

AESOP 2012 TRACK 10 Special Session:
OMEGA Planning Mega transport projects & events

Incorporating Principles of Sustainable Development within the design and delivery of Major Projects: An international study with particular reference to Major Infrastructure Projects

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Incorporating principles of sustainable development within design and delivery of major projects

- ❑ **Clients:** The Institution of Civil Engineers (UK) & The Actuarial Profession (UK)
- ❑ **Focus: Risk Analysis & Management for Projects Handbook – RAMP**
 - ❑ published in 2005 by Thomas Telford, London
 - ❑ directed towards those engaged in the appraisal and management of project risk, anywhere in the world.
 - ❑ RAMP Process takes a ‘whole lifetime’ strategic approach to risk, and especially targets possible financial implications.
 - ❑ oriented towards decision-makers, project sponsors and private s. investors
- ❑ **Aim:** To incorporate principles of sustainable development within the design & delivery of major projects
- ❑ **Time:** 18 months: January 2009 – June 2010

Step 1 – Literature reviews

- ❑ Seven sectoral papers on treatment of environmental & social concerns in project appraisal from viewpoints of:
 - economist – actuary – civil engineer – transport planner – environmental planner – social & community planner – city & regional planner

- ❑ All papers prepared by invited contributors from academic or consultancy backgrounds

- ❑ One overview paper:
 - perspectives of sustainability visions as applied to MUTPs

- ❑ Literature Review Report
 - synthesis of preceding contributions & compare and contrast study of each contribution
 - plus material from main OMEGA study of MUTPs
 - findings informed questionnaire design

Step 2 – Questionnaire investigations: surveys

- ❑ Aim: 60 interviews with key people from **banks, public bodies, development agencies, consultancies and NGOs**
 - Actual achieved 44 H-L + 14 P-H = **58**
 - very senior management positions or specialist roles

- ❑ Agencies / institutions - UK and international & Case studies - UK and international (France, Sweden and USA)

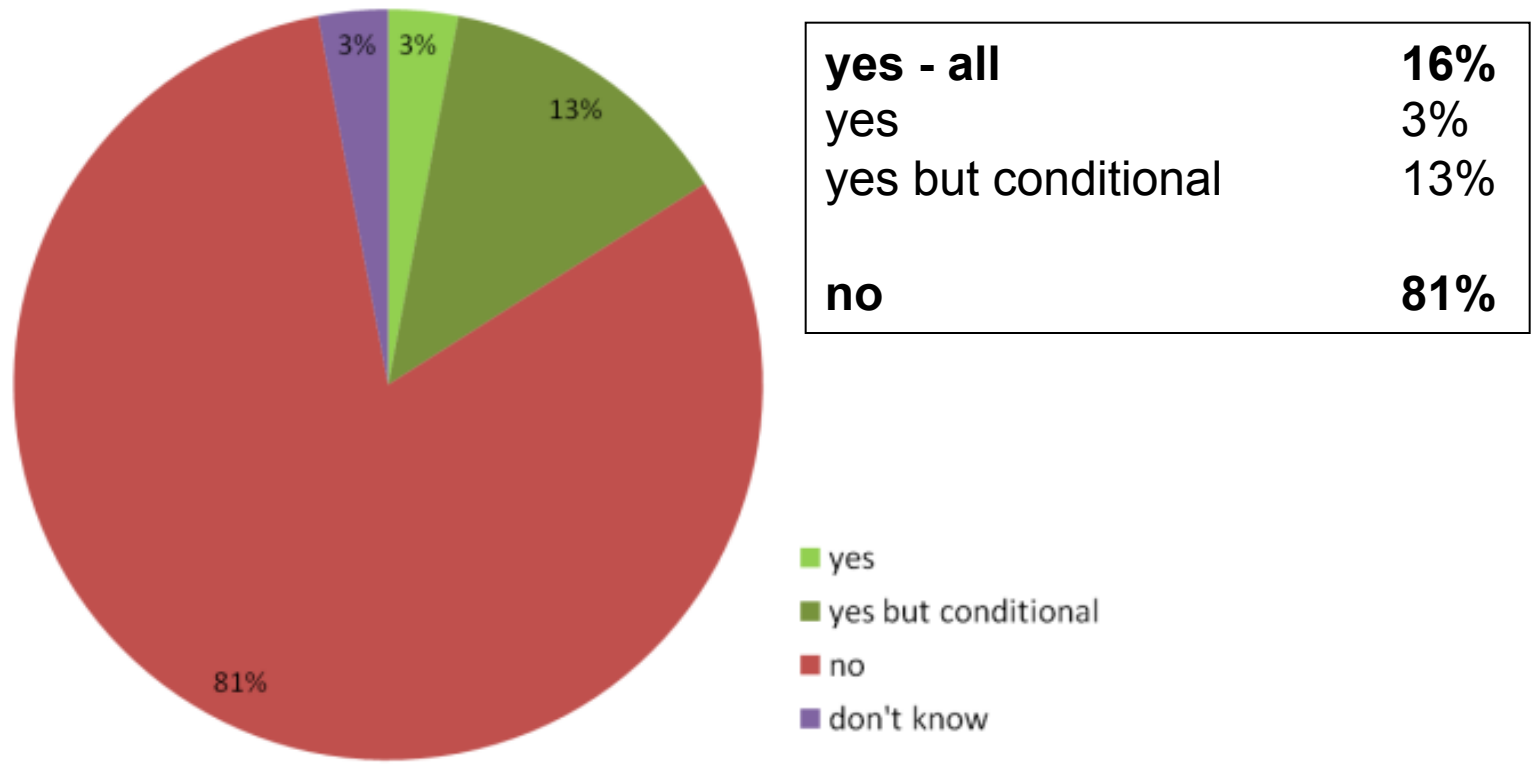
- ❑ Pre-hypothesis surveys: open discussions - with limited guidance from probing questions.

