly more independent technocratic process back into the political domain of decision-making.

In February 2011 the UK government announced the creation of a new body, the Major Projects Authority (MPA), to scrutinise all major projects (defined as projects that require HM Treasury approval, including mega-projects) both on an individual and a portfolio basis. The MPA is a partnership between the Cabinet Office and HM Treasury, and will support government decision-making and monitoring of large projects in a number of ways, including (from Cabinet Office, 2011):

- (i) Providing an annual report on the progress of projects in the government's major projects portfolio;
- (ii) Requiring every major project to have an 'Integrated Assurance and Approval Plan' (IAAP), without which HM Treasury approval may not be given;
- (iii) Recommending that central government bodies (such as the Department for Transport and other ministries) develop an 'Integrated Assurance and Approval Strategy' (IAAS) for their respective project portfolios – this strategy would build on / enhance existing methods of making investment approval decisions;
- (iv) Provide additional assurance and monitoring of 'problem' projects;
- (v) Encourage transparency (through publication of project information on-line, and the annual report on progress of the government's major projects portfolio).

Like the Dutch Parliamentary study of major projects in 2004 (see above), the UK's Major Project Authority followed reviews of shortcomings of major projects in the UK.¹³ How the MPA will change the planning, appraisal and monitoring of mega-projects in the UK remains to be seen. However, the early indications from the recently-published guidelines suggest that the emphasis will continue to be on the 'iron triangle' of scope, time and cost; while environmental and social considerations may continue to receive only secondary status, as in Germany (see above, and below).

¹³ The UK reviews of major projects were carried out by the National Audit Commission (June 2010) and the Cabinet Office's 'Efficiency and Reform Group' (August 2010)

Greece: In Greece, the appraisal and prioritisation of MUTP's was even more limited, especially up to the 1980's. According to Skayannis and Kaparos (2008: 24): "Before 1989, there was practically *no* publicly known evaluation process (for such projects), nor was the public sector engaged in such exercises, at least via formal structures (e.g. units in Ministries)... As far as MUTP appraisal is concerned, it seemed that no publicly-known appraisal process had been taking place for the majority of the projects.....besides the feasibility studies done by the prospective investors." The impact of EU membership, however, and the technical requirements of the Community Support Frameworks, has introduced a significant amount of appraisal work introduced into much public works projects (mainly commissioned by the Ministry of Planning and Environment) which is typically outsourced to consultancy firms. These commissioned studies, following many EU procedures and guidelines, *ostensibly* provide the basis of for subsequent project approval or rejection and subsequent funding (much of it from the EU or the European Investment Bank (EIB) although there is much anecdotal evidence to suggest that political factors often override more technical advice in final judgements made about such projects, including matters concerning their funding.

3.1.3.4 Over-riding importance of political priorities and significant events

The above review attests to the fact that the appraisal and prioritisation of major infrastructure projects (especially MUTPs) varies from country to country, and that even the most sophisticated face significant limitations and shortcomings as well as considerable political influences. Common to all ten countries studied has been the over-riding importance of politically imposed priorities and politically significant mega events and disasters that altered and shaped project priorities. The following country examples illustrate the impact of these.

Politically imposed priorities

- **France:** After a boom in motorway construction in the mid-1990's, France saw the appointment in 1997 of a left-wing minister to the Ministry of Construction and a Green Party minister to the Ministry of Planning and the Environment which for a while resulted in a moratorium on motorway construction. (Zembri, 2008: 31).
- **Japan:** Something similar occurred in Japan in 1967, when a Governor of Tokyo (Ryokichi Minobe) was elected who was a strong environmentalist. He strongly opposed motorway development, and stopped most of the planning and construction of major roads within the Tokyo Metropolitan Area, (including the Metropolitan Expressway project – an OMEGA case study) during his governorship until 1979 (OMEGA Centre, 2011:2).
- **Germany:** too provides plenty of examples. For example, in 2002, when a Federal government coalition agreement between the Social Democrats (SPD) and the Greens specified that road and rail should receive equal amounts of (federal) funds, "effectively skewing the project list in favour of rail." (Peters, 2008: 16).
- **USA:** "Perhaps the single-most important point to keep in mind when thinking about political support and financial mechanisms for Urban Surface Transport Mega-Project (USTMPs) in the USA, is that while many receive federal funding, *most* of the political and institutional support for them is derived from local (political) constituencies where "...those supporting them are often interested primarily in meeting local needs and interests...." The result of this 'bottom-up process' is that unless there is local support they are often stymied, particularly since federal funding cannot pay the entire cost, and other revenues (state, local, taxes, fees, private equity) are needed. (de Cerreño and Nobbe, 2008: 11).

Politically significant mega events and disasters

- **Sporting/cultural mega events:** Responding to important sporting/cultural mega events is another form of setting political priorities that significantly affect MUTP developments. In this regard, the Olympic Games have been prominent in influencing MUTP developments, for example in Japan (in Tokyo, 1964; Sapporo 1972; and Nagano, 1998), the USA (winter Olympics in Salt Lake City in 2002), Greece (Athens Olympics, 2004), and the UK (London, 2012). Another important UK (cultural) mega-event was the London's Millennium Dome, whose 2000 deadline strongly influenced the completion of the Jubilee Line Extension (JLE) (also an OMEGA case study).
- **International political events:** Another kind of international (non-sporting) mega event impacting on MUTP developments are major international political events, such as the re-unification of Germany in 1989 and the handover of Hong Kong to the People's Republic of China in 1997 (both already referred to earlier). In the former instance, the re-unification of West Germany with East Germany led to 17 major infrastructure projects being considered 'priority projects' *regardless* of their real cost-benefits and impacts. This was done on the grounds they promoted east-west national unification (Peters, 2008: 16). In the case of Hong Kong, as earlier mentioned, a huge port and airport development scheme (PADS) committed the territory to a massive infrastructure investment programme prior to the 1997 handover in an effort to counter uncertainties presented by many pundits concerning the transition. The more cynical argued that the programme's principal aim was for the British to raid the overflowing coffers of the Hong Kong colonial administration *before* the handover.
- **Natural disasters:** Perhaps among the most important mega-events of all are natural disasters such as earthquakes, tsunamis, cyclones etc. Japan is a prime example of a country impacted by major earthquakes, which occurred (amongst others) in 1948 (Fukui), 1995 (Hanshin), 2004 (Chūetsu), and 2011(Tōhoku). With the difficulty of forecasting earthquakes, and the importance of the infrastructure remaining intact to support disaster relief efforts, Japanese infrastructure is designed to a much higher standard of earthquake resilience than would otherwise be the case. Indeed, Ohta and Muromachi conclude that simple cost-benefit analysis (CBA) techniques are *inadequate* for such contexts, and that earthquake-prone infrastructure should thus be evaluated using a different framework of public investment (Ohta and Muromachi, 2007: 21). With the experience of the flooding devastation of New Orleans in the USA and more recently Queensland in Australia, perhaps the same logic will eventually apply to flood prevention measures for mega infrastructure developments?
- **Man-made disasters:** In addition to the above mega events impacting on MUTP developments are man-made disasters, including wars, global financial crises and global warming - all of which have their own devastating impacts on major infrastructure developments both during and post crisis. Perhaps the logic posed by Ohta and Muromachi should also apply to these events in terms of risk mitigation and post crisis rectification? Certainly, the ramifications of the global financial crisis on Western economies are presenting governments with conflicting and cruel choices between austerity or 'new deal' type stimulant approaches or indeed some mix of both in efforts to cope with the fast diminishing access to the necessary funding to even maintain/operate MUTPs let alone build new infrastructure. These choices amplify the uncomfortable fact that all MUTPs are 'big bets' – especially so in circumstances of the highest uncertainties and risks where pay-offs are by no means guaranteed (even in the long run).

3.1.3.5 Environmental concerns and stakeholder participation

As earlier indicated, environmental issues and stakeholder participation in MUTP's emerged as important considerations from the late 1960's and have steadily grown in importance since, with some degree of acceleration in the first decade of the new millennium. While

many of these environmental issues are considered in greater depth in the Working Paper #2 Series on MUTP Sustainability Challenges in the following Section; some important observations contained in the Working Paper #1 Series regarding the prevailing conflict(s) between environmental and economic concerns and the role of MUTP stakeholders are summarised briefly below.

Environmental concerns still secondary to economic concerns

From the review of the ten working papers it was noted that while environmental and habitat assessments are now a major requirement in most large-scale infrastructure project appraisals, they in fact *seldom* prevent a scheme from going ahead. In Germany, it was reported that “Struggles for economic growth and competitiveness, as well as local and regional ‘pork-barrelling’, still tend to weigh more heavily than long-term public and/or environmental interests ... (and) Although stakeholders can appeal the final plan approval decision, such legal battles often drag on for a long time, delaying projects by many years though “they rarely ever manage to kill a project altogether.” (Peters, 2008: 1 and 11).

Even in Sweden, a country renowned for its pride for environmental protection, environmental issues appear to take second place to economic imperatives when it comes to MUTPs. According to Pettersson (2008: 15), “...critics still argue that environmental issues (of MUTPs) are poorly reflected in the cost estimates (and that) despite the [enhanced measures], the plans for several large-scale infrastructure projects have been implemented *regardless* of whether opposition was voiced of socio-economic, environmental and/or local concerns. The Southern Link of the ring road around Stockholm was for instance built regardless of concerns voiced on all three grounds...., perhaps most notably in spite of several independent analyses in the appraisal process which implied negative returns of the project.” The same source goes on to report that an Environmental Impact Assessment of the project, performed by a consultant on behalf of the National Road Administration, was even stopped because it was too critical. Overall, in Pettersson’s view, “....regarding the role of infrastructure in meeting the future challenges for CO2 emission reductions, there seems to be a gap between the rhetoric and the “real politik” at present...” (Pettersson, 2008: 20). Similar conclusions have emerged in other countries covered in this review, and are described further in Section 4.2.2, Sustainable Development Challenges.

The stakeholders’ role – both increasing and decreasing

Also since the 1960s, over time, stakeholders’ formal involvement in the MUTP decision-making process has been steadily enhanced in most of the countries reviewed by the Working Paper #1 series, with the possible exception of the Hong Kong experience. Most countries have formalised and strengthened the consultation process, including the holding of public inquiries. Even in the exception cited above (Hong Kong) which is still considered an ‘administrative state’ (albeit under different national masters), “....there has been rising civil awareness [since the 1990’s] with, for instance, green groups monitoring the environment and others keeping scrutinizing eyes on the use of tax-payers’ money and some even raising issues of social justice.” (Mee Kam Ng and Pretorius, 2009: 14). Yet in recent years, some developments have tended to *reduce* local involvement in the decision-making process. The growing role of the EU in the prioritisation and privatisation of transport projects and services is one example. Another example is in the way that governments have reduced the role of local authorities in an attempt to streamline the mega-project development process (as witnessed in the UK). Some of this streamlining may be entirely justified and appropriate – in other cases, it is less clear. In the Netherlands, for example, several Acts ¹⁴ were introduced in the 1990’s to improve co-ordination of infrastructure projects, to speed up the approval process, and also strengthen the central government’s

¹⁴ For example, the Tracé Act, 1994, and the nimby-procedure (*Not in My Backyard*), also in 1994.

powers relative to the local (municipal) authorities. “The whole process has been aimed at shifting the equilibrium of planning powers in favour of the national state. The planning process for large infrastructure projects has thus moved from a decentralized legal context to a more centralized one. (Despite this) However, there is still a preference in the planning project towards deliberation between the different governmental levels, and the strong enforcement tools as the ‘*nimby*’ procedure are often not used” (Giezen, 2007: 11). Hence while stakeholder involvement has grown and become more formalised, to some extent the local voice, as expressed through the local authorities, has diminished.

3.1.3.6 Conclusions and emerging issues

Conclusions

Some key conclusions can be highlighted among the many issues covered in this synthesis of the ten papers. Firstly, the country working papers have shown the difficulty that planners have faced in accurately predicting the future. Many policies have later proved to be inappropriate, within just a few decades – for example, the priority given to building urban motorways while allowing the run-down of railways and tram systems. Secondly, over time, there have emerged considerable similarities in the urban transport policies and approaches adopted by the different countries. Examples include: the type of MUTPs constructed; the countries’ responses to economic events (generally, they have responded to economic downturns with major cut-backs rather than counter-cyclical investment); the general trend towards privatisation and private sector financing; and so on. At the same time, within these overall trends there have been noticeable policy swings within each country as their governments changed. These swings to ‘right’ and ‘left’ occurred in most countries (e.g. USA, UK, France, Sweden, Australia), and was reflected in increased or decreased funds for public transport, increased or decreased planning co-ordination, and so on. In addition, the local context, such as individual politicians and mega events (including disasters) has had an important influence over policies affecting MUTPs and their specific developments.

