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The potential role of value management in environmental impact assessment: a Maseru case study

Abstract

Environmental impact assessment (EIA) studies are undertaken to assess the anticipated environmental impacts of proposed projects. Such studies typically address biophysical and socio-economic issues. Using a case study approach, the effectiveness of the EIA process adopted for a landfill project in Maseru, Lesotho, is reviewed. It was found that the Maseru environmental impact statement (EIS) was not fit for the purpose as it did not facilitate effective decision-making. This failure was to a large extent due to inadequate briefing by the client and ineffective study implementation and review procedures. It is proposed that value management (VM), a value-adding technique mainly applied in the manufacturing and construction industries, could improve the effectiveness of EIA.

Keywords: Value management, environmental impact assessment, sustainability, infrastructure, planning and design

Abstrak

Studies oor omgewingsimpakwaardering is gedoen om die geantisipeerde omgewingsimpak van voorgestelde projekte te skat. Sulke studies spreek biofisiese en sosio-ekonomiese sake aan. 'n Gevallestudie oor die effektiwiteit van die omgewingsimpakwaardering van 'n stortingsterreinprojek in Maseru, Lesotho is gedoen. Daar is gevind dat die Maseru omgewingsimpakverslag nie gepas was vir die doel omdat dit nie effektiewe besluitneming gefasiliteer het nie. Hierdie mislukking was grootliks toe te skryf aan onvoldoende instruksies deur die kliënt en oneffektiewe studie implementering en oorsigprosedures. Daar

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word voorgestel dat waardebestuur, 'n waardetoevoegingstegniek grootliks toegepas in die vervaardigings- en konstruksie-industrieë, die effektiwiteit van omgewingsimpakwaardering kan verbeter.

Sleutelwoorde: Waardebestuur, omgewingsimpakwaardering, volhoudbaarheid, infrakstruktuur, beplanning en ontwerp

1. Introduction

The *National Environmental Policy Act (NEPA)* was implemented by the Federal Government of the United States of America (USA) in 1970. NEPA was the first legislation that required environmental impact assessment (EIA) to be carried out before implementation of certain projects (Lawrence, 1997: 79; George & Lee, 2000: 3).

> *The fundamental aim of NEPA was to force all agencies of the federal government to integrate environmental concerns into their planning and decision-making (Ortolano, 1997: 315).*

Many countries have since adopted similar EIA policies. Requirements for EIA are even imposed in countries that do not have legal EIA mandates because development assistance organisations such as the World Bank insist that EIA be undertaken for projects that they finance (Ortolano, 1997). Despite this widening application of EIA, critics claim that EIA does not always meet the needs of informed decision-making (Pardo, 1997: 137; Saarikoski, 2000; Sigal & Webb, 1989 cited in Hill, 2004). Such EIAs are therefore ineffective and of limited value to the developer or the commissioning decision-maker.

Kelly, Male & Graham (2004) describe value management (VM) as a process in which the benefits of a project are elucidated and evaluated against a set of values held by the client. The application of this technique in the manufacturing and construction industries is well documented (see, for example: Kelly & Male, 1988; 1999: 333; Male, Kelly, Fernie, Grönqvist, & Bowles, 1998a; Thomson & Austin, 2001; Lin & Shen, 2007). However, there is no published evidence of attempts to link the application of VM to EIA.

The premise of this study is that the application of VM principles in EIA will facilitate the integration of environmental considerations into the decision-making process for development projects. The potential of VM to facilitate more effective EIA is explored by means of a case study of an EIA for a landfill project commissioned by the Maseru City Council in Lesotho.

2. EIA objectives

The primary goal of EIA is the provision of environmental advice to decision-makers. EIA has multiple objectives (Clark, 1984: 12; Caldwell, 1988), including stimulating debate among interested and affected stakeholders about the nature and form of a development proposal and its environmental and social consequences, and assisting a proponent's planning and design team to develop alternatives and/or mitigation measures that meet the proposal's needs with reduced environmental impacts (Brown & Hill, 1995). Lawrence (1997: 84) has called for a re-ordering of EIA objectives, with environmental sustainability as the overarching goal. He proposes that objectives such as formulating more environmentally sound undertakings are more important than decision-making and institutional objectives such as the provision of environmental advice to decision-makers.