Step 2 – Questionnaire investigations: surveys cont' d

- ❑ The hypothesis-led interviews followed a **structured set of 16 questions focused on four hypotheses** about project appraisal and sustainability, developed from consideration of the literature review findings

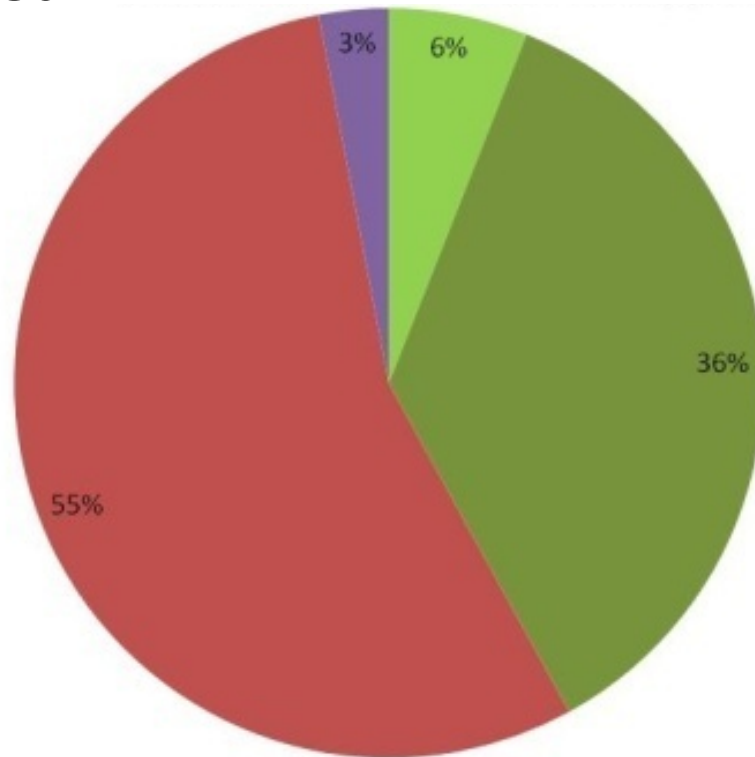
- ❑ The four key hypotheses were:
 - Economic growth is essential, sustainability is not;
 - Monetization is essential to sound project appraisal (& role of CBA);
 - Objectives are more important than economic rationalism; and
 - Engagement of all stakeholders in the appraisal process is essential.

