EXAMINING THE SUSTAINABILITY IMPACTS OF MEGA-SPORT EVENTS: FUZZY MAPPING AS A NEW INTEGRATED APPRAISAL SYSTEM

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ABSTRACT: Unlike other aspects of daily life and work, the pursuit of sustainable development in our communities requires an understanding of complex and sometimes counterintuitive processes that unfold over a long period of time. In order to develop these ideas it is necessary to find a situation, which is both complex and time constrained. Such a situation is found with mega-sport events and their host cities/regions. Many decision-making and problem-solving tasks are too complex to be understood quantitatively, however, people succeed by using knowledge that is imprecise rather than precise. Fuzzy logic is a powerful problem-solving methodology with a myriad of applications in embedded control and information processing. The authors report on progress towards their long-term objective of the development of an integrated appraisal system that can be considered as a new language; a new way of communication between academics, social, environmental scientists, politicians, decision-makers and the general public.

Keywords: fuzzy maps, integrated appraisal system, mega-sport events, sustainable development

1. INTRODUCTION

In the effort to achieve greater economic growth, environmental and social issues were ignored. With the realisation that this cannot continue came the introduction of the concept of sustainable development. Undoubtedly, sustainable development is the current management buzzword, all too often bandied about as though it represented some new concept. In reality it represents an ageless and fundamental concept based on simple common sense. Sustainability simply means acting in a way, which does not undermine one's ability to sustain one's activity into the future (WCED, 1987). Although, sustainable development can be interpreted in many different ways, there are three areas of crucial importance that lie within the concept. Firstly, there is the importance of thinking in a much more integrated way about the linkages between the environmental, social and economic strands of sustainable development. Secondly, there is the importance of the environment as an economic driver; and thirdly, the challenge of sustainable regeneration (Porritt, 2002).

Sustainable development requires an integration of the ecological imperative to stay within the carrying capacity of the planet, the economic imperative to provide an adequate standard of living for all, and the social imperative to develop forms of governance that promote the values people want to live by. Environmentalists can foster innovation by speaking out for the right kind of regulatory standards, educating public to demand innovating environmental solutions and becoming sources of information about best practices. However, the view of environmental protection and regulation remains static (Porter and Van der Linde, 1995). Prediction and evaluation of social impacts are often understood in different ways and consequently it is difficult to give a specific definition. Social scientists make claims to be able to understand and predict certain aspects of human behaviour, but whether human behaviour does or does not show sufficiently stable responses to factors influencing can only be settled by an appeal to evidence and not by prior speculation (Lipsey and Harbury, 1992). Traditionally economic theory has been concerned primarily with finding steady states and to a lesser extent finding cycles. Economic theory deduces or predicts various relationships between variables (Thomas, 1997). However, information flows in the economy are not perfect, and some sections of the economy operate more or less independently of one another. Perhaps one of the greatest services dynamic systems theory has done is to make economists aware that other types of solutions are possible (Kesley, 1988).

Various methods can be employed to identify and evaluate environmental, social and economic impacts, and all are considered to be integrated processes. However, they have rarely integrated the

sustainability issues of a proposed policy, plan or project. Partasarathy (2002, p. 297) noted that *…a definition of sustainability should be developed that does not apply a fixed character to a set of practises or technologies. Sustainability is not a property of a system or of one of its components. We need to look at sustainability as a process that incorporates complex environmental, social and economic phenomena, institutions and mechanisms*…. The classic dilemma of any valuation method is that where a number of factors need to be assessed that are so different and hence are difficult to compare and weigh against each other, like comparing apples and pears. The analysis and comparison of different issues ends up in a subjective taste of what is best, and that is the end of the discussion, often with no qualifying statement on how they arrive to any conclusion (Hauge and Eriksen, 2002). It is with this view in mind that this study is being undertaken. This research will focus on developing an integrated appraisal system that can be considered as a new language, a new way of communication. Since sustainable development and mega-sport events are complex issues, the strengths and weaknesses of these valuation methods have been examined and assessed. Once this is completed, the concept of fuzzy logic will be employed for a more holistic approach. Fuzzy logic provides a remarkably simple way to draw definite conclusions from vague, ambiguous or imprecise information.

2. MEGA-SPORT EVENTS

Mega-sport events are a key means by which cities can stimulate major programmes of regeneration and improvement, express their personality, enhance their status and advertise their position on the global stage through place-marketing (Paddison, 1993; Kearns and Philo, 1993; Harvey, 1989). Mega-sport events have emerged as a significant catalyst of change and development at local, regional and perhaps national level and can act as a key instrument of development policies for their host cities (Essex and Chalkley, 1998; Chalkley and Essex, 1999a and 1999b; Essex and Chalkley, 1999). However, there has been very little research into the benefits and problems of mega-sport events for host locations (May, 1995).