EIA seeks to attain its various objectives, as set out by Hill (2004), in four main stages: scoping (planning); assessment (design); evaluation (approval), and management (implementation). Terms in parentheses refer to a simplified view of the life-cycle for a project. Scoping is conducted at an early stage of an EIA as a participatory process to identify the key environmental issues and reasonable alternatives to a proposed project that are subsequently assessed by appointed specialists. The exploratory environmental studies for these issues are subsequently presented in an EIA report which then informs a public evaluation of impacts and alternatives and the approval/rejection decision for the development proposal by a competent authority.

3. Usefulness of VM in EIA

According to Kelly (2007: 435), VM is:

> *a project-focussed process that makes explicit and appraises the functional benefits of a product, process or service consistent with a value system determined by the client.*

Kelly (2007), drawing on the work of Borjeson (1976) and Morris & Hough (1987), provides guidance regarding the meaning, from a VM perspective, of the terms 'project' and 'client'. A 'project' is:

> *an investment by an organisation on [sic] a temporary activity to achieve a core business objective within a programmed time that returns added value to the business activity of the organization, while a 'client' is described as: the unitary or*

> *multifaceted specifier of (construction) activity and employer of resources, sponsoring a project in parallel to the core business activity (Kelly, 2007: 435).*

As he observes, it is the client whose requirements are to be satisfied and whose core business will be enhanced through the undertaking of the project.

EIA seeks to extend this limited delineation of project value to at least ensure that existing environmental and social attributes (that have value to society) will not be compromised by a project. It preferably seeks to ensure that a project will enhance these attributes by delivering wider benefits to society, such as restoring degraded environments, during project implementation.

Male *et al.* (1998a: 16) identify six situations which provide value opportunities when there is: an unstructured problem or business opportunity; a need for strategic commitment by the organisation; a convergence of information from different parties; uncertainty about or within the project; an introduction of new personnel to the project, or a need for technical and/or capital commitment. The last four - and possibly all six - of these situations typically apply to particular EIAs, to a lesser or greater extent. VM can take place at any stage of the project life cycle where opportunities for value improvement can be realised (Kelly & Male, 1988; SAVE International, 1998: online). Male *et al*. (1998a: 16) assert that VM uses structured, team-orientated exercises that evaluate existing or generated solutions to a problem by reference to the value requirements of the client. The VM process usually incorporates a series of workshops, interviews and reviews, whereby the project requirements are communicated and evaluated against the means of achieving them (Constructing Excellence, 2004: online).

Several VM techniques can be applied during the project life cycle. The choice of technique depends on the project stage at which VM is to be undertaken. Kelly & Male (1988; 1993: 21-22) describe four formal VM approaches: the Charette (to review the brief); the 40-hour VM workshop; the VM audit, and the contractor's change proposal. The VM framework developed by Male *et al*. (1998a: 14-15) provides five additional VM approaches that can be used at specific stages during the project life cycle. These approaches are comprehensively described by Male *et al*. (1998a: 14-15; 1998b) and include: the pre-brief workshop; a briefing workshop; an outline (sketch) design workshop; a final (sketch) design workshop; an operations workshop, and an implementation workshop. The relationship between the project life cycle, the EIA process and

possible VM workshops is depicted in Figure 1, but it should be noted that the timing of EIA processes and VM workshop interventions is not intended to match exactly.

Of particular relevance to EIA are the pre-brief (strategic brief) workshop, the briefing (project brief) workshop, the scoping brief review (Charette) workshop, and the implementation workshop.

The strategic brief sets out the broad scope and purpose of the project and its key parameters, together with an output specification. A primary function of the pre-brief workshop is to provide a clear indication of project mission and its strategic fit with the client's business organisation. This VM approach has similar objectives to the EIA scoping process, which engages with a range of external stakeholders to identify their environmental concerns.

The project briefing workshop converts the strategic brief into operational terms. More specifically, it specifies the performance of the elements of the project; in essence, the deliverables. The project briefing workshop could be used at the end of the scoping process in EIA to develop the terms of reference for the selected specialist studies which, in turn, generate predictive information about potential environmental impacts.

The Charette workshop is a VM audit of the brief, often undertaken before the project design is complete. In the context of EIA, this intervention could occur when the scoping report and draft EIA are completed. At this stage of EIA, the value that different stakeholders attach to each impact is ascertained via participatory processes, typically either by written submission of comments to the EIA team or by face-to-face dialogue. The evaluation stage provides information on values to the decision-maker to complement the more factual information on predicted impacts provided by the environmental specialists. Information on facts and values can then be combined to weigh impacts, leading to the choice of a preferred project option.