H1 Respondent supported the hypothesis: Economic growth is essential, sustainability is not



Overall the implication is that respondents strongly support the aim of sustainability but are not always consistent about its treatment in appraisal compared to economic growth

H2 Monetization is essential to sound appraisal – impacts that cannot be measured need not be included in appraisal

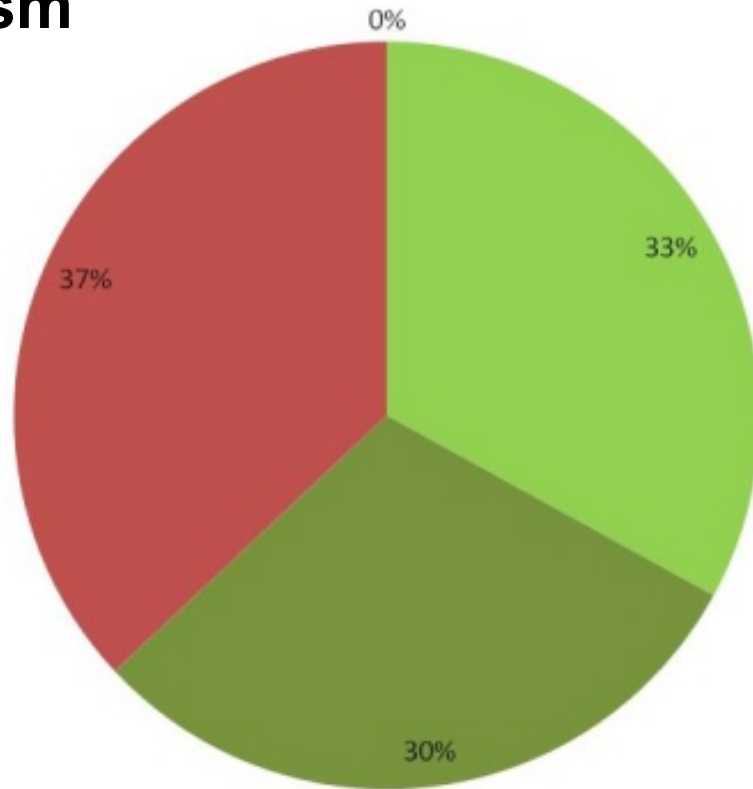


yes - all	42%
yes	6%
yes but conditional	36%
no	55%

- yes
- yes but conditional
- no
- don't know

This suggests that monetization of factors is *not* seen as the fundamental basis for appraisal that it once was.

H3 Respondents supported hypothesis Project Objectives (visions) are more important than economic rationalism