Emerging Issues

The Working Paper #1 series also briefly mentioned some emerging issues that are likely to be important for MUTPs in the future. Some mentioned new transport technologies, such as the MAGLEV (as in the case of Japan and Germany), as well as computer-based applications such as road user charging and integrated ticketing (e.g. in the Netherlands and Germany). In the Netherlands, proposals to introduce road pricing on freight (in 2011) and on car passenger movement (by 2016) “may change the Dutch infrastructure planning context in a considerable way” (Priemus, 2008: personal communication). Another important emerging issue, noted in the Swedish Working Country Paper is a levelling-off in the total distances travelled by car in Western metropolises. The authors of this paper argue that a clear trend has appeared in the past decade, suggesting that the continued growth in overall car mileage, seen since the Second World War, has peaked and may be beginning to decline. A third, and arguably the most important emerging issue, is the ‘sustainability agenda’ and the related issues of global warming and peak oil, which are considered further in the Working Paper #2 Series synthesis in Section 3.2.2.

3.2 Working paper #2 Series: Sustainable development challenges of MUTPs

3.2.1 Aims and purpose of Working Paper #2 series

This set of working papers looks at themes and challenges typically confronted by MUTPs in the pursuit of sustainable development. The purpose of these papers is to provide insights

into selected challenges that MUTP's face in the pursuit of sustainable development. This task is made especially difficult on account that many MUTP stakeholders have different, as well as often changing, expectations of such projects. When MUTP delivery is obliged by government and civil society to significantly contribute to visions of sustainable development, there typically arises considerable tension in deciding which dimensions of the sustainable development vision should *ultimately* prevail, and perhaps more challenging, how these fit/do not fit with the more traditional economic growth agenda.

This series of working papers was commissioned by the CoE of its Academic International Partners to investigate sustainability issues from an *international* perspective, focused largely on particular Partner research expertise and interests. Figure 3.5 provides details of the main themes covered by these papers. Each paper:

- Examined the concepts and definitions of sustainable development employed;
- Investigated how the selected theme relates to MUTP planning, appraisal and delivery;
- Presented both generic and context-specific issues, with examples where relevant; and
- Offered conclusions on how sustainability can be better incorporated in future MUTPs in light of the investigation.

Figure 3.5: Main Sustainability Aspects Covered in Working Paper #2 Series

OMEGA Academic Partners	UK	FR	GR	DE	NL	USA	AUS	HK	JPN	SWE
Accessibility										
Accountability					†					
Affordability										
Biodiversity							†			
Cohesion			†							
Competition										
Ecology									†	
Efficiency										
Energy										†
Equity										
Globalisation	†									
Health										
Privatisation		†								
Safety										
Subsidiarity										
Transparency										
Viability								†		
Spatial/Territorial Restructuring				†						
Institutional Development						†				

A list of the ten working papers and synthesis presentation is provided in Appendix 12 (with links to each of the documents), while a summary of their key findings and conclusions is given in the following Section.

3.2.2 Summary of findings

This section summarises the key findings of the working papers on 'Sustainable Development Challenges of MUTP's', undertaken by the CoE and its OMEGA partners. The section is divided into four parts/discussions as follows:

- Sustainability: definition, measurements and application to MUTPs;
- Practical Issues of incorporating sustainability in MUTP's;
- Sustainability challenges and policy responses; and
- Conclusions.

3.2.2.1 Sustainability: definition, measurement and application to MUTP's

The Meaning of 'sustainability'

'Sustainability' is a widely-used term with almost everyone nowadays in favour of what the vision of 'sustainable development' supposedly represents, notwithstanding the variety of interpretations of how it is best defined and how it should be applied. As Low has observed, "'sustainable' has become the adjective of choice for any project an agent wishes to persuade stakeholders to accept." (Low, 2007: 4). Since the 1960's there has been much debate about the meaning of the term. In 1987 the Brundtland Commission defined 'sustainable development' as "...development that meets the needs of the present without compromising the needs of future generations to meet their own needs" (United Nations, 1987)

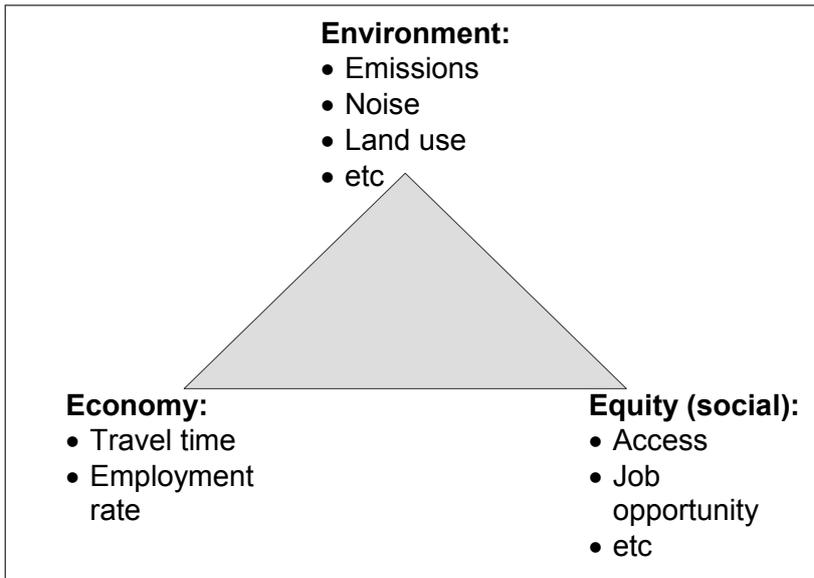
In 1992, the Rio Earth Summit agreed that "...the protection of the environment and social and economic development are fundamental to sustainable development..." (United Nations, 1998). This declaration highlighted the 'three pillars' of sustainability – environmental, economic and social – which are illustrated in the 'sustainability triangle' in Figure 3.6

Dimitriou and Thompson (2001) advocate a fourth dimension, namely that of 'institutional sustainability', meaning that policies and interventions depend on social structures and institutions (see also Skayannis and Kaparos, 2007: 4). This dimension is illustrated in Figure 3.7 which explains the framework adopted by the UN Commission for Sustainable Development (UN CSD) for its sustainability indicator set.

While it is difficult enough to arrive at a satisfactory *overall* definition of the concept of sustainable development, it is impossible to agree on a final, universal definitive *measurement* of sustainability. This is because:

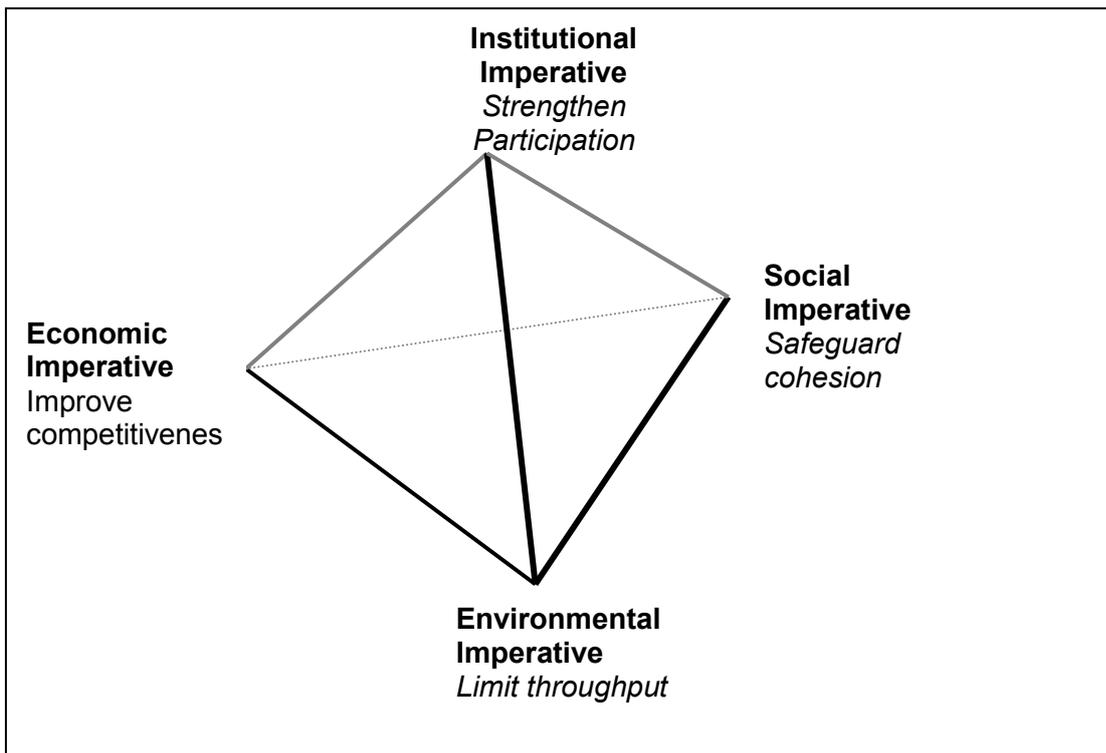
- The concept involves value judgements which are *ultimately* subjective and which will furthermore change over time;
- There will *always* be limitations regarding the extent of knowledge about the concept and its operationalization (for example, re: unknown species, unknown effects, and so on); and
- The concept is highly complex – with so many variables to consider, it is simply *not* possible to comprehend all the interactions and interdependencies it entails nor is it practical to collect every last item of information covering these variables, even if it was possible.

Figure 3.6: The sustainability triangle



Source: Kracht and Munafò, page 3 (from Enquete Commission, Bundestag, Germany 1998)

Figure 3.7: The sustainability pyramid



Source: Charlotte Kelly, ITS, Leeds (adapted from Valentin and Spangenberg, 2000)

At best, therefore, any attempt to decide whether or not a MUTP is ‘sustainable’ will simply be based on the best available evidence, and ultimately, involves moral and ethical choices. As Brecher and Nobbe explain (2007: 4) “... sustainability can only be given a meaningful definition by defining it in terms of a process rather than an outcome” – a view supported by Padiaditi. (2008: 2). This process, they explain, involves making judgements and trade-offs (between environmental change and economic growth, for example), so “If humans are to alter significantly critical elements of the environment, they should do so knowingly.”

Measuring and monitoring 'sustainability'

Kracht and Munafò (2008: 2) reviewed international efforts to develop indices and measurements of 'sustainable development'. The authors reviewed numerous indicator sets produced worldwide and conclude that not only is such data somewhat piecemeal, they pose major problems of comparability, despite on-going efforts that have been made to try and harmonise such data. One of the most complete indicator sets is that produced by the UN's CSD. With regards to transport, a study by Jeon, Mihyeon and Amekudzi (2005) of 16 national, regional and international sustainable transport indicator sets found that the *most* widely used indicators are traffic or infrastructure-related (e.g. traffic volume, road length), followed by environmental indicators (particularly fuel consumption and emissions). Economic factors (such as economic per capita indicators) were measured only by a few such projects, and similarly, socio-cultural and equity-related indicators were *not* widely used at all (Kracht and Munafò, 2008: 5). The same source further concluded that "...unfortunately not all sustainable indicator sets (environment / economy / equity) have the same quality. Some are more elaborated, some are less. It seems that especially the equity and environment indicators are still less methodologically sound than the well-established economic indicators" and that this conclusion also applies to MUTPs.

Assessing sustainability in projects, programmes and plans

There are now a number of well-established procedures for assessing the 'sustainability' of major projects, or at least certain aspects of them. These include: Environmental Impact Assessments (EIAs), Strategic Environmental Assessments (SEAs), Sustainability Appraisals (SAs) (in the UK); Social Impact Assessments (SIAs); Social Cost Benefit Analyses (SCBAs) and Multi-Criteria Analyses (MCAs).

- **Environmental Impact Assessments:** These were introduced in the USA in 1969, and involve a two-step process: a preliminary assessment to determine whether any further action is needed; and an Environmental Impact Statement, involving a detailed assessment of the project's predicted environmental effects and of alternative paths of action (Brecher and Nobbe, 2007: 5).
- **Strategic Environmental Assessments:** EIAs have been promoted in the EU since 1985. However, these deal only with projects, whereas many environmentally damaging decisions occur at a more strategic level. Hence in 2001, in accordance with the EU SEA Directive 2001/42/EC, the EU required all member states to introduce Strategic Environmental Assessments (SEAs) of strategic plans and programmes. The directive applies to statutory plans (regional, local, transport and waste plans), but *not* to national governments' plans and policies, which are considered voluntary. SEA's may, however, examine policies *within* statutory plans. Normally, SEA's should be carried out *before* EIA's are undertaken, so that the information acquired can inform EIA's at a later stage. The use of SEA's have now extended beyond EU with the result that they are now being promoted world-wide by the UN and other international development agencies. It should be noted, however, that they focus mainly on environmental consequences, rather than overall sustainability.
- **Sustainability Appraisal:** SEA's form part of a wider SA process in the UK that is required for local (land-use and transport) plans. (SAs were at one time also required for UK regional plans, until the latter were abolished in 2010). SA includes social and economic factors as well as environmental factors and is intended to ensure that decision-makers and the public understand the impact on sustainability of projects, programmes and plans. SAs involve an elaborate qualitative assessment of options against various sustainability criteria. However, the approach is *very* complex with the result that critics have argued that the "framework and process that is set out through [UK] planning legislation does *not* provide a practical route forward to assessing the

sustainability of transport strategies at a regional level.” (Marsden, Kimble, Nellthorp, Kelly, 2007: 12).