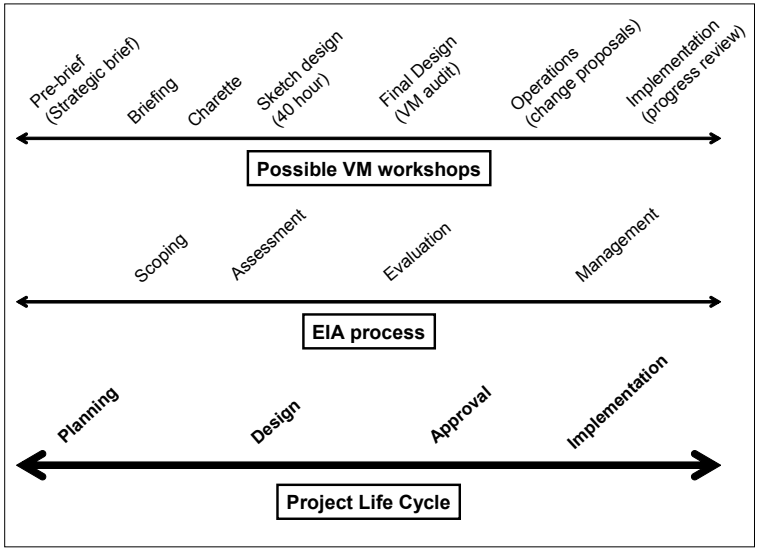

Figure 1: Relationship between the project life cycle, EIA process, and VM workshops
Source: Edwards, 2009: own drawing

Finally, the aim of the VM project implementation workshop is to ensure that the recommendations of previous workshops are implemented. This would typically include progress reports, solutions to problems encountered, reviewing, and fine-tuning. The VM implementation workshop can occur after any previous workshop; from the pre-brief stage through to site operations. In EIA, the implementation stage is called EIA follow-up, where the actual impacts of construction and operation of a facility or infrastructure are monitored to provide feedback to project managers for remedial action if necessary. After implementation of an EIA, a post-hoc audit can be undertaken to evaluate the effectiveness of the EIA process so as to generate lessons for improving future studies.

During each VM workshop a generic VM process comprising a structured job plan is used to explore ways to maximise the value of the project (SAVE International, 1998: online). The job plan comprises six phases which are all comprehensively documented by Male *et al.* (1998a, 1998b): information gathering, functional analysis, creative speculation, evaluation of alternative ideas, development, and presentation. Functional analysis and creative speculation are phases critical to the success and effectiveness of VM.

Value improvement is not solely aimed at reducing costs; its primary purpose is to assist in delivering a project, product or service that best meets the requirements of the client, even if that eventually means added cost (de Leeuw, 2001). In applying the concept of value improvement in EIA, the requirements need to be broadened beyond that of the client to improve, or at least maintain and not degrade, the value of the environment into which a project is to be introduced.

Environmental values can be categorised as either economic or non-economic (Erikstad, Lindblom, Jerpåsen, Hanssen, Bekkby, Stabbetorp & Bakkestuen, 2008: 132). The economic category consists of utilitarian values, in which the environment is valued for the direct benefits it provides to humans in the form of living and non-living resources. Another set of functional (utilitarian) values are the less visible ecological processes and life-support systems that sustain human life, including agricultural systems, fisheries, forests, water catchment areas, and clean air (IUCN, 1980). Non-economic values attached to the environment are based on ethical or moral grounds, the so-called immaterial values (Erikstad *et al*., 2008: 132). These include aesthetic values that people attach to aspects of the environment, which is an anthropocentric approach. This category of non-economic values also includes what is called an existence value, which is held to be an intrinsic value in nature that is independent of the use it has for humans – a claimed non-anthropocentric value of the philosophy of Deep Ecology (Næss, 1973 cited in Erikstad *et al*., 2008: 132) that is, nevertheless, a value held by people.

EIA adds consideration of environmental values to project planning and design, commencing with scoping, where environmentalists and experts are asked to identify those aspects of the environment that they value and wish to protect. The EIA process then uses specialist studies to inform two aspects of environmental planning and design. On the one hand, EIA identifies the intrinsic suitability of an environment for a particular development, by analysing physiographic constraints such as soils, slopes, flood plains, and climatic factors (McHarg, 1971). Avoiding areas subject to these constraints in the planning of development can reduce the capital cost of engineering structures. On the other hand, EIA also evaluates the impact of a development on those aspects of the environment that have social value, which McHarg (1971) defines widely to include wildlife, cultural heritage, and recreational value. EIA and VM processes are thus complementary, in aligning value systems from the outset and bringing together representatives from competing value systems (Male *et al*., 2007: 112-113). The potential usefulness of VM in EIA is explored below using a case study.