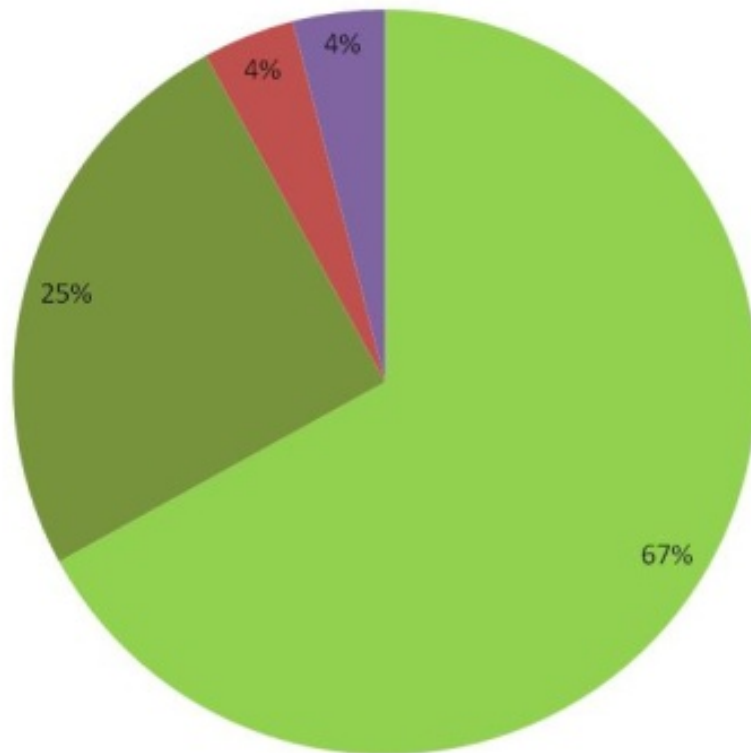


yes - all	63%
yes	33%
yes but conditional	30%
no	37%

- yes
- yes but conditional
- no
- don't know

doubts over the effectiveness of current processes for environmental & social appraisal and strong preference for clear framework for assessing indicators for a range of relevant objectives.

H4 Respondents supported hypothesis: Engagement of all stakeholders in the appraisal process is essential



yes - all	92%
yes	67%
yes but conditional	25%
no	4%

- yes
- yes but conditional
- no
- don't know

Overall there was clear support for stakeholder engagement being open and effective.

Selected survey findings from Step 2

- ❑ OMEGA Survey: **Only 11% of respondents** felt all Social and Environmental aspects of Sustainable can be monetized
- ❑ OMEGA Survey: 84% think CBA **does not** addresses well E&S aspects of SD
- ❑ OMEGA Survey: 65% think appraisal of mega transport projects would **more effectively** employ the use of MCA to cover all factors, rather than an exclusive use of CBA.
- ❑ OMEGA Survey: 70% of respondents felt **CBA should be used to inform MCA based appraisal**, rather than principle tool for decision making

Selected survey findings from Step 2

- ❑ Definitions of aspects of S&E aspects of **SD vary with stakeholder** and are in constant flux

- ❑ OMEGA Survey: 69% felt public authorities should set **clear and firm priorities** for appraisal of environmental and social enhancement

- ❑ OMEGA Survey: 92% felt **context** - cultural, political, commercial, temporal - was important for the planning, appraisal and delivery of MUTPs

Challenges highlighted by study

- ❑ **sustainable development** has the **potential to re-define the order of development priorities** that major infrastructure projects **should** contribute to.
 - ❑ For example, international concerns over global challenges such as **climate change and energy depletion** have led to the evolution and implementation of new **international and national policies** and to follow-up development projects focused on actions to tackle these challenges.

- ❑ environmental and social factors are **not externalities to development** but instead comprise **fundamental components of the context** within which sustainable development must be achieved.

Challenges highlighted by study cont'd

- ❑ decision-making in mega project planning and appraisal frequently **requires major trade-offs and compromises** in order to effectively achieve project aims and objectives.

- ❑ Managing the risks, uncertainties and tensions generated by such trade-offs **requires institutional capacities and transparent governance frameworks** that reflect the **different perspectives** of key project stakeholders involved in project developments in all phases.

- ❑ However the institutional frameworks for many major infrastructure projects are often **too fragmented and silo-based to arrive at acceptable compromises** and short of suitably qualified staff to tackle the challenges they confront.

Challenges highlighted by study cont'd

- ❑ views on what **sustainability *actually* involves**, and how major infrastructure projects *might* be best framed to achieve goals of sustainability, not only **differ** from context to context
- ❑ the **operationalization** of sustainability is still in its infancy. Therefore project **appraisal criteria are likely to evolve over time as new knowledge and understandings are acquired**. Challenging the extent to which **current project appraisal frameworks** satisfactorily address the environmental and social dimensions of sustainability.
- ❑ In consequence, Study Team advocate that such projects need to be seen more as '**innovation projects**' than engineering projects.