- **Question Schedule for Sustainability:** In France, the *Agence de l'Environnement et de la Maîtrise de l'Energie* (ADEME) has developed a question schedule to analyze the sustainability of new infrastructure projects. This is employed as a tool which is similar to that for France's new building standards schedule.¹⁵ The former has six principal themes, of which the most important are: project coherence (town planning effects, socio-economic impacts, integration with existing infrastructure, etc); environmental quality (noise, energy, pollution impacts, etc); and social impacts, participation and user quality (Leheis, date .2007: 4).
- **Social Impact Assessments:** Appraisals of major projects sometimes include SIAs, particularly projects in developing countries funded by the regional Development Banks¹⁶ and the World Bank. SIA's originated in the USA as a component of EIAs, and have grown in importance over time. A SIA involves tools and approaches which can be applied at different stages in project and policy development, often as part of a broader social analysis. It normally supplements an environmental assessment. According to Kaparos and Skayannis (2007: 8), SIAs address social impacts in a very comprehensive though straightforward manner, and as a result the authors recommend that they should be made a formal (and legally-binding) requirement for MUDP planning and appraisal.
- **Social Cost-Benefit Analysis:** SCBA has been in use for over fifty years, and is widely used in the appraisal of major projects, especially in the transport sector. All project costs and benefits are expressed in money or proxy monetary terms over a defined period of years, and monetary values are attributed for non-monetary items (to reflect economic, environmental and social factors which do not otherwise appear as project costs and incomes). The costs and benefits are discounted to arrive at an overall rate of return (usually the Benefit/Cost Ratio), which provides decision-makers with a single figure for each project, allowing for easier comparison. Over the years there has been considerable debate about the shortcomings of CBA, and numerous attempts to improve the process. For example, in Germany since 2003, spatial impacts assessment, environmental risk analysis and habitats directive assessment have been included in the project appraisal process – these being expressed in non-monetary values (Peters, 2008:15). Similar efforts (at improving the CBA process) have taken place in other countries, yet strong criticisms remain that environmental and social impacts are *not* adequately treated (see, for example, Kaparos and Skayannis, 2007: 7; and Muromachi, 2008: 12).
- Multi Criteria Analysis (MCA) is a much broader approach that explicitly considers both monetary and non-monetary costs and benefits in quantitative and qualitative terms. Here the results for each factor are presented in a summary table setting out *all* the criteria identified for assessment. This requires decision makers to exercise their judgement as to the relative weighting among the various criteria, enabling trade-offs to be made transparently. The intention is that MCA should provide the framework for a more holistic and transparent approach to developing and appraising projects that is *preferably* directed by policy. It can accommodate Financial CBA and Social CBA appraisals within its framework. MCA is thus more relevant for assessing sustainability impacts in infrastructure project appraisals, and is also more conducive to facilitating stakeholder engagement in project design and appraisal. (See Kracht & Munafò, 2008; Kaparos and Skayannis, 2007: and also OMEGA RAMP Study, 2010: 20). However, the application of MCA to mega-projects does not guarantee that sustainability concerns will be properly addressed – this depends on the priorities of the people and institutions carrying out the assessment. Social and environmental dimensions will therefor only

¹⁵ HQE = *Haute Qualité Environnementale* (High Quality Environmental standard), the French green standards for refurbishment and new buildings

¹⁶ The African Development Bank's, for example, undertake 'Integrated Environmental and Social Impact Assessment' (IESIA) guidelines are designed to highlight major issues and potential impacts that should be taken into account during the preparation and assessment phases of the Bank's projects.

receive their proper place when MCA appraisal is policy-led, and the policies (and institutions) are focused on sustainability, as opposed to narrowly focused on economic growth.

3.2.2.2 Practical issues of incorporating sustainability in MUTPs

Environmental impacts of sustainability

Low (2007: 7) highlights the fact that environmental impact assessments for MUTPs all too often take place after the project has been designed. This observation has also been made by And in German and Dutch MUTP. However, this is too late in the process for: “By the time a project is fully designed, and political and public expectations have been raised, it is too late to pose the question and expect a realistic answer unbiased by the politics surrounding the decision, because the political costs of cancelling a project at a late stage are too great” (Low, 2007: 7). He concludes that if a project is going to go ahead anyway, “...it is not only a waste of time and money investigating the risk, it is also misleading and deceptive, as it gives the public a false sense of security in the project” (Low, 2007: 8).

On this basis, Low argues, it is essential that EIA’s should form an integral part of the project planning, and be incorporated from the early stages of the project. He goes on to claim: “It is not necessary to have all the details of an MUTP worked out before the risk assessment process can start. For instance, if a tunnel, bridge, motorway or railway, or some combination of these, is to be constructed in a particular area...reasonable assumptions can be made about the location and nature of the project that can be corrected as the design proceeds. These assumptions can be entered into a risk analysis process.” This risk analysis process may be described as a ‘risk management cycle’, and is akin to iterative planning.

However, even if the EIA is properly integrated in the MUTP planning process, there remain major technical difficulties in doing this due to the uncertainties that surround many of the variables that feed into the assessment/appraisal. As Brecher and Nobbe explain (2007: 5), “the EIA process in the United States and similar procedures in other nations have serious faults. These difficulties have been well documented, and include issues of:

- Boundaries: i.e., how far (geographically) should the assessment be carried?
- Impacts: i.e., how far (along the causal chain) should harmful effects be traced?
- Uncertainty: i.e., about the impacts themselves, both now and in the future.

To illustrate typical shortcomings in the EIA process, Low cites an implemented project in Melbourne in 2008-9 (the Port Phillip Bay Channel-deepening Project) which carried substantial environmental risks – for example, to marine habitats, and to human and wildlife health through disturbance of toxic sediments. Two environmental assessments were carried out: the first of which was considered unsatisfactory, and a supplementary assessment which led to a 15,000-page report. Yet while ...“the logic of the process could hardly be faulted, nor the thoroughness with which the risk assessment was conducted..”, the assessment was “really little more than an informed guess buried within a mountainous report on the science of the conceptual models and the process of analysis” (Low, 2007: 22)

Low concludes that environmental risk assessments themselves carry two major (and contrary) risks: those of risks assessments leading to ‘risk-aversion’ (i.e. over-cautiousness), and discouraging beneficial action; and those risks that are conversely, a danger ...“of [the public and decision-makers] being reassured and manipulated by risk analysis into a belief that all risks have been ‘managed’ or can be ignored”. The author argues rather controversially perhaps that the solution to these challenges is either *not* to carry out the risk assessment at all, or else do it properly. For the latter, however, the *context* in which the assessment is carried out is all-important. Low explains “The [Port Philip Bay]

example...revealed how the process of 'rational' choice can be subverted by political choice.the application of rational techniques of risk analysis is *not* sufficient to assure or even improve overall rationality. The key to rationality is the exposure of arguments and judgements to effective scrutiny; the real consideration of alternatives at every step; the involvement of the public and stakeholders at every step; the creation of situations throughout the process where the force of the better argument can win the day over the bets and guesses of politicians subject to the force of powerful vested interests." (Low, 2007: 26)

It should be noted that the measures advocated for effective assessments of: stakeholder participation, transparency, accountability, monitoring, *all* focus on social and political actions. Hence the greatest obstacles to effective environmental assessments of MUTPs are *not* primarily technical, but human-related and that the real challenge is not so much in collecting the data, but how it is applied.

Economic aspects of sustainability

As with environmental assessments, the issues surrounding the economic aspects of sustainability are well documented. Pretorius and Ng (2008) focus on the difficulties of comparing costs and benefits of major projects over time – especially the differences between public and private sector approaches, and the problems of incomplete information and inter-generational effects.

They point out that private sector organisations make their budgeting decisions within a relatively well-defined envelope and as a result, "it is...much easier to evaluate impacts with private sector capital budgeting decisions than with public sector decisions, principally because private sector organizations function in relatively narrow markets with 'good' price information, with relatively good knowledge of competitors, and relatively clear incentives." (Pretorius and Ng 2008: 7). The authors also point out that private sector projects often have a more limited number of stakeholders (who are usually pretty well defined), compared with the public sector, for whom the 'entire public' is potentially a 'stakeholder'.

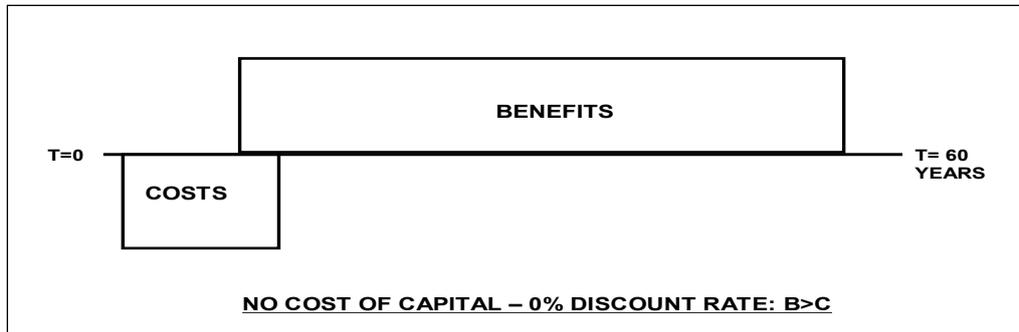
For the public sector, Pretorius and Ng explain that not only are there numerous and not-clearly defined stakeholders; there is also limited information about prices and costing (some aspects such as access to roads, for example, not being priced at all). There is furthermore limited information about impacts and people's preferences; and the project objectives are also much broader and complex. Consequently, the authors conclude that "public sector capital budgeting decisions are conducted several orders of complexity away from the rarified private sector atmosphere described above, despite drawing on a common methodology" and that from the point of view of sustainability, these limitations "take on a far more grave nature, and in the end ...demands consideration at the level of social institutions and governance." (Pretorius and Ng, 2008: 14). In other words, purely market-based approaches public sector projects, especially, are *inadequate* and as a result, social decision-making is also necessary. And the larger the project, the more complex it becomes, thereby increasing the scope for unintended consequences and reducing the ability to influence impacts.

Inter-generational effects:

The inter-generational distribution of project impacts is "a fundamental challenge to public policymaking and allocation of public sector capital when sustainable development is an objective" (Pretorius and Ng, 2008: 17). Essentially, it depends on how much people care about future generations. A key issue in assessing such effects is the choice of discount rates. The higher these are, the lower the valuation of future impacts, compared with present-day costs and benefits. This is illustrated in the Figures 3.8 and 3.9. With a zero discount rate and a 60-year period, the benefits over the project life significantly outweigh

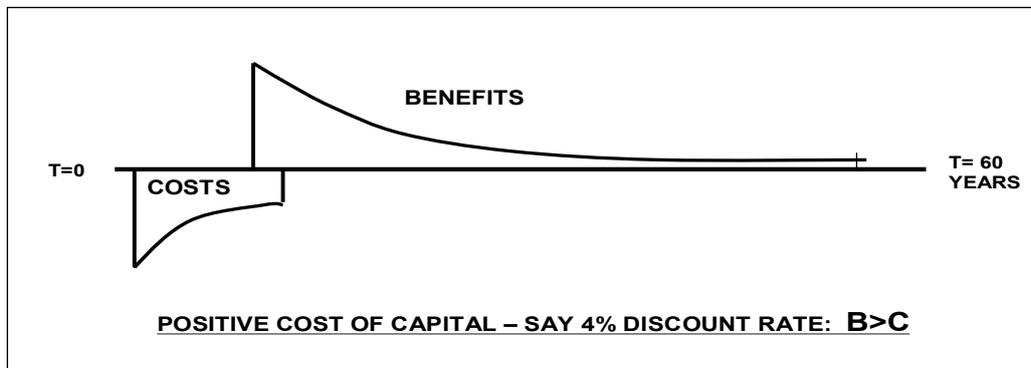
the initial costs (in the example shown). However, with a 4% discount rate, the benefits quickly decline and become less significant compared with the initial costs:

Figure 3.8: Effects of zero discount rate on projects with inter-generational impacts



Source: Pretorius and Ng, 2008: 18

Figure 3.9: Effects of 4% discount rate on projects with inter-generational impacts



Source: Pretorius and Ng, 2008: 18

In choosing a discount rate, private sector organisations are *compelled* by the market to maximise their returns, otherwise they will be ‘punished’. And as a result they choose higher discount rates because this is the rate set by the market (i.e., the opportunity cost of the capital), plus a premium to reflect project risks and debt obligations (including to shareholders). However, the rates they use are ...“significantly above risk-free rates, which places concern for inter-generational project impacts practically beyond [the private sector’s] horizon....” (Pretorius and Ng, 2008: 22). Private sector discount rates of 15% (not untypical) mean that most impacts occurring after 12-15 years have little influence on total present value, and hence private sector decisions focus mainly on the short term; which is a fundamental issue for MUTPs which are typically large and expensive projects designed especially with long term benefits in mind.