4. Maseru waste landfill project

Maseru is the capital of the Kingdom of Lesotho, a mountainous country of approximately 30 350 sq. km surrounded entirely by South Africa. The country, poverty stricken and with one of the highest rates of HIV infection in the world, has a population of two million people of which Maseru accounts for some 174 000.

The Maseru City Council was tasked with developing a sanitary landfill site to cater for the variety of municipal waste produced in Maseru. Since 1983 all municipal waste produced in Maseru and its environs has been dumped in an abandoned quarry selected by the City as an official dump site (Khalema & Sets'abi, 1999). The quarry site is unsatisfactory, being located on sloping ground upstream from the main reservoir that supplies the city with potable water (Chapeyama, 2004). It is situated within 25m of domestic dwellings in the HaTs'osane residential area (Lesotho Council of NGOs, 2006: online), and produces noxious gases as a result of decomposition and spontaneous combustion (Ministry of Health and Social Welfare, 2005). The site thus poses serious health hazards to the local population (Lesotho Council for NGOs, 2006). In addition, the rapid growth of the local textile industry, fuelled by trade opportunities initiated by the USA (Chapeyama, 2004: 6), has resulted in a new source of solid and liquid waste which needs appropriate management. Illegal dumping of sludge from some factories is already occurring on the outskirts of Maseru (Chapeyama, 2004: 10). The environmental problems, in particular the issue of waste disposal, associated with such economic expansion are further exacerbated by rural-urban migration (Motsamai *et al*., 2003: online). It is against this background that a potential landfill site was identified by the Maseru City Council, and a consultant commissioned to undertake an EIA of the site. The EIA was commissioned in line with the *Environment Act No. 10 of 2001* (Government of Lesotho, 2001) which provides a mandate within which EIAs are to be undertaken in Lesotho (Government of Lesotho, 2001). Even though the commencement date of the Act has not yet been published (see Lesotho: Second State of Environment Report for 2002 [Government of Lesotho, 2004]), the National Environmental Authority is using the Act to encourage developers to undertake EIAs voluntarily for projects with potential to cause adverse impacts on the environment.

The contract to undertake the EIA was awarded to a locally-based environmental consultancy. The objectives of the EIA were to assess the biophysical and socio-economic impacts of the project and to use this information to establish the suitability of the project for the

area proposed for its development (Maseru City Council, 2005). The Environmental Impact Statement (EIS) was published in October 2005.

The National Environment Secretariat rejected the first EIA on the grounds that it was inadequate to inform decision-making. More specifically, it was deemed insufficient in scope and in detail (Ts'asanyane, 2007: personal communication). Faced with this problem, and given the national significance of the project, the Maseru City Council was obligated to commission a second consultant to repeat the EIA exercise. This resulted in the Council being faced with disruptive delays and abortive costs.

The questions arising from this case are: (i) how effectively did the Council communicate its EIA requirements to the first consultant?; (ii) what steps were taken by the Council to ensure that the consultant's interpretation of the EIA brief aligned with its own?, and (iii) what measures did the Council implement to ensure that the EIA procedures employed by the consultant would result in their brief being satisfied?

Given this specificity of context (Yin, 1994: 13), the case study methodology was adopted, with a single case pilot study being selected as a prelude to further study (Yin, 1994: 40-41). Data was collected *via*: (a) a review of the documentary evidence, namely, the terms of reference prepared by the Maseru City Council for the consultant (scope of the EIA) and the first EIS developed by the consultant; (b) a semi-structured telephone interview with a representative of the Council to establish how the EIA was conducted, and (c) unstructured face-to-face interviews with officers of the local environmental authority regarding the inadequacy of the EIA and to clarify issues relating to environmental legislation and EIA procedures in Lesotho. Follow-up telephone interviews were conducted for clarification purposes.

Content analysis (see Krippendorff, 1980) was applied to the project documents and responses to the interview questions. This technique allows systematic analysis of qualitative data so that generalised conclusions can be drawn (Haggarty, 1996). By tracing the EIA process from the perspective of each of the stakeholders, a series of 'stories' was developed (Eisenhardt, 1991). Through this story-telling similarities and differences emerge, facilitating a deeper understanding of the process under review (Tzortzopoulos & Sexton, 2007). Cross-checking the results from one technique with those from another (triangulation) leads to greater reliability in the analysis (Jankowicz , 2000).