The case for broader appraisal

- ❑ where private sector funds are invested in a project, a financial appraisal of the forecast cash flows is **always** required to demonstrate return on investment.
- ❑ Social CBA is **often required by public bodies** as a valuable discipline in allocating funds across different fields (e.g. transport, health and education). The **central concern is that CBA should *not* be central to the overall appraisal** but should be set within a wider assessment which reflects the full range of environmental and social factors.
- ❑ **Environmental factors which *cannot* be quantified are not monetised and thus are too often not taken into account.** In the case of social factors, even where monetary values can be attributed, critical questions remain over distributional effects, i.e. the varying impacts on different communities and on different societal groups.

The case for broader appraisal cont.d

- ❑ traditional SCBA often results in a **lack of transparency** in the monetization efforts. Decision-makers **cannot** properly understand the **project dimensions** and their **impacts** or **balance the interests** and priorities of differing stakeholders throughout the project lifecycle.

- ❑ incorporating environmental and social factors of SD within projects requires a broad/clear understanding of the multiplicity of key decision-making factors and should **go well beyond economic concerns**

- ❑ Appraisal needs to reflect project policy contexts and directives, and allow for the full engagement of key stakeholders as **early in the project lifecycle** as possible with the aim to contribute positively to SD, not just to **mitigate negative impacts** or avoid difficult decisions.

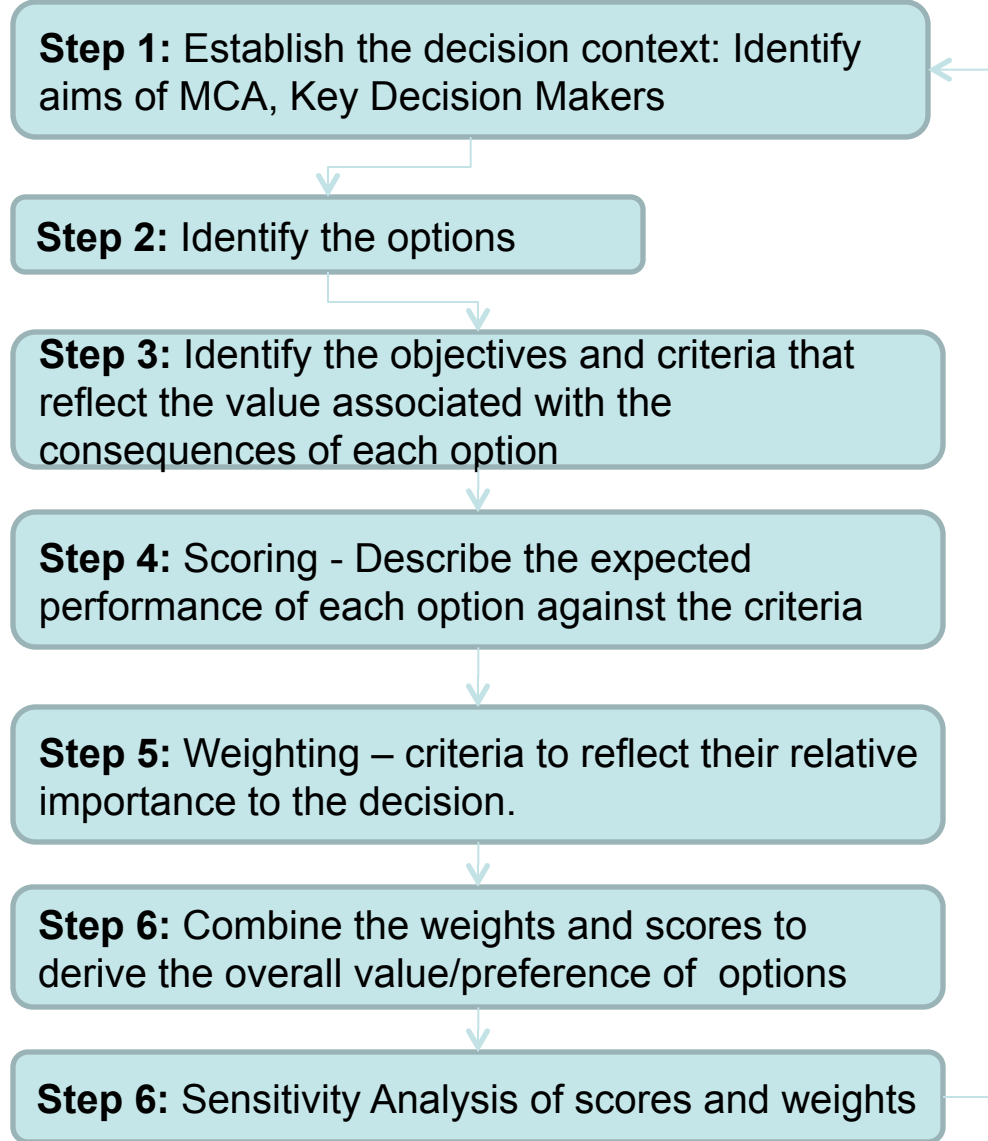
- ❑ **Multi Criteria Analysis is suited to providing these qualities.**