Any kind of development policy ought to be designed to achieve sustainable development. In particular, as far as mega-sports events are concerned, it has been accepted that, apart from the aims of playfulness and joyousness of the events, the development policies that come with it should not only pursue socio-economic objectives but also strive to attain environmental stability. When a city is nominated as the host city of a mega-sport event, this generates endless debates about the types of impacts that the mega event would bring. Mega-sport events can have wide-ranging effects (see Figure 1), i.e. economic, political, commercial, physical, socio-cultural, and psychological. Mega-sport events are being viewed as an integral part of economic development and marketing plans. Thus, they may be suitably described as ‘mega’ by virtue of their size in terms of attendance, target market, level of public financial involvement, political effects, extent of TV coverage, construction of facilities and impact on economic and social fabric of the host community (Hall, 1992). A vital dimension of any mega-sport event challenge will be to build quickly and confidently upon the host region's economy and improving environment. A targeted and well-managed economic, environmental and social programme linked to the mega events sporting and multi-cultural investment could bring a host city and its greater region a handsome dividend in the future.

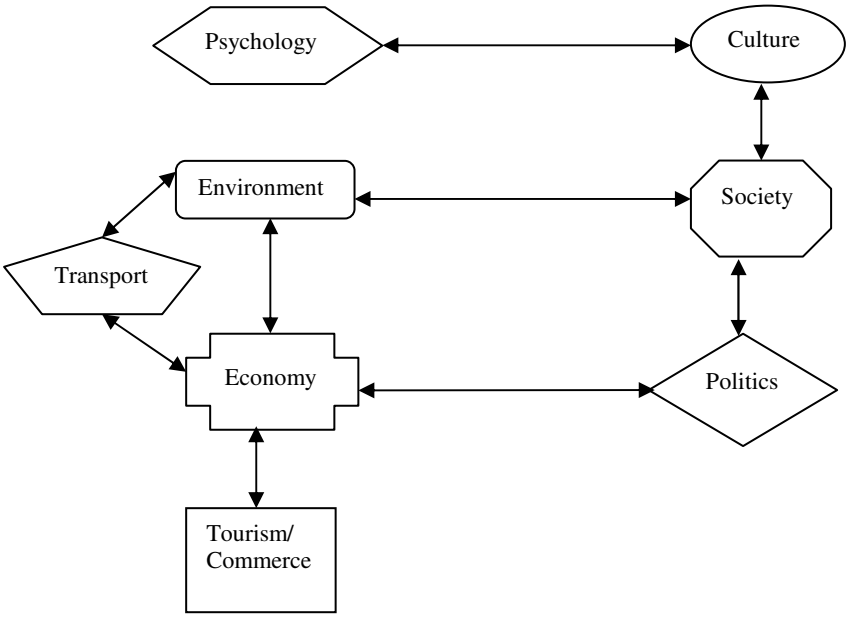


Fig. 1. *Systems Thinking - Overview Map 1.*

Success in any bid for a mega-sport event will bring with it the need for what will be, in that region's context, unparalleled investment in new and improved sporting facilities. This expenditure, along with the injection into the local economy from the operation of the event itself, the complementary developments around new facilities and the economic activity generated from the facilities after the close of the event, will have a long lasting impact on the local and regional economy. Mega-sports events are widely recognised as having environmental impacts and frequently form part of the environmental strategy of a country or a destination region within a country. Most of the organising committees are particularly sensitive and committed to protecting and improving the environment while staging the event (IOC, 2002). Another point that has to be defined is what constitutes economic success or failure - whether this is the immediate profit of the event or the long-term benefits to an area. The evaluation of the sustainability impacts of any mega-sport event is a complex and difficult task and it involves far more than simply estimating its potential revenue and expenditure (see Figure 2). There are some other parameters that have to be estimated such as the number of jobs created in the region (Armstrong and Taylor, 1993). One reason therefore why the Seoul 1992 Olympics were successful is the fact that as a consequence many Korean enterprises entered successfully the international market. The reason why the 1992 Barcelona Games were successful was the fact that the city addressed many of its serious problems and continues to enjoy the positive impacts of the 1992 Olympic Games (i.e. tourism, further economic development). A possible reason why the Atlanta Games were not successful is the fact that the massive commercialization damaged the Olympics and, despite the fact that Atlanta presented profits in its budget, there were no real long-term benefits to the city after the end of the Games (Brunet, 1996; Haynes, 2001; Hill, 1996; Lynch and Jensen, 1984; Mann, 2002; Pyo *et al.*, 1988; Roche, 1994; Witt, 1988).