5. Discussion of the results

5.1 Initiation of the EIA

The Maseru City Council, working in close collaboration with the project stakeholders, had prepared a scoping document outlining the terms of reference for the EIA consultant. In addition, an inception meeting was held upon commencement of the EIA. This meeting was attended by Council representatives, the consultant, subcontractors and specialists, and other key stakeholders. The purpose was to reach a common understanding of the EIA objectives, its scope, and the services the consultant would be offering. The inception meeting was used as a platform upon which the Council's requirements and expectations for the EIA were communicated to the consultant. In essence, the consultant was tasked with undertaking a baseline survey comprising ecological, hydrology, geotechnical, and water quality surveys; investigating the socio-economic status of communities in relation to the proposed waste site; liaising with major stakeholders; promoting comprehensive public participation by engagement with villagers likely to be affected by the project; comprehensively assessing the likely impacts of the project, including prevention measures, mitigation or compensation, and analysing alternatives. The following evaluation shows that common understanding was not achieved in the first EIS.

5.2 Evaluation of the EIS

Table 1 summarises the extent to which the consultant analysed issues identified in the scoping stage as being requirements of the EIA. While the consultancy firm was selected for its technical ability to assess the issues to be covered in the EIA, in many instances the level of detail contained in the first EIS was inadequate for informed decision-making by the Council and environmental authority. These shortcomings can be ascribed to a poorly defined EIA brief (from the client) and execution plan (from the consultant) that failed to indicate specific procedures and methods that would be used to execute the EIA, despite the inception meeting held to develop a shared vision of the nature and extent of the EIA. It is against this backdrop that the process of VM is tested for its potential for maximising the effectiveness of EIAs. This is explored by highlighting the shortcomings of the EIA undertaken by the consultant and indicating where the use of VM could have obviated or mitigated these shortcomings.

Insofar as the baseline survey is concerned, a number of VM interventions would conceivably have rendered this phase more meaningful in terms of providing the Council with sufficient information upon which to base decisions. The application of a VM Charette workshop at the briefing stage could have clarified the need for investigation of the ecosystem structure and patterns, together with their propensity for disruption as a result of project activities. If such clarification had not occurred at that stage, a subsequent VM implementation workshop should have been able to identify this shortcoming and facilitate remedial action. Similarly, the absence of a geotechnical map to facilitate assessment of the suitability of the area for the intended purpose, and the deficiency of information relating to water quality, might also have been addressed by VM interventions.

The provision of infrastructure required for the effective functioning of the landfill, such as access roads and a transfer station, was not addressed by the EIS, despite having been highlighted in the scoping brief. Again, the use of a VM implementation workshop could have avoided this omission.

A tenet of VM is the participatory nature of its processes. The apparent lack of participation by local village councillors is a serious deficiency of the EIS, leading the Maseru City Coucil to conclude that public participation in the EIA process had been inadequate. The use of VM workshops during the various phases of the project would have facilitated stakeholder participation; and would have been reported upon during the relevant implementation workshops.

Insofar as impact assessment is concerned, there was no indication in the first EIS of how the infrastructure required for mitigating the negative impacts of the project would be dealt with. Using VM techniques, these requirements would have been noted in the briefing workshop (application of the Charette) and subsequently verified at an implementation workshop.

A serious shortcoming of the EIS is that of not providing a technical design with specifications. Coupled to this was the failure to consider alternatives, thereby diminishing the possibility of objectively considering the proposed design and any alternatives. The EIA consultant had been tasked with producing and assessing a technical design for the landfill project, and with proposing and assessing alternative designs (Genesis Environmental Solutions, 2005). In addition, the consultant was supposed to assess alternative sites for the project that had been through the original site selection process, but only the preferred site was considered in the EIS. Since VM considers the technical attributes of selected components and

then proposes and analyses alternatives in terms of functionality and cost, these shortcomings would have been addressed by VM intervention. This would typically be carried out *via* a 40-hour (or shorter) VM workshop. Again, a VM implementation workshop could be used to ensure that approved design decisions were implemented.

Finally, during the subsequent operations on site, the opportunities for contractor's change proposal could be used to initiate project changes conducive to the attainment of the Council's (and other stakeholders') objectives. The VM implementation workshop could again serve as a vehicle to ensure that imperatives decided at previous meetings were actually implemented and reported upon.