Current Approaches to MCA

- ❑ Multi Criteria Analysis (MCA) systems are widely used in project appraisal (Sussex University's Science Policy Research Unit (SPRU -Stirling, 2006)
- ❑ MCA systems involve structures to allow quantified (**not necessarily monetized**) and non-quantified indicators to be set out together in a tabulated form
- ❑ MCA aims to establish preferences between **options** using an explicit set of **objectives** that the **decision making body has identified**, and for which it has established measurable criteria to assess the extent to which the objectives have been reached
- ❑ Highway investment appraisals use MCA techniques which take into account impacts with both monetary values (such as travel time savings), and social and environmental impacts (noise impacts and blight) **which may be quantified but not valued**, or assessed only in qualitative terms.

Current Approaches to MCA cont.d

Form of Generic MCA



Current Approaches to MCA cont.d

- ❑ MCA in the UK: New Approach to Transport Assessment (NATA)
Controversial application of MCA used here as an example.
- ❑ Core to NATA MCA: An **Appraisal Summary Table (AST)** that displays the degree to which the five **Central Government objectives for Sustainable Transport** would be achieved (policy led).
- ❑ AST allows judgement to be made about the overall value-for-money of the option or options in achieving the Government's Sustainable Transport objectives.
- ❑ AST “allows **consistent view** to be taken about the value of the strategies and plans developed for the different study areas”.