As the same authors explain: “A project aimed at reversing global warming but requiring substantial present investment will be summarily rejected – only schemes with shorter term benefits will qualify for funding. ...This logic pits the interests of future generations against the present generation tasked with making such investment decisions.” (Pretorius and Ng, 2008: 22-23). To overcome these limitations, lower rates are often used for public sector projects. Known as ‘Social Discount Rates’, these are, however, “very complex to ...operationalize effectively”, (Pretorius and Ng, 2008: 28), and there is considerable debate about what an appropriate rate should be.

In the UK Government’s Green Book (HM Treasury, 2003) the official guidance on appraising public projects and programmes) the discount rate for public sector projects was reduced in 2003 from 6% to 3.5% per annum (with further reductions to 1% per annum for

projects with very long life expectancies). Other parties have recommended even lower rates for long-term projects – for example, the Stern Review (HM Treasury, 2006) used a 1.4% discount rate in its calculations of climate change impacts, and recommended zero discounting of future generations.

Implications for private financing of public projects:

As regards considering the sustainability implications of using private sector financing in MUTPs, Pretorius and Ng conclude argue that the *public sector's* discount rate should be at least the 'risk-free' rate (i.e., typically 3%), reflecting the opportunity cost of borrowing. For the *private sector's* discount rate, commercial rates should apply, and will be significantly higher. Hence the greater the proportion of private finance, the higher the overall discount rate. This means, the authors argue, that the project's discount rate "*cannot* be low because private sector imperatives must outweigh public sector interests,...and inter-generational distribution of costs and benefits and sustainable development initiatives have to be sacrificed..." (Pretorius and Ng, 2008: 29).

The conclusion is simple, they argue: "The institutions chosen to execute and operate projects matter; and if these are dominated by the private sector the outcome is clear – the private sector's priorities *must* also dominate. ...[P]ublic sector projects...should be differentiated *very* carefully as to which objectives policymakers wish to achieve – (and) if sustainable development and inter-generational equity...are considered desirable objectives, private sector participation may simply have to be ruled out in favour of outright social objectives. Reconciling the impact of such policy initiatives is likely to be a real political and institutional challenge – a reversal of the modern assumption that private sector participation in public sector projects is the default preference" (Pretorius and Ng, 2008: 36).

Social aspects of sustainability

Kaparos and Skayannis focus on the social dimensions of sustainability, and on 'social cohesion' in particular. They emphasise its multi-dimensional and multi-level nature. Specific attributes on include (after Kaparos and Skayannis, 2007: 6):

- Equitable distribution of direct and indirect transport benefits and costs;
- Poverty alleviation – implying a pro-active approach to distributional impacts;
- Participation and political impacts – "transport decisions need to be collective decisions of a society that 'hangs together'; and
- Exclusion – both individual and community-wide barriers to accessing transport.

'Social cohesion' also has different geographical levels. For example, the EU frequently uses the term in policies to tackle national, regional and sub-regional disparities. Neighbourhood cohesion is a well-known issue, and there is also 'global cohesion', resulting in international policies for debt relief, poverty reduction and other social challenges. However, there can be/usually are tensions between different levels. For example, a transport project that adversely affects a community's cohesion may on the other hand benefit national cohesion (op cit, 2007: 3).

The concepts of 'social sustainability' and 'cohesion' are therefore complex, and overlap in many respects with other dimensions of sustainability, notably environmental, economic and institutional sustainability. However, Kaparos and Skayannis warn against over-extending the sustainability concept. They argue that "The main risk is of the concept losing its meaning when trying to deliver too many objectives that may be conflicting in the real world. Moreover, by assigning too many dimensions and definitions..., eventually the term becomes arbitrary and user-defined without a clear meaning" (op cit, 2007: 4). Low also

warns against its loose application, suggesting "...'social sustainability' for instance seems to have replaced the term social justice" (Low, 2007: 6).

The difficulties of incorporating social dimensions of sustainability in CBA and MCA are similar to those of incorporating environment dimensions, and are well-documented. Kaparos and Skayannis include difficulties in choosing and measuring indicators; risks of double-counting (for example, a benefit such as improved accessibility may also lead ultimately to costs such as employment or housing displacement); and a potential bias towards higher income groups. By valuing highly the time savings of rich populations, CBA favours projects that save those people a lot of time, at the expense of poor people who can afford to pay little to defend their environments." (Kaparos and Skayannis, 2007: 7)

In light of these difficulties, and also because they are politically sensitive, social factors have tended to receive less attention both in project appraisals and in appraisal guidance such as TRANSECON (2003), and TRB (2001). Consequently, Kaparos and Skayannis (2007: 9) recommend that SAs should become a formal part of the planning and appraisal of MUTP's, with the same legal status as Environmental Impact Assessments. They, however, caution that even Multi-Criteria Analysis faces serious technical and theoretical difficulties in incorporating wider cohesion impacts, particularly impacts such as "strengthening the participatory processes, innovations in partnership working and capacity-building." This conclusion by the authors emphasises the importance of public scrutiny and key involving stakeholders in the appraisal processes; a concern which also relates to institutional dimensions of sustainability.

Finally, and perhaps most importantly, as the following quotation suggests, Kaparos and Skayannis (op cit: 2007: 10) query the opportunity costs of MUTP's as they relate to social cohesion and ask: "If sustainable cohesion is a primary societal goal, are MUTPs [the best] road to that goal? Investment in other sectors such as education, health and facilities for disadvantaged social groups may give a better 'social return'. If 'cohesion' is a primary policy objective, then the decisions of governments, development organizations and regional institutions (such as the EU) to invest in large transport projects need to be challenged...and there must be established procedures enabling voices from the social arena to challenge the developments before they become conceptualized."

Institutional aspects of sustainability

Institutional sustainability serves as an 'umbrella' to the three 'E's' (the environment, economy, equity dimensions of sustainability), "in the sense that policies and interventions can *only* be sustained by social structures and institutions" (Kaparos and Skayannis, 2007: 4). Institutional sustainability can be described as: "...institutional structures and processes that have the capacity to function effectively over the long term, passing on decade to decade, even generation to generation, cherished visions and aims of sustainable development. They can also ensure a continuing provision of resources on a sustainable basis. These institutions include the administrative and legal systems through which government develops and implements policy, the operational capacity and approach of public and private organizations at all levels throughout society, and the effectiveness with which they engage together in planning and project development on a sustainable basis." (OMEGA RAMP Study, 2010: 12).

Institutional impacts on MUTP sustainability are described in several of the Working Papers – see Low and Sturup (2008); Leheis (2007); Bertolini and Salet (2008); Brecher and Nobbe (2007) – and two country examples are presented below:

- **USA: Limits of public sector institutional capacity:** Brecher and Nobbe (2007: 6) argue that sustainable transport development requires a comprehensive approach to planning, which integrates transport, land-use and economic development, and co-

ordinates different transport modes. This is despite the fact, they explain, that in countries such as USA, "...governmental institutional arrangements discourage such a comprehensive approach." The authors describe the US pattern of government as "picket fence federalism," meaning that it possess strong vertical integration of functional departments and weaker horizontal integration at the levels of national, state and local government. They consider "...these horizontal connections generally have little effective influence over the activities within the vertical components..." and on this basis, the allocation of public funds tends to follow (and re-enforce) a 'picket fence' structure. "As a result, comprehensive planning and decision-making that views the modes as alternatives or complementary is discouraged" (op cit, 2007: 6-9). These negative impacts, the same source argues, are illustrated in the experiences of the Metropolitan Planning Organisations (MPO's). These organisations (numbering 385 in 2005), were first established in 1965 to undertake planning, programming and coordination of federal highway and transit investments in urbanized areas. From very modest beginnings, their powers and funds have steadily increased, and also their stakeholder representation:

"MPO's may be either subordinated to state Departments of Transportation, or to regional councils of government, but may also work in cooperation with them. They are required to have a "decision-making body" – the board. Their boards vary strongly across the country. Most of them are mainly composed of local officials and stakeholders, but there are few federal requirements affecting voting and representation structures of the boards." (op cit, 2007: 16). In practice "...MPO's are generally weak, diffuse assemblages of local officials. The real lobbying muscle almost invariably occurs outside their framework, though the MPO's do ratify the projects." (Altshuler, 2008). Brecher and Nobbe (2007: 16) identified four major shortcomings of these organisations:

- The States control most MPO decisions (making MPO's less effective as advocates for the metropolitan areas);
- MPO's directly control relatively little money (although billions of dollars are channelled through them);
- They have limited staff capacity and organisational budgets; and
- MPO board decisions are biased towards highway constituencies, and against certain minority groups.

As a result, the MPO's are not carrying out the functions that were originally intended for them. They have little political independence: "...State Departments of Transportation still exercise enormous influence; for example, they still have the control over the majority of transportation planning decisions – reflecting their governors' bias towards highways – and the power to veto MPO-selected projects. Thus projects with an urban transportation focus are often neglected." (Brecher and Nobbe, 2007: 16). In the USA, therefore, there are strong institutional barriers to co-ordinated planning, and the structures tend to reinforce existing development biases (notably towards highways).

- **Australia: Institutional and policy parallels:** There are close parallels in Australia to USA where according to Low and Sturup (2008: 5), the public service agencies are organised "in vertical bureaucratic 'silos' with very little horizontal communication among them, let alone co-ordination of their activities and responsibilitiesThis silo effect is especially important in transport where the road planning agencies, and each separate form of public transport agency (trains, light rail or trams, buses), have their own organizations with different degrees of power and different ways of viewing the world. Land use planning, likewise, normally exists in a silo of its own. There have been efforts to integrate the planning and management of public transport but there is no integrated structure comparable, for example, with the European *Verkehrsverbund*."

Also paralleled in Australia to the USA is the dominance of the 'highway lobby' in national and state funding for transport. At the Federal level, funding for urban transport other than roads is not yet on the governmental agenda. According to Low and Sturup, this focus on roads is partly because of the lobby that has grown around the road programme. They argue that an outcome of this silo mentality has been the

development of groups of professionals embedded in particular places in the public service. They further claim that “Due to the availability of funding, the emphasis on road development over a long period, and the long term employment tenure of public servants, there exist, therefore, embedded and powerful groups of road engineers in the public service. These engineers actively engage in planning and developing projects, and tend to view transport solutions in terms of road building projects” (2008: 14). The same source suggests the introduction of recent neo-liberal privatisation and competition policies have tended to reinforce this ‘silo’ effect. For example, competition policy has resulted in the break-up of vertically integrated transport monopolies, with the separation of policy and service delivery. All States in Australia have implemented this sort of reform in public transport service provision; however, interestingly in almost every State the Roads Corporation has survived relatively unscathed.

Low and Sturup (2008: 15) also argue that the separation of land use planning from roads and public transport planning has similarly had some negative impacts on sustainable urban development in Australia (as elsewhere). They point out that “Urban developers have come to be responsible for infrastructure development on green field sites, including local roads, (with) such infrastructure being handed over to the relevant public authority once completed.” This, they point out, has not only led to large urban investments occurring *without* adequate provision being made for rail (heavy or light) serving the development but also “embeds road-based public transport as the only applicable (transport) solution.”

3.2.2.3 The private sector, MUTP’s, globalisation and sustainability

Role of the private sector:

Leheis (2007) looked at the role of the private sector in MUTP developments, with particular regards to sustainability. She identified advantages and disadvantages of such private sector involvement. On the positive side, she argues that the private sector can sometimes/often offer: rapid access to funds; speed and efficiency in executing projects; innovative approaches; an integrated approach to project design, construction and management; and greater financial discipline and tight management. On the other hand, she claims the disadvantages include: the private sector’s focus on financial profitability, at the expense of social and environmental concerns; a partiality in project implementation that benefits *only* those who can afford to pay for the infrastructure/services provided; and the employment of costing methodologies (of the infrastructure and services) based on guesstimated hypothetical future values (that are often inaccurate and loaded). She concludes that the private sector *can* carry many of the sustainability challenges of MUTPS as much/well as the public sector, and that both sectors therefore have a role to play in meeting such challenges. The problem she emphasizes though lies in defining the relationship of the two sectors and the degree of transparency, control and cooperation each should/can offer (Leheis, 2007: 11).