Table 1: An evaluation of the EIA for the Maseru waste landfill project

EIA component	*Analysis requested by the client*	*Analysis done by the consultant as revealed by the EIS*	*Shortcomings of the analysis*	*Implication for the EIA outcome*
Baseline survey	Undertake ecological survey	Plant and animal species found on site were identified	Ecosystem structure and functioning is more than lists of species; what is needed is discussion of ecosystem patterns and processes and how these may be disrupted by project actions	Not adequate to inform decision-making
	Undertake hydrology and groundwater survey	Boreholes were drilled to determine the depth of the water table, the presence of aquifers in the area, and the direction of groundwater flow	None	Adequate to inform decision-making
	Undertake geotechnical survey	Geological map used to describe the geology	Geotechnical investigations not done to determine the suitability of the area for the project	Not adequate to inform decision-making
	Analyse the quality of ground- and surface water sources within the area proposed for development	Laboratory analysis of the water samples from the ground- and surface water sources to assess the quality of the water	The water quality data presented without any interpretation, no mention of the projected changes in water quality when the landfill becomes operational	Not adequate to inform decision-making
Socio-economic investigations	Carry out the socio-economic survey in collection zones of Maseru City Municipality	Problems with the current solid waste removal service and the willingness to pay of the waste producers determined	None	Adequate to inform decision-making
	Carry out socio-economic survey in the communities around the proposed site to determine their social and economic status	The socio-economic status of the area determined with respect to sources of livelihoods of the communities and availability of services and facilities	None	Adequate to inform decision-making

Stakeholder participation	Liaise with all the major stakeholders	Scoping report prepared by the consultant and submitted to stakeholder institutions; inception meeting to establish shared vision between key stakeholders; meetings with stakeholder institutions; debriefing meeting; stakeholder workshop	Some of the issues raised during scoping not addressed in the EIS. For example, there is no indication of how the facilities required for the functioning of the landfill will be made available, such as access roads and a transfer station	Not adequate to inform decision-making
Public participation	Undertake a comprehensive public participation process	Public gatherings held in the villages to be affected by the development	Findings from the interviews indicated that the local councillors in the villages mentioned in the EIS were not aware of the public participation meetings said to have taken place in the villages. The local councillors should have been involved in all matters of development proposed in the villages. This revelation led to the local environment authority questioning the accuracy of the EIS on this matter and concluding that the public participation was not adequate	Not adequate to inform decision-making
Impact assessment	Identify all impacts that are likely to result from the project activities and determine measures for their prevention, mitigation or compensation	Impacts identified and mitigation measures indicated	No indication of how the infrastructure required for mitigating impacts will be made available, which the consultant should have discussed with the relevant government authority	Not adequate to inform decision-making
Analysis of alternatives	Provide an analysis of alternative sites and technical designs of the project	Project designs were not done, neither preliminary nor alternatives to the proposal. Only one site considered	The consultant stated in the EIS that the project does not have a technical design with specifications (Maseru City Council, 2005). Without project designs (preliminary and alternatives) it would be difficult to accurately determine specific impacts of the project	Not adequate to inform decision-making

6. Conclusions

This article explores the potential role of VM in EIA, using a case study to illustrate how VM can be applied to improve the value of EIA to a project client. The case study suggests that, while the Maseru City Council relied on EIA consultants to produce an EIS to communicate potential environmental impacts of the proposed landfill project, the Council did not effectively brief and manage its consultants. The first EIS did not provide information that was adequate to inform Council's decision-making, particularly with respect to proposing and assessing alternative sites and technical designs for the projects.

The application of VM techniques could be directed, first, towards defining and reviewing methods to be used to execute the various aspects to be addressed in the EIA. In this context, VM can improve management of, and co-ordination between, the range of organisations and individuals involved in the EIA process. Secondly, VM can contribute to the formulation of projects that not only meet a client's need, but can also be adapted to address environmental values held by interested and affected parties, in reconciling competing value systems. This reconciliation can be achieved through VM's change-orientated, participatory approach to facilitate the generation of alternatives that represent better value satisfaction to a range of stakeholders. In summary, VM in EIA would focus on what Male *et al*. (2007: 112) describe as 'value system evolution and resolution'. This focus applies in two contexts: in managing the relationships between the multiple stakeholders involved in an EIA's organisational system more effectively, and in producing a project formulation that optimises environmental values in addition to the more traditional emphasis on cost and functional performance specifications.

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