Example of NATA Appraisal Summary Table for a particular project option

Scheme Name A46 Newark - Widmerpool Imp.	Description : Dual-2 lane, grade separated carriageway; mainly on-line with off-line sections at Kinoulton, Bingham, Syerston and Farndon.	Problems : Poor accident record and suffers from congestion. Significant development pressures at Bingham and a need for better links to Newark and Lincoln.	Cost £m :77
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OBJECTIVE	SUB-OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	Noise	Changes considered at properties having a noise level greater than 57dB and an increase of 1.0dB or more. No allowance has been made for any potential mitigation measures. Decreases due to bypass sections.	Estimated number of people likely to be annoyed by noise levels are: 242 for the "do minimum" situation; 183 for the "do something" situation.	A net decrease of 59 people who would be annoyed by noise in the "do something" situation compared to the "do minimum".
	Local Air Quality	"The project leads to an increase in PM10 levels of at least 2µg/m3 and in NO2 levels of at least 4µg/m3 and concentrations are above the air quality standards NO2 objective of 40µg/m3."	No. properties experiencing air quality - better 305 (NO2) / 519 (PM10) - worse 232 (NO2) / 18 (PM10)	-380 PM10 -3882 NO2
	Greenhouse Gases	12% increase	Difference is + 6252 tonnes CO2	Adverse
	Landscape	A landscape travelled and fought over historically but now managed intensively although appearing quite well wooded. Long views and rolling varied landform give some interest	-	Moderate adverse
	Townscape	Assessed in Landscape	-	Included in Landscape
	Heritage of Historic Resources	An area rich in remains of various periods, esp Roman and Civil War. Many sites likely to be affected since even detailed surveys do not reveal more than 50% of sites found in practice	-	Moderate adverse
	Biodiversity	A substantially agricultural landscape where small pockets of woodland are probably of heightened significance. NB desk search may not include all second tier nature conservation sites.	-	Slight Adverse
	Water Environment	There are several high quality watercourses providing abstractions and dilution of discharges for the area that will be affected by the scheme. Groundwater is also abstracted for industrial and agricultural use. Impacts must be minimised, by mitigation, to protect this environment.	-	Slight Adverse
	Physical Fitness	New opportunities for both pedestrians and cyclists, therefore improving physical fitness.	-	Slight Beneficial
	Journey Ambience	Improved journey ambience for both road users using the bypasses and pedestrians and cyclists within the village boundaries.	-	Moderate Beneficial
SAFETY	-	Substantial improvements to safety by up-grading of current sub-standard single carriageway to dual carriageway and the incorporation of a number of localised bypasses.	Accidents Deaths Serious Slight 1515 n/a n/a n/a	PVB £45.6m
ECONOMY	Journey times & Vehicle op Costs	No VOC calculations made.	Trunk road journey time savings: Peak 19.8 mins; inter peak 4.2 mins	PVB £67.60m 204% of PVC
	Cost	N/A	-	PVC £33.1m
	Journey time reliability			
	Regeneration	Provides link to Newark and Cotgrave both with SRB funded programmes.	Serves regeneration priority area? Development depends on scheme?	Yes No
ACCESSIBILITY	Option values	No new alternative modes provided or additions/removals of existing bus/rail services	-	Neutral
	Severance	Benefits on communities such as Eastside and Farndon outweighed by increased difficulties in crossing the dual carriageway.	-	Slight Adverse
	Access to the Transport System	No provisions for improved access, frequency or routing of existing services nor introduction of new services. Quality of bus stop facilities may improve but access between bus stops remains difficult.	-	Slight Adverse
INTEGRATION	Transport Interchange	No specific improvements to interchange facilities.	-	Neutral
	Land-Use Policy	Consistent with some Land Use policies in Structure Plan and Local Plan, but no specific policies related to the proposed scheme	-	Slight Beneficial
	Other Government Policies	Supports general transport Government policies.	-	Slight Beneficial

COBA	PVB: £113.2m	PVC: £33.1m	NPV: £89.1m	BCR: 8.91
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Benefits/issues in use of MCA systems

- ❑ **MCA provides a framework which is useful for classification: determining priorities or selecting between alternatives.** There is a degree of judgement which can be a matter of concern, but MCA can bring a degree of **structure, analysis and openness** to classes of decision which lie beyond the practical reach of CBA.

- ❑ **Use of MCA tools is particularly valuable for direct participation of stakeholders** as it allows for visualizing different perceptions of the relative importance of the criteria by different groups (businesses, public authorities, community groups etc. in areas affected, as well as project sponsors and supporters), highlighting how results can change if different stakeholders' interests and perceptions are taken into account - **but how/who selects participants?**

Benefits/Issues in use of MCA systems cont.d

- ❑ **MCA techniques give the decision-makers the opportunity to learn about their own preferences and those of the involved stakeholders.** In consequence the MCA approach can prove a valuable instrument for assessing sustainability and also for carrying out the **decision process and consensus building in a ‘sustainably sound’ way.**
- ❑ **The MCA approach can be used with considerable flexibility.** It allows engagement of all interested parties and should **encourage thinking** rather than provide a **simplistic guide to the ‘right’** answer. This sets it in contrast to the use of CBA techniques alone.