The private sector and globalisation:

Dimitriou (2007: 37) also looked at the growing role of private sector capital in MUTPS but as an integral part of the broader movement of completion-led globalisation. He alludes to the fact that during the past 10-15 years, infrastructure became a ‘hot’ investment area for global investors, especially in the emerging economies, with over €145 billion of private funds invested in this sector in 2006, (an increase of 180% compared with 2000). Up until the global financial crisis in 2008, the growth of private sector investment in infrastructure (of all kinds) was so rapid, and the returns so great, that in 2007 a representative of Standard & Poor’s Infrastructure Group presciently warned that the level of equity in such projects was shrinking to dangerous levels, and a “bubble” was about to burst. Drawing from a variety of

sources, Dimitriou offered many reasons for this rapid growth of the private sector's role, which may be grouped under 'push' and 'pull' factors. The 'push factors' include: the enthusiastic promotion by national governments and international organisations such as the World Bank, IMF, EU and WTO; a 'big fix' mentality, whereby political leaders and development planners are attracted to projects which appear to offer a single solution to major problems; the importance of symbols of national development, whereby mega projects are seen as tangible expressions of national aspirations for economic and social development; and the presence (at the time) of financial markets were awash with new and more innovative financing models, and infrastructure was seen as a good investment for global investors looking for long term, stable and inflation-proof returns. The 'pull' (or facilitation) factors include: the enhanced global capacity of global corporations, influencing the attitudes of government decision-makers as to the size of projects, and encouraging larger projects to be built; the enhanced global financial network of banks and entrepreneurs, facilitated by global information technology arrangements capable of moving funds from one part of the earth to another, literally in an instant; technological advancements facilitating new types of mega-projects; and an increased inter-dependency of mega projects, with the result that major infrastructure investment (especially) generates the need for further mega investments in order to fully realise the benefits of the original project.

Emerging problems

The above outlined private sector's rapidly expanding role has created many challenges and emerging problems for sustainable development. These include (after Dimitriou, 2007: 38-40):

- **The impact on pushing up discount rates.** Banks were achieving 5% interest per annum on 20-year bonds (i.e. for 'doing nothing'), which meant that project rates of return needed to be far greater (typically a minimum 12-15% per annum).
- **A growing emphasis on short-term gains**, exacerbated by the arrival of private equity investors in the markets (from just 2% of global investors in 2000 to reportedly 50% by 2007) more interested in re-cycling finance within a 5-year cycle by buying and selling-off infrastructure assets...rather than making more socially responsible long-term investments.
- **Fears that the public sector was selling-off infrastructure too cheaply**, ignoring its scarcity and under-estimating its longer term benefits.
- **Concerns that projects too often relied on governments to guarantee the finance**, and even subsidize (sometime by default), MTP construction and operation.
- **Concerns about transparency.** In the UK, for example, approximately £91bn of public debt attributable to PFI's in 2007 was held 'off-balance sheet'. While, internationally, Sovereign Wealth Funds (SWFs), with worldwide assets of approximately US\$3 trillion in 2007 were increasingly investing in infrastructure but proving both highly opaque and non-accountable to neither regulators, shareholders or voters.
- **Anxieties about the public sector's capacity to manage the complexity of MUTPs** and their planning and appraisal process, with MUTPs typically requiring contract documentation and due diligence legislation requirements that went far beyond many capabilities of the parties involved in putting such new agreements together.
- **Concerns about undermining the concept of transport, utility and communications infrastructure as 'public goods'** available to all individuals at reasonable costs within geographic and administrative areas.
- **Concerns about corporate social responsibility** – whether the corporate private sector, with no allegiance to place or community, was using MUTP's to advance its own interests rather than those of the nations, regions and communities the infrastructure and services traverse (Dimitriou, 2007a: 3).

- **Queries as to the *raison d'être* of many MUTPs.** While the *raison d'être* for many MUTPs is to ...“improve the global competition of cities and regions, help avoid urban ‘gridlock’, stimulate regional development and support geo-military strategic interests” (Dimitriou, 2007a: 3), these promises are frequently unfulfilled. In a recent appraisal of seven of Europe’s largest urban projects, Bertolini and Salet (2008) explain that only two of the seven were in a position to: enhance regional competitiveness, link into inter-regional networks; and or be in a position to integrate economic activities with social and cultural functions. In other words, despite the rhetoric, they “did not immediately bring real change in the urban systems.” (Bertolini and Salet, 2008: 6).

Some considered responses (to sustainability challenges of globalisation)

- **Globalisation and sustainability:** Dimitriou (2007: 41) identifies two key lessons that may be drawn from the recent global credit crisis and the current climate change challenges that strengthen the case for pursuing goals of sustainability: First, that to effectively address these two challenges, there has been a demonstrable need for much greater global collaboration (and co-ordination) *rather than* competition, and that therefore greater attention should be given to collaboration as a principal driving force of globalisation as well as conventional notions of ‘competition. Second, that *no longer* can/should governments and communities alike primarily rely on de-regulated markets *outside* of well thought-out sustainable public policy strategies to forge our future – whether this be for our global financial health or for the health of our physical (both built and natural) environments.
- **Public versus private sector:** In order to foster this greater sense of collaboration and encourage moves towards more sustainable policies, the same source emphasises the need to recognise that “a strong and solvent public sector is needed in order to facilitate the development of a more efficient and sustainable private sector” and for both strengths to take root, major efforts in capacity building are needed to provide more effective leadership for the future.
- **Need for new broader planning and appraisal approaches:** Dimitriou also advocates that new approaches to infrastructure planning, appraisal and delivery need to be introduced “that embrace more constructively the social, environmental and broader development aims that major infrastructure projects should contribute to as *strategic agents of change*” (op cit, 2007: 41-47).
- **Call for a strategic approach:** Dimitriou’s recommendations resonate with those of Bertolini and Salet (2008: 5) who advocate more flexible strategic approaches to MUPT planning and management that place greater emphasis on ‘strategic incrementalism’ to seek out the ‘right’ balance between strategic planning (that considers and regularly revisits all objectives and options), and operational management (that is more adaptive, flexible and inventive in muddling-through all small steps and daily worries). They argue that both “... are needed in order to organise successful projects, and so is of course their mutual interaction.” They point out that the required attitudes are so divergent and the strategic dimension so vulnerable that it is essential to generate and keep open a diverse reservoir of trajectories that might fit the project (op cit., 2008: 5-6)
- **Consideration of alternative options:** Bertolini and Salet (2008) also stress that the regular examination of alternative options is *not* a wasted effort as some would have us believe. They argue quite the contrary, and claim the so called ‘redundant’ knowledge that is generated is actually an asset, since knowledge about different project trajectories is *always* needed, so that when circumstances change (as they inevitably will), new responses and new pathways can be adopted. “The only thing that is certain (they claim) is that there will be uncertainty” and this approach allows for projects time ‘to breathe’, and for changes in direction to be taken if necessary (op cit, 2008: 8). Low argues in support of this approach by claiming that “...The key to rationality is: the exposure of arguments and judgements to effective scrutiny; the real consideration of

alternatives at every step; (and) the involvement of the public and stakeholders at every step” (2007: 26).

- **Policy-led planning and appraisal:** The OMEGA RAMP Study (see Section 4.3 below) also identifies the importance of policy-led planning using MCA, and aligning the policies more closely with sustainability goals. It argues that truly sustainable development will only be achieved: “...when MCA appraisal is policy-led by broader priorities that are integrated within the overall government development and decision-making process by virtue of the adoption of international policy guidance and targets regarding for example the Millennium Development Goals (MDGs) or Climate Change challenges, and imposed/overseen by a powerful centralized agency that has overarching responsibility for achieving sustainable development outcomes across all sectors and agencies and private sector interests.” (RAMP, page 50). Until this happens, the social and environmental dimensions of sustainability will continue to be “subservient to economic growth concerns with the result that in essence we have a ‘business as usual’ model....or some form of ‘green-wash’.” (RAMP, page 50).

Peak oil and global warming – technical and policy responses

Drawing on findings from Working Papers 2.3, 2.6 and 2.8 in particular, the following section examines some technical and policy responses to sustainability issues in the transport sector, with particular reference to MUTPs:

- **Energy forecasts:** The transport sector currently accounts for nearly one-fifth of global energy use, and is heavily dependent on oil compared with other sectors. Its energy consumption furthermore is likely to rise by 57% by 2030 (over 2005 levels), or by 39% if ‘aggressive policies’ are adopted (IEA, 2007). This growth is likely to come particularly from road freight and aviation – for which increasingly new MUTPs are being built.
- **Emissions forecasts:** Investigating a number of scenarios to stabilise greenhouse gases at 450-550 ppm CO₂ equivalent, at a mitigation cost of less than \$100 per ton of CO₂ equivalent, the International Panel on Climate Change (IPCC) (2007) concluded that at this price (of carbon mitigation) all sectors - except transport - showed absolute reductions in greenhouse gas emissions by 2030. The transport sector, on the other hand, showed a 36% *increase*, rising from fifth to second largest source of emissions (after energy generation). This is a sobering observation when one considers the fast growing pace of MUTP developments world-wide, and when taking into account that in the long-term, emissions need to come down by 50% to 80% for all sectors, *including transport* (Åhman, 2008: 7). Åhman offers two main ways that reductions in transport emissions (and oil dependency) can be achieved: the first is through technical solutions (such as improved energy efficiency and ‘cleaner’ fuels); and the second is through behavioural changes (particularly transport modal shift and reductions in travel demand); both are important to future MUTP planning.
- **Peak oil:** Åhman, (2008: 5) argues that while it is *unlikely* that oil supplies will run out for a long time to come,¹⁷ the cost of extraction *is* likely to rise as the easily-recovered reserves diminish which will translate into significantly higher fuel prices. On the other hand, if CO₂ mitigation measures are successful and oil demand decreases after 2030, he claims that “there will be plenty of oil (mostly unconventional) that should be left in the ground.” He goes on to claim that “...given the inertia in (travel) behavioural shifts, technological developments and in-built infrastructure such as roads, rail and energy production, there is a strong need *not* to allow the transport sector to develop unsustainably as it has in the past, but instead to embark upon a new path towards a low carbon transport system as *soon as possible*. Once again, this has major potential implications for future MUTP developments.

¹⁷ Although oil companies usually cite a ‘reserves-to-production’ ratio of 20-40 years, there is in fact no immediate or even long-term physical shortage of fossil materials – since there are abundant reserves of natural gas and coal, and also oil from unconventional sources (such as heavy crudes, tar sands). (Åhman, 2008: 10)

- **Improving fuel efficiency:** According to Åhman (2008: 10) there is considerable scope to improve vehicle energy-efficiency (especially of trains), through reduced vehicle size and weight, reduced drag and rolling resistance, and increased drive-train efficiency. For trains, increased energy-efficiency can also be obtained through improved electric motors, overhead wires and pantograph, regenerative braking and reduced drag. Major savings of up to 50% are potentially achievable (especially for motorcars and lorries) and in the EU, there is an agreement that the average motor vehicle should emit not more than 130g of CO₂ per km; which is about 20% lower than current new vehicles are achieving. Similar standards are being encouraged in the USA and Japan. Yet while improved vehicle efficiency is considered (by some) as the main hope for reducing future transport emissions, the growth in travel demand is likely to 'dwarf' these efficiency savings (Muromachi, 2008: 4). What the implications of these developments are for future MUTPs is difficult to ascertain. They do, however, highlight the potential significant role of new technological innovations on MUTP developments rather than its size.
- **Switching to renewables / low-carbon fuels**
Other technological developments of potential significance for future MUTPs include the use of:
 - **Bio-fuels:** According to Åhman (2008: 15) the future use of bio-fuels in transport is hard to predict, partly because other sectors, such as heating and electricity generation, can utilise the fuel more economically and efficiently. On the other hand, these other sectors can more easily utilise wind and solar energy, while transport has fewer alternatives. Bio-fuels offer some potential for reducing future carbon emissions (and oil dependency), however, the scope is difficult to predict. Generally it is assumed that the bio-fuel total contribution will be relatively low, say around 10-20% of total global fuel demand. The EU is promoting 10% bio-fuel use in the road transport sector by 2020, and the USA 7.7% by the same date. Åhman indicates that a 'second generation' of bio-fuels is currently being developed which, unlike the first generation (based on grains), utilises wood materials and residual wastes from agriculture, industry and households. These materials are more efficient at reducing CO₂ emissions, and also reduce the food versus fuel conflict (Åhman, 2008: 13). It will be several years before these developments make an impact and quite how they may do this for MUTPs is presently open to debate.
 - **Electric-powered vehicles:** Hopes for the widespread use of battery-powered vehicles have not yet materialised, mainly because of insufficient battery capacity (Åhman, 2008: 16). Instead, attention has focused on 'hybrid' vehicles with two or more distinct power sources (e.g. combustion engine and one or more electric motors). Current hybrids offer energy savings of between 15-45% compared with conventional vehicles, but their initial cost is higher, and though they have existed since the early 1900's, their penetration in international motorcar markets has so far been very limited. However, sales have recently increased significantly but the implications for MUTPs is once again less clear.
 - **Plug-in hybrids and all-electric vehicles:** Interest is now focusing on 'plug-in hybrids' (ability to recharge batteries from mains supply) and 'all-electric vehicles' (using public charge-point networks). The application of both schemes (in London and Paris, respectively) rely on substantial government subsidies as the vehicles are costlier (than conventional vehicles), and also depreciate faster (Milligan, 2010). Crucially, however, their impact on reducing greenhouse gas emissions *is only as good as the original electric supply*; a point incidentally that applies more significantly to fast train programmes as well as other MUTP developments.
 - **Fuel cell vehicles:** Another alternative fuel use option is to rely on renewable electricity to produce hydrogen (via electrolysis) and use this in a fuel cell vehicle. In the USA, \$1bn was spent on a programme to develop commercial fuel cell vehicles by 2020. The programme was, however, halted in 2009, on the grounds that other vehicle technologies would produce quicker reductions in emissions. Hydrogen

vehicles are thus not expected to be practical within 10-20 years, and developing the infrastructure to distribute hydrogen is also a major obstacle. (Åhman, 2008: 16). The implications for MUTPs are thus considered to be marginal in the short-run.