Benefits/Issues in use of MCA systems cont.d

- ❑ **The development and employment of sound objectives, beyond concern with purely financial market fundamentals** and reflecting established policy objectives surrounding the project – local, national, international.

- ❑ **The results of CBA appraisals**, so important for particular key investors and project sponsors, **are assigned the appropriate priority in the context of overall policy priorities** and against goals of sustainable development at the different stages of the project management process.

- ❑ MCA is likely to be most effective when appraisal is integrated within the overall development and decision making process for a project.

Benefits/Issues in use of MCA systems cont.d

- ❑ **MCA techniques require the disciplined use of analysis and measurement as far as these may usefully be employed.** The use of these techniques is in important ways more demanding of experience and good training than the use of CBA or CEA. For example NATA has been criticized for the **inconsistent nature** of its implementation to projects both within single scheme and appraisals, and between appraisals
- ❑ **The MCA process has the disadvantage that it can be manipulated** either through the choice of representative stakeholder groups, which may not be inclusive, through the choice of criteria and/or balance of these in proportion to the project objectives. Or the stakeholder groups may have a prior agenda which unduly influences the outcome of the MCA.

Benefits/Issues in use of MCA systems cont.d

- ❑ **One important lesson from the current application of the NATA MCA** is that the weightings given to objectives by decision makers are left open, and tend to be dominated by transport sector CBA concerns leading to the dominance of time savings in appraisals and the diminished importance of the underlying objectives. This leads to the question of who is best place to define such weightings? 69% of respondents felt public authorities should set clear and firm priorities for appraisal of environmental and social enhancement.

- ❑ **CBA in an important part of appraisal, but should not dominate**

Option	Appraisal typology
1	CBA
2	MCA – CBA Led
3	MCA – Non Policy Led : CBA incorporated but not leading
4	MCA – Sustainable Development Policy Led: Incorporating CBA

Benefits/Issues in use of MCA systems cont'd

- ❑ **Engagement of stakeholders throughout the project lifecycle**, allowing significant issues and information to be brought out at specific stages: project conception, appraisal, implementation, operations & monitoring.

- ❑ **The framework can help identify project risks** and for seeking trade-offs in moving towards decisions while effectively involving all project stakeholders. A process of this kind, supported by the RAMP Process, provides invaluable guidance in the choice and design of the project and in the treatment of the social and environmental risks of sustainable development.

- ❑ **Failure to approach the project's development in this way can mean a failure to reflect key issues in decision-making** and thus may generate increased risks of delay and loss.

Key Study Conclusions

- ❑ **The conventional view that economic growth concerns should be dominant in project appraisal is held by *hardly* anyone** sustainability is now seen as fundamental by most people involved in mega infrastructure project development.

- ❑ **Despite the rhetoric, sustainable development has been increasing in importance over the last twenty years** with global and national policies developed to focus on it and appraisal methodologies gradually taking it into account.

- ❑ **Very few practitioners of those interviewed now see monetization of factors as a pre-requisite to sound appraisal.**

Key Conclusions Cont'd

- ❑ **Although substantial research continues on establishing sound monetary values for environmental and social factors, practical difficulties exist – distributional effects**

- ❑ **Using Multi Criteria Analysis (MCA) in project appraisal is widely supported among those interviewed**, as this is seen to offer scope for addressing a wide range of objectives in a structured way.

- ❑ **Firm objectives for projects are seen by survey respondents as important by a majority of practitioners but there is some caution over their role.** There are also differences over the extent to which environmental and social criteria can be measured and which ones should have priority.

Key Conclusions Cont'd

- ❑ **There is very strong support for project stakeholders being involved in the development and appraisal of mega projects from an early stage.** It is recognised, however, that not all stakeholders can play an equal role and that a careful management of the project stakeholder engagement process is thus essential.
- ❑ **The realization that engaging project stakeholders does *not* mean that all their aspirations can be met is critical.** This is important since different groups are likely to have different aims, and because it is very likely that some will be disappointed by the final outcome of the decision process

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