Policy Responses

- **Switching to public transport:** In his review of how urban public transport might help to reduce carbon dioxide emissions in the transport sector, Muromachi (2008) reviewed four major international studies on climate change¹⁸ and found that urban public transport had received very little attention in all four reports. He claimed that this attention was usually relegated to the 'other' category of potential contributions to transport sector carbon reduction, and that 'modal shift' as a whole was seen as only a minor contributor (usually less than 10% of total transport reductions, for all modes including public transport). Seeking to emphasise the potential importance of public transport behavioural changes on energy efficiency, Muromachi explains that this depends on a number of factors, including: passenger loadings; trip length (shorter trips requiring significantly more energy); and energy source (for example, a shift from cars to electric rail is not very promising if the electricity comes from coal-powered technology).
- In Western countries, bus and rail passengers use about 20-50% of the energy per passenger per kilometre compared with car users. In Japan, the ratio is lower – about 16-33% (reflecting higher passenger loadings); and in developing countries, the ratio is (often much) lower (reflecting very crowded public transport). The energy (and carbon) footprints of MUTPs that switch to public transport can thus be potentially significantly reduced. A study by the Transport Research Laboratory (TRL) found that the modal shift from motorcar to new urban rail ranged from 5-30%. The majority of passengers using the new rail service were either new travellers, or had diverted from other rail or bus services. Similar figures were obtained from a Japanese study of four domestic urban rails / monorails (Muromachi, 2008: 7). In a study of BRT in Latin American cities (by Wright and Fulton, 2005), a 5% increase in BRT mode share was accompanied by a 1% decrease in motorcars, taxis and walking, and a 2% decrease in mini-bus use. However, the above studies mostly looked at single (or a few) routes introduced into an existing urban situation, with few other changes to the overall transport context. When considered in this light, the modal shifts appear more significant, and if comprehensive packages of infrastructure and demand management can be introduced, then the potential for modal shift is considerably greater.
- **Infrastructure provision:** The choice of infrastructure (especially for MUTPs) has a major impact on future energy consumption (and CO2 emissions), in three main ways, in terms of the: energy embodied in the infrastructure itself; the traffic induced by the new infrastructure; and the infrastructure's impact on enabling (or disabling) modal shifts.
- Energy embodied in the infrastructure: According to Åhman, (2008:20) studies have estimated that around 10-20% of the total energy used for road transport is embodied in creating and maintaining the infrastructure; for rail the figures are slightly lower. However, these are network averages, and for specific infrastructure items (e.g. bridges, tunnels, fly-overs) the figures are considerably higher. In Sweden, the embodied energy in the Stockholm Ring Road (with many tunnels) was estimated to be 60% of the total energy consumed by the traffic over the infrastructure's lifetime (this is one of Sweden's busiest roads). (op cit., 2008: 20, quoting Jonsson, 2005). Hence, any decision to construct an MUTP immediately involves a massive energy commitment, while the long-term impacts of this commitment are likely to be much more significant and complex.
- Induced traffic: While new roads can relieve congestion and improve mobility, they can also induce traffic (which would not otherwise have occurred). In the UK, the traffic

¹⁸ These were: the IPCC's *Fourth Assessment Report* of 2007 (Working Group III); the IEAs' *World Energy Outlook Report* in 2006; the World Business Council for Sustainable Development's *Report on Mobility 2030: Meeting the Challenges to Sustainability* of 2004; and the Stern Review Report on *The Economics of Climate Change* of 2006.

induced by a new road has been estimated at 10% in the short term and 20% in the long-term. (Goodwin, 1996; quoted in Åhman, 2008: 21). At specific sites, the effects can be considerably higher. In Stockholm, the Södra Länken Ring Road was designed to carry 60,000 vehicles per day, but now carries 100,000 vehicles per day (and this does not include traffic still using the 'relieved' by-roads) (Åhman, 2008: 21 – quoting Jonsson, 2005). Yet again, for road-based MUTPs the implications of these findings are very significant, particularly in terms of carbon and energy footprints.

- Impact on modal shifts: New major transport infrastructure also determines future modal choices, and once a pattern of transport has been established, it becomes very hard to change it, because land-use adapts to the new pattern and people's habits adapt to the new infrastructure. This is a particularly notable impact of MUTPs, as shown elsewhere in this report.
- Infrastructure provision: Because built infrastructure accounts for a significant share of overall energy use and also shapes land-use patterns and mobility for many years to come, infrastructure planning (especially for MUTPs) is thus of high importance for societies wishing to move towards a low carbon future. The main challenge here for planners will be how "to satisfy an increasing demand for accessibility and affordable mobility in a world where transport systems no longer can rely on...inexpensive fossil fuels but are forced to use land use-restricted bio-energy or theoretically abundant but far more costly alternatives based on renewable electricity such as solar power. Given the high inertia in the transport infrastructure system, travel/housing and working patterns, this long-term view needs to be included in planning today" (Åhman, 2008: 22).

3.3 Working paper on UK mega projects and corporate social responsibility

3.3.1 Aims, purpose and methodology of the study paper

As part of the overall research project, a study was commissioned by the OMEGA Centre to consider how Corporate Social Responsibility (CSR) was treated in selected MUTP's, and identify lessons which could inform the future planning, operation and delivery of similar projects. Liane Hartley of *Mend (London Ltd.)* carried out the study, focusing on CSR issues in the three OMEGA UK case studies:

- Jubilee Line Extension (JLE)
- Channel Tunnel Rail Link (CTRL)
- M6 Toll Road (M6TR)

The study entailed a review of OMEGA's research material on the UK MUTP's, to highlight particular issues and lessons that directly responded to the defined Overall Research Questions (ORQ's) and Overall Research Hypotheses (ORH's). The main objectives were:

- To examine the treatment of CSR in the development of the MUTP's as a dimension of Sustainable Institutional Development;
- To identify generic and context-specific lessons from these case studies which can be used to inform future planning, operation and delivery of similar projects;
- To highlight findings and lessons that responded directly to the OMEGA 2 Overarching Research Questions/Hypotheses;
- To present the findings in a report.

The study focused on four research questions / hypotheses in particular, which were considered most relevant to CSR issues as outlines in Table 3.2 below.

The study methodology involved reviewing the definition and origins of Corporate Social Responsibility and its relationship to MUTP's. Several CSR themes and characteristics were

identified, and then the research material from the three UK case studies was analysed to identify specific CSR lessons from each.

Corporate social responsibility: definitions, origins and characteristics

The concept of Corporate Social Responsibility (CSR) is described by Amalric and Hauser (2005)¹⁹ as “activities that lead a company to contribute to society beyond the products and services it produces, the employment it provides, and the returns on investment it generates.” O’Connor and Spangenberg (2007)²⁰ highlight how CSR impacts on business performance through the “need to address a Triple Bottom Line of economic, social and environmental performance.” The concept of Triple Bottom Line (people, planet, profit) was itself introduced into academic literature by Elkington back in 1998.²¹

The concept of CSR has been steadily gaining credibility in the public and private sectors. There is now extensive literature, techniques, resources and institutions available for promoting CSR in organisational practices – these include: (i) international fora for accountable and sustainable development; (ii) the emergence of standards, systems and frameworks for providing common ground on CSR; (iii) a significant amount of academic literature on the diverse range of CSR disciplines.

Table 3.2: Four research questions / hypotheses

ORQ/O RH	Question/Hypothesis	Particular Relevance to CSR
ORQ#1	What constitutes a “successful” MUTP in the 21 st Century?	<ul style="list-style-type: none"> • Which stakeholder(s) and which success factors? • Are CSR considerations counted as measures of success?
ORQ#3	How important is context in making judgements regarding Overall Research Question 1	<ul style="list-style-type: none"> • What drives success in a given context? • What is the contribution of CSR to that success? • Does the value of CSR vary in different contexts? • How is CSR defined in different contexts?
ORH#1	Traditional criteria relating to cost overruns, completion dates, generation of travel time savings for users and rates of return to investors are inadequate measures of success in 21 st Century as sustainable development concerns become increasingly critical both globally and locally.	<ul style="list-style-type: none"> • There is a definitive shift in attention towards CSR considerations as measures of success over the lifetime of the project; • CSR becomes more defined over the lifetime of the project; • Global (meta) and local (micro) CSR indicators are embedded within the project.

¹⁹ Amalric, F. & Hauser, J. (2005). Economic drivers of corporate responsibility activities. *The Journal of Corporate Citizenship*, winter, 20, 27-38.

²⁰ O’Connor, M. & Spangenberg, J. (2007), “A Methodology for CSR Reporting: Assuring a Representative Diversity of Indicators across Stakeholders, Scales, Sites and Performance Issues”, accepted for publication by the *Journal of Cleaner Production*. (Earlier version available in the *Cahiers du C3ED* series, Université de Versailles St-Quentin-en-Yvelines, Guyancourt, December 2004).

²¹ Elkington, J (1998) *Cannibals with Forks: the Triple Bottom Line of 21st Century Business*.

ORH#2	The new emerging international and local agenda related to vision(s) of sustainable development is multi-dimensional and goes beyond notions of environmental sustainability in that it also concerns interrelated concepts of economic sustainability, social sustainability and institutional sustainability.	<ul style="list-style-type: none"> • Projects display a more sophisticated and diverse consideration of sustainability to include CSR issues; • There is a recognisable effort with projects considering sustainability beyond the environmental pillar and having a set of multi-dimensional indicators; • Issues that would have been overlooked are now brought to the fore and a richer understanding of project impact ensues; • This understanding leads to better projects and delivery.
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However, largely due to the complexity and long-time scales associated with MUTP's, the mechanisms for identifying and dealing with CSR in the provision of major projects remain limited and disaggregated. Current assessment techniques, for example, include the use of Cost Benefit Analysis, Environmental Impact Assessment, Social Impact Assessment, and other processes and standards, but these are usually not integrated into a single sector specific framework.

To manage these better, new tools, methods and ways of thinking are needed in order to adequately address emerging demands. The United Nations Development Programme has identified a set of criteria linking sustainable development, urban environments, good governance and project performance (Badshah, 1998), and further CSR characteristics have been proposed by Holme and Watts (2000). For this paper, the set of CSR characteristics was adopted as shown in table 3.3, (with some *Mend* additions), as a basis for analysing CSR issues and lessons arising from the three UK case studies:

Table 3.3: Main themes for assessing CSR in the three UK MUTP case studies

Governance <ul style="list-style-type: none"> • Rule of Law\Legislation • Responsiveness • Reporting & Disclosure • Transparency 	Equity <ul style="list-style-type: none"> • Accountability • Employee Rights • Human Rights • Environmental Protection • Supplier relations/Ethical Procurement
Engagement <ul style="list-style-type: none"> • Partnership/engagement • Participation • Consensus Orientation • Communication • Community Involvement 	Strategy <ul style="list-style-type: none"> • Effectiveness & Efficiency • Strategic Vision • Principles & Codes • Project Management, Regime, Assessment • Consumer Education/Lobbying

Badshah, A. (1998) *Good Governance for Environmental Sustainability, Public Private Partnerships for the Urban Environment Programme (PPPUE)*, United Nations Development Program, UNDP, New York.

Holme, R. and Watts, P (2000), Corporate Social Responsibility: Making Good Business Sense, World Business Council for Sustainable Development, January 2000

Summary of findings

Table 3.4 below sets out a basic appraisal of the main CSR issues that each project interfaces with, as a quick reference dashboard. This has been compiled from a review of the “summary of CSR issues and lessons learned” at the end of each project chapter.

From this, we can conclude that each MUTP encountered slightly different CSR issues through the course of project inception, planning and delivery. Each projects CSR characteristics and experiences are summarised below

Table 3.4: Project CSR dashboard

CSR Dimension	CSR Issue	JLE	CTRL	M6TR
Governance	Rule of Law/Legislation		<input type="checkbox"/>	<input type="checkbox"/>
	Responsiveness		<input type="checkbox"/>	<input type="checkbox"/>
	Reporting & Disclosure	<input type="checkbox"/>		<input type="checkbox"/>
	Transparency	<input type="checkbox"/>	<input type="checkbox"/>	
Engagement	Partners/engagement	<input type="checkbox"/>	<input type="checkbox"/>	
	Participation		<input type="checkbox"/>	
	Consensus Orientation		<input type="checkbox"/>	<input type="checkbox"/>
	Communication		<input type="checkbox"/>	
	Community Involvement		<input type="checkbox"/>	
Equity	Accountability	<input type="checkbox"/>		<input type="checkbox"/>
	Employee Rights	<input type="checkbox"/>		
	Human Rights			<input type="checkbox"/>
	Environmental Protection	<input type="checkbox"/>		<input type="checkbox"/>
	Supplier relations/Ethical Procurement	<input type="checkbox"/>		<input type="checkbox"/>
Strategy	Effectiveness & Efficiency	<input type="checkbox"/>		
	Strategic Vision	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Principles & Codes		<input type="checkbox"/>	
	Project Management, Assessment	<input type="checkbox"/>	<input type="checkbox"/>	
	Consumer Education/Lobbying		<input type="checkbox"/>	<input type="checkbox"/>

Jubilee Line Extension (JLE)

This project highlighted the importance of political context, the transparency required when private sector is overwhelmingly seen as a major winner, the need for competent relationship management from a delivery point of view and clear lines of accountability when projects overrun time and cost limits.

All of these issues meant that JLE was a symbol of the Blair administration approach to governance and communication. The project was subject to spin and suffered many setbacks (collapse of the tunnel in Heathrow, use of fairly new NATM tunnelling techniques, arguments over Westinghouse Signalling systems, delays due to the upgrade at London Bridge station, costs of the new tube stations, strikes,) that were portrayed in the media to criticise the government’s approach to managing and financing major projects. It also demonstrated what happens when too much reliance is placed on private sector interests that are themselves subject to the vagaries of the global financial market, quirks of personality and relationships that are opaque, operating outside of the public domain.

JLE was a project of long gestation and evolved from the culmination of a desire to link the South East with the west and Central London that harked back to the early part of the 20th Century. However it took a private sector visionary with his personal connections, savviness and charm to provide the catalyst for urgency and scrutiny on a potential link to South East London. This grew momentum when it was demonstrated (again by the private sector) that such a link would lever thousands of jobs and deliver against wider objectives such as strengthening London's role as a world financial centre and provide capacity for Canary Wharf to grow and attract further inward investment.

The decision over the final routing of the line was subject to intense debate and scrutiny with competing interests and agendas within and outside government arguing for different approaches. However, the promise of private sector funding eventually swayed the decision by government to give the go-ahead. For this reason many saw the project as an example of the private sector wagging the tail of government with little public scrutiny or accountability. The cynical view was that it was a private sector project to serve private sector needs in providing a mechanism to transport workers and investment to Canary Wharf. Any aspect of "wider benefit" was seen as a bonus but outside the core objectives of building a tube line as quickly and cheaply as possible.

However as the project progressed and context changed other objectives began to accrue which added complexity to the original objectives and which demanded a set of competencies that were not in places originally. Namely this relates to the conflation of the JLE with the government's vision for regenerating the Greenwich Peninsula, the siting of The Dome, the non-negotiable deadline of having it open to coincide with the opening of The Dome, desire for JLE to be a world-class demonstrator project and the use of new technologies and techniques.

Despite the delays and costs (the line is regularly cited as the most expensive piece of railway ever built) general consensus is that as a piece of engineering it was a success and exceeds passenger number usage. It also provides step-free access at all stations and has unlocked significant land value uplift along the route.

Key lessons:

- Private sector wagged the tail of government with little public scrutiny or accountability
- Poor levels of project competency for delivering project of this scale
- Employment led project for satisfaction of private sector growth plans and vision that they conceived themselves – not a government/public interest vision
- Regeneration benefits slow to trickle to neighbouring deprived areas
- Private sector seen as mainly benefiting from the project. Public seen as mainly losing due to major cost overruns
- Relationship management and effective organisational culture recognised as vital for turning the project around
- Sustainability was ill-defined and went unrecognised despite some account taken of it

Channel Tunnel Rail Link (CTRL)

CTRL similarly has a convoluted history and the provenance of its eventual route alignment was even more controversial. CTRL was for many seen as a loss-making folly from the start. The government were unequivocal from the very beginning that absolutely no public money was to be used to fund the project and that it had to be financed solely by the private sector. This was in fact enshrined in law by Thatcher's government. CTRL was seen by the Thatcher government as an opportunity to demonstrate the ability for major infrastructure projects to be delivered without the need for public outlay.

This project demonstrated the importance of having a political champion to galvanise multiple stakeholders, portfolios and agendas within government towards a common vision. In the case of CTRL it was initially Heseltine who was willing to put his neck on the line and champion a project that was largely sneered at by the anti-Europe quarters of his own party. Later it was Prescott who took the unprecedented step of overriding the decree by the previous government that no public monies should be used to support the project. He stepped in with an ambitious and complex rescue package for the project, without which, would have spelled disaster.

The organisational structure from the delivery side was very complex and ultimately comprised of numerous consortia within consortia. The level of complexity of stakeholders was vast and led some to question the ethics and transparency of contractors building a tunnel which they had a commercial stake and interest in. There appears to be no mention of any attempts towards ethical procurement.

Again, the government were slow to respond or recognise the vision for CTRL as a catalyst for regenerating the Thames Gateway (or latterly known as the East Thames Corridor.) Government originally favoured a southerly approach because this was seen to be more cost effective (on the back of traditional cost benefit analysis techniques.) However these failed to acknowledge the substantial potential for regenerating East London, South Essex and North Kent which the rival Arup scheme supporting an approach via Stratford did.

Again, it took the charisma, connections, clout and vision of the private sector combined with a savvy politician to sway the view that was supported by narrow, rationalist economic and cost driven assessments. Sustainability was taken more seriously in this project partly because the change of government saw an emphasis on a wider understanding of sustainability to consider social and economic aspects reflected in new policy on Sustainable Communities and Growth Points (such as Ashford.)

However soon CTRL, like JLE stopped being simply a tunnelling project but became conflated with the wider Thames Gateway regeneration programme, becoming integral to it and the backbone to various government policies and programmes on housing and regeneration investment.

One major success and benefit to CSR arising from CTRL was the Planning Forum that was set up. Recognising that early in the project there had been some deficiencies in the mode and effectiveness of communications and engagement with communities, the project established a dedicated community relations team. This was alongside the Planning Forum structures that ensured there were mechanisms in place for consultation and liaison on key planning matters, mainly on environmental issues.

The Planning Forum was generally considered by participants to have achieved a number of important results:

- it helped establish a special planning regime in the CTRL Act which provided for effective joint working between the promoters and designers, local authorities, government and other interested parties. This included influencing the Planning Memorandum which established the responsibilities of the promoter to engage in and the qualifying authorities to put in place internal decision making arrangements, including greater delegated powers so as to meet the timetable for determination of submissions;
- establishing a common form and content for submissions to the authorities affected by the route which was a significant advantage to the promoters who were then not faced with manifold different requirements;
- the PF enabled authorities to learn from each other as construction progressed from one area to another;

- contractor's representatives took part in the PF which enabled a synergy in design and construction (e.g. including the re-use of spoil);
- common designs were agreed for both important features of the railway (e.g. bridges and noise barriers) and for other lesser matters which were important during the construction period (e.g. hoarding and fencing for construction sites);
- where cross boundary issues were raised the PF was able to give a considered view on the location options;
- regular reports were received from the promoters on the operation of the Public Enquiry System, and the resolution of complaints and operation of the small claims scheme was reported by the Complaints Commissioner;
- the PF produced more than 50 Guidance Notes on matters ranging from submission procedures in the early stages, to the return and disposal of land following construction.

The PF was seen to have created a genuine partnership between the parties involved. This was greatly assisted by the continuity given by the majority of the nominated staff being involved in the PF throughout.

Key lessons:

- Savvy public is making its own evaluations and appraisals based on available information
- Messages conflict as to the role of CTRL being an agent of regeneration and change or a mode of revenue raising and profit making dressed up to be publicly palatable
- intensive lobbying for Ebbsfleet - mainly by Blue Circle who had a lot of derelict land in their portfolio –
- Heseltine a key champion, head of a very powerful govt department, strongly pro-Europe, went against his own Cabinet
- Prescott saved the project from financial disaster by battling against treasury and using good relationship with Blair and Brown.
- Stakeholders consulted but did not listen to reason when they did not get what they wanted.
- Union Railways departed from BR by their policy of openness and consultation.
- It is inevitable that stakeholder agendas will change in response to changing circumstances and policies.
- effective engagement means communities being involved in decision making. Local communities at KX especially felt they were properly engaged rather than managed.
- community benefit still perceived as “delivery to cost and time”
- Planning Forum was a major success and innovation of the project helping to delegate significant responsibility and powers to the local level and encouraging boroughs and stakeholders to work together collaboratively and effectively.

M6 Toll Road

This project drew criticism on a number of CSR levels not least because of the unprecedented level of control given to a private company over a road by the government. Even MEL, the private sector concessionaire themselves marked their surprise at how the terms of the concession over the road was so stacked in their favour. This signalled a lack of judgement and naivety on the part of the government in handling a project of this kind.

However, some argue that actually the government did very well out of it since it got a toll road that it didn't have to pay for and which (to some extent) achieves its main objective of relieving the severe congestion in this region of the UK.

The project was marked by the level of intense lobbying it attracted from a wide spectrum of interests. There were protests from many user groups, notably hauliers who objected to the

toll and the impact it would have on their business. Motorists also argued that the toll road would do nothing to alleviate congestion, only displace it. Local residents objected to the disturbance and disruption caused by the construction phase and loss of environmental and visual amenity. However the project did make a significant effort towards mitigation and environmental protection, having in place strong environmental controls.

This was marred by local residents reports of failure to respond to local concerns particularly during the foot and mouth disease crises where they felt the project carried on unabated and unconcerned by the risks caused by potentially spreading the disease.

There were vociferous campaigns from environmentalists claiming that the project undermined policies to promote alternative modes of transport but they lacked any credible alternative to what they had to admit was a very real and evident problem of congestion in the West Midlands area.

Communication issues are the strongest CSR theme here with many examples of how MEL was poor at recognising the need for sensitivity when communicating with the public, especially over the issue of toll levels. The government had failed to specify a cap on tolls and this meant that MEL was at liberty to set the toll to whatever level they wished. MEL executives were quoted in the press that they could and would charge whatever they liked and this prompted embarrassment and resignations on their part.

Having undertaken extensive market research they felt this adequately met the need for consultation with stakeholders however it was seen by many as an exercise in determining people's maximum willingness to pay threshold. MEL were seen as a money making enterprise keen to make a profit out of the project and this led to criticism of the government for allowing a piece of the public highway network to effectively be privatised, allowing no ability for government policy or statutory requirements to be imposed without a negotiation with MEL and a subsequent (and costly) contract amendment.

Government were roundly criticised and admitted they had overlooked the issue of how to ensure UK road policy was to be implemented in this context of having a small part of it effectively outside their control. People were also upset at the handling of the project by the Labour Government who had pledged to abandon the project in the lead up to the 1997 election and then promptly gave it the go-ahead when they reached office. As a result the public felt betrayed.

Key lessons:

- Unsuccessful - has not achieved objective of reducing congestion
- Qualified success as relief road but tolls reduces effectiveness. Should have been normal part of motorway network.
- Cynicism surrounds motives of private sector for delivering the project
- Project with private sector objectives does not meet public needs
- Sustainability only considered in direct environmental sense
- M6TR was money making exercise for MEL, not a public benefit.
- Business principles are still king in decision making about MUTP's
- Government mishandled the concession agreement
- Government reneged on sentiments against the road, public felt betrayed
- Poor levels of judgement and accountability by government
- MEL overwhelmingly benefitted from government naivety
- Community seen as potential toll-paying customers by MEL
- Project has to satisfy growth and profit objectives for private sector to get involved

4. The OMEGA 3 Project: Risk analysis and management for projects study

4.1 Aims and purpose of working papers

The RAMP study of how to better incorporate social and environmental dimensions of sustainability into appraisal of major infrastructure projects arose from an invitation made by the Institution of Civil Engineers (ICE) and the Actuarial Profession (AP) to the OMEGA Centre to submit a successful competitive bid to undertake a study of 'how better to incorporate social and environmental dimensions of sustainability into the appraisal of major infrastructure projects'. The choice of focus of the study reflected the significant shift of thinking that at the time within *both* institutions toward the belief that sustainable development has critical implications for the planning, appraisal and delivery of *all* major projects, and that this particularly affected environmental and social factors, which pose potentially serious risks for project management and implementation in light of the limited coverage of these areas by traditional planning and appraisal approaches. In view of this, the ICE and AP decided in 2008 to revise their handbook on *Risk Analysis and Management for Projects (RAMP)* published in 2004, to better address the appraisal and management of environmental and social risks in major projects and commissioned the OMEGA Centre to carry out a study and to provide recommendations on how to address these concerns as they relate to major infrastructure projects.

The OMEGA 1 Project comprised five main stages:

- **A review of relevant literature**, involving eight commissioned papers prepared by researchers and practitioners from different professions and perspectives, synthesised into a ninth paper to form the Study's Literature Report (see Appendix 24 for executive summary).
- **An international survey** of key decision-makers and professionals involved in infrastructure development. This comprised 57 interviews among representatives of international organisations, national governments, private sector interests and academia, and across four case study countries (UK, France, Sweden and USA) (see Appendix 25).
- **Analyses of the material from these two stages** focused on the RAMP Handbook principles and structure, with the aim of developing a new appraisal framework for incorporating environmental and social aspects of sustainable development within the RAMP process. This provided the basis for preliminary proposals for the draft chapter of the RAMP Handbook.
- **A seminar to discuss the findings of these analyses**. The seminar was attended by two dozen invited delegates, all experienced and influential professionals in the field of major infrastructure projects. Their discussions provided informative feedback on the analysis and preliminary recommendations.
- **A synthesis of the findings from these successive stages**, which provides the basis for the Study conclusions and recommendations, an input to the next edition of the RAMP Handbook, and the basis of the summary of findings which follow below.

4.2 Summary of findings

The following paragraphs briefly outline the main OMEGA 3 Study findings, fully explored in the [RAMP Final Report](#). They are covered under two main themes, with some key statistics quoted from questionnaire surveys conducted in support of the Study.

4.2.1 Challenges of incorporating environmental and social factors in decisions on major infrastructure projects

- **Economic growth:** Traditionally, the underlying principal aim of most major infrastructure projects has been the delivery of economic growth on the basis of the trickle-down economic benefits which they are predicted to generate. Today this premise is challenged by a broader agenda of multiple development aims as reflected in the concept of sustainable development²². This concept in effect re-defines the order of development priorities that major projects should contribute to and even the manner in which they should serve such goals.
- **Global challenges:** There is significant growing international concern over global challenges, including climate change and energy depletion. This has led to the evolution and implementation of policies at international and national levels which are designed to focus action on tackling these challenges. These include global development strategies such as the *Agenda 21*, the *UN Millennium Development Goals* and the *EU Strategy for Sustainable Development*.
- **Environmental factors:** Primarily physical in nature, these concerns are closely bound up with the quality of life in terms of their social and economic impacts. Environmental and social factors of sustainable development are *not* externalities to development but instead comprise its fundamental components on an integrated basis with economic factors and aspects of institutional development and governance. In consequence, there is growing interest in establishing new planning, appraisal and delivery methodologies for infrastructure project development that can more appropriately address the widening range of environmental and social concerns of the 21st century.
- **Trade-offs in decision making:** The increasing importance attributed to visions of sustainable development has persuaded more and more project sponsors to emphasise the formulation and presentation of a 'sustainable business case' as part of their infrastructure development approaches. It is rarely possible to address all environmental, social and economic factors equally within a project and thus decision-making frequently requires major trade-offs and compromises in order to achieve project aims and objectives. The need to manage the risks, uncertainties and tensions generated by these trade-offs brings to the forefront the importance of establishing appropriate and transparent sustainable institutional capacities and governance frameworks. This is critically important because many institutional frameworks for major projects are often too fragmented and silo-based to competently undertake assessments which arrive at acceptable compromises.
- **Sustainability:** Few of those involved in infrastructure development now publicly share the former conventional view that economic growth should be the *sole*, even dominant, concern of project appraisal²³. There remain, however, differing views on what sustainability actually involves, and how major infrastructure projects might be best framed to achieve it. In consequence, there is a need to appreciate that doubts remain over how far current projects satisfactorily address environmental and social dimensions of sustainability. Decision-makers should be aware that this is *essentially* because the concept of sustainability is still in its infancy and its operationalization very much in the early stages.

4.2.2 The case for broader appraisal frameworks

- **Economic growth:** Notwithstanding the above findings, while infrastructure project appraisal methodologies continue to evolve, *most* are still appraised against traditional targets of economic growth; even though support for this principle now appears to have

²² Defined by the Brundtland Report in 1987 as "meeting the needs of the present generation without compromising the ability of future generations to meet their needs."

²³ 81% of survey respondents acknowledged that economic growth should not be 'king' of all appraisal criteria.

significantly reduced. The quest for broader project appraisal frameworks, through enhancement of Social Cost Benefit Analysis (SCBA) or the use of Multi-Criteria Analysis (MCA), reflects increasing concern over the sustainability of current development patterns. This has led to formal requirements, set out in many governments' policy documents, to incorporate environmental impact studies into infrastructure plans and projects.

- **Project investment appraisal:** Where private sector funds are invested in major project developments, investors clearly need to generate a commercial return, and subsequently are obliged to employ a financial appraisal of the forecast cash flows (usually through Financial Cost Benefit Appraisal [FCBA]). But most investment in major infrastructure development continues to be based on traditional forms of SCBA. Appraisals of this kind provide an interpretation of the main factors in *monetary* terms, summarised in a single rate of return figure that is important especially for public sector bodies, which are usually the project sponsors and may be major investors. Both SCBA and FCBA combine cash flows with monetized values for factors such as time, accidents, and air quality.
- **Monetisation:** While substantial research continues on establishing sound monetary values for some environmental and social factors, practical difficulties *remain*. For social factors, even where monetary values can be attributed there remain critical questions over distributional effects, i.e. the varying impacts on different communities and on different societal groups. Furthermore, the lack of transparency inherent in many aspects of traditional CBA precludes decision-makers from properly understanding the project and its impacts, even if reasonably sound figures could be identified for monetising all the various factors in project appraisal. Some critics argue that the use of CBA as the principal platform for project appraisal may actually *prevent* key decision-makers from being in a position to balance out the various interests and priorities of differing stakeholders throughout the project lifecycle²⁴.
- **Environmental and social factors:** Incorporating the environmental and social factors of sustainability within a major infrastructure project requires an approach to appraisal that offers a broader and clearer understanding of the multiplicity of key decision-making factors. This should go well beyond economic concerns and market imperatives, particularly for public sector projects²⁵.
- Such an approach, as in the case of MCA, should reflect the project's policy context and directives in project objectives and allow for the full engagement of key stakeholders as early in the project lifecycle as possible. The aim should be to contribute positively to sustainable development, not just to mitigate negative impacts or avoid difficult decisions.

4.3 Study recommendations

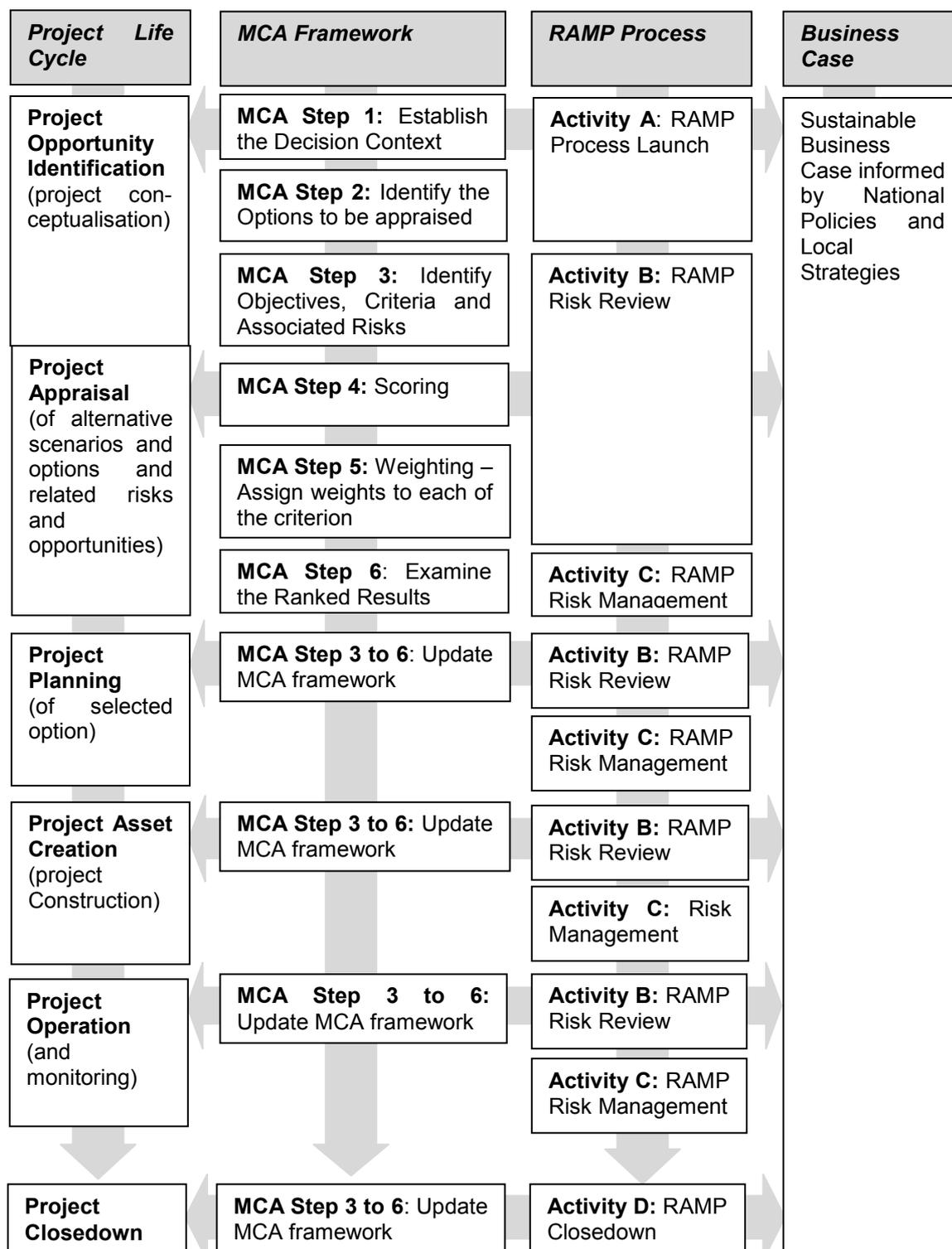
The OMEGA 3 Project concluded with the recommendation that Multi Criteria Analysis (MCA) provides a suitable framework for presenting and assessing the relevant factors of sustainable development of major infrastructure appraisal as a basis for decision-making throughout different phases of the project lifecycle. MCA was seen to offer a framework and methodology for determining overall preferences amongst a series of project alternatives where each accomplishes a series of objectives. Project objectives are assessed using indicators which comprise *both* quantitative and qualitative information. In this way MCA provides a framework for techniques of comparing and ranking different alternatives, and using a variety of indicator types, side-by-side. As recommended by the Study, the MCA framework involves a six stage process reflecting the project life cycle and can be integrated with the four activities of the RAMP process, as shown in Figure 4.1. This process enables

²⁴ 91% of survey respondents disagreed with the premise that monetization is essential to sound project appraisal.

²⁵ 63% of survey respondents agreed fully or conditionally with the premise that firm objectives and visions for projects are seen as important.

identification and management of project risks at different stages in a project lifecycle, enables financial values to be placed on them, and facilitates mitigation and control. The MCA framework allows these to be achieved from a multiple stakeholder perspective. The Study recommends that the framework should be used within an approach that employs a 'sustainable business case' for the proposed project to ensure consistency. Finally, it is emphasized that the approach should aim not merely to mitigate negative impacts but also to contribute positively to all dimensions of sustainable development. This includes the appraisal and management of environmental and social risks – the particular areas of concern highlighted at the outset of the study by ICE and AP.

Figure 4.1: Interaction of MCA framework and RAMP Process within the Project Life Cycle



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