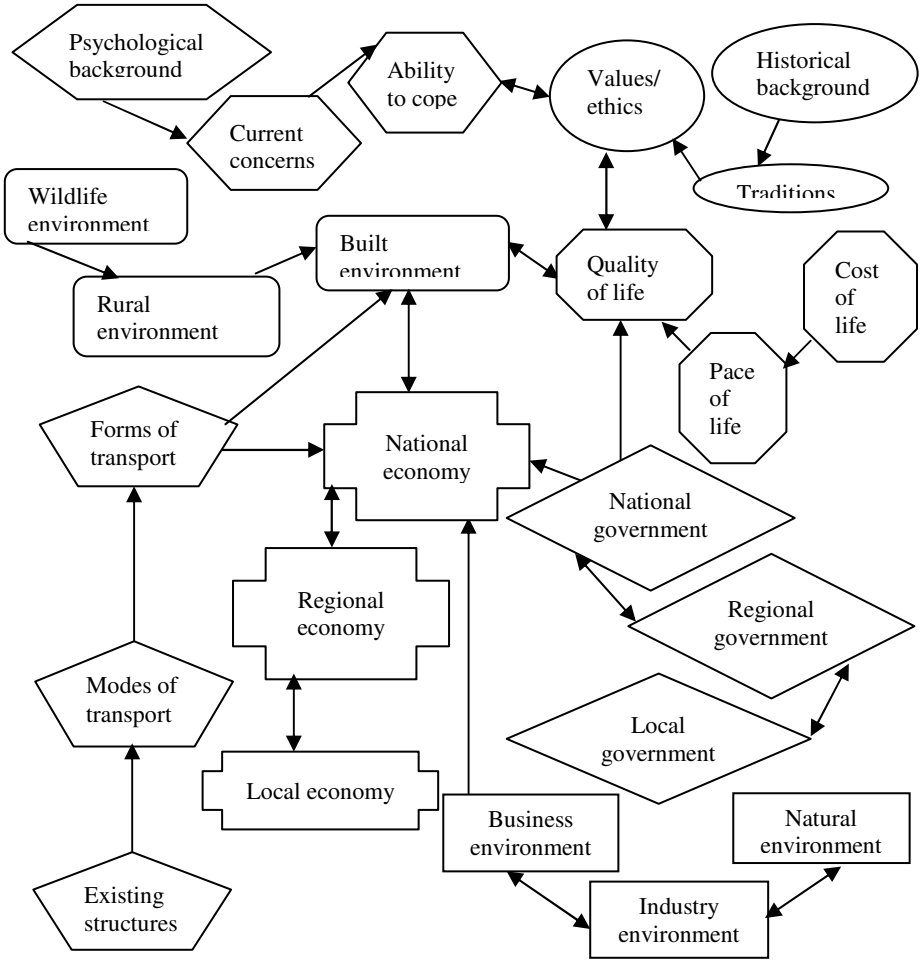


Fig. 2. *Systems Thinking - Overview Map 2.*

Big projects, such as mega-sport events, have a purpose, which can be stated as one or several objectives. For some projects these objectives may be explicitly and easily identified, whilst for others are implicit, being the result of a large number of a part of any political process (Therivel and Partidario, 1996). The objectives of any policy, plan and project (PPP) should be structured and prioritised. The primary objectives of PPPs will involve a balance of economic, social and environmental priorities that can only be stated vaguely. The common sense understanding of sustainable development is simply that when society works together and cares about the environment, not only do people learn to respect the environment, they improve their quality of life and their welfare but they build stronger and more supportive communities (Hart, 2001). Within the context of globalisation and de-industrialisation development policies have been required to become more pro-active and entrepreneurial, often involving some form of competition for jobs and investment.

2.1. Existing Valuation Methods

Recent literature argues that social, environmental, economic impact appraisal should be fully integrated in the planning and decision making process, and not limited to being merely a tool to predict the likely impacts of intended projects (Craig, 1990; Dale and Lane, 1994, 1995; Burdge and Vanclay 1995; Taylor *et al.,* 1995; Vanclay, 2002). This implies that practitioners and decision-makers should exert influence from the very beginning of a project development until after project completion. However, there are few examples where this has occurred. In most cases valuation methods are concerned with the prediction of the potential impacts of proposed policies, projects and plans, which often proves difficult, and therefore the project planning and decision-making process has been in the hands of others, mostly technical experts and politicians. In addition, instead of the social, environmental and economic issues being integrated, several valuation methods emerged as different

disciplines each with each own paradigm and discourse (Stolp, 2002). There is a tendency to avoid or ignore any detailed consideration of the ways in which these aspects interact and their different impacts (Burningham 1995; Dale and Lane 1995; Ortolano and Shepherd 1995).

A good-quality impact appraisal process informs planners, decision-makers and the public on sustainability decisions. The impact appraisal process should be focused and accountable so that it would provide sufficient, reliable and usable information for decision making; customised to the characteristics of the decision making process and cost and time effective; integrated and sustainability-led to ensure an appropriate impact assessment of all strategic decisions relevant for the achievement of sustainable development; address the interrelationships of environmental, economic and social aspects, and facilitate identification of development options that are more sustainable; participative and iterative, i.e. informs and involves the interest parties throughout the decision making process, explicitly addresses inputs and concerns in the decision making, and has clear and easily-understood information on the actual impacts of a proposed project, plan and policy (McIntyre and Vivian, 2002). Nonetheless, all existing valuation methods are considered to be systematic and integrated processes for the identification, evaluation and management of the sustainability impacts of a proposed project. Most of the valuation techniques/processes have rarely integrated environmental, social and economic issues successfully, the predictions are often incorrect and the decision-making processes do not rely heavily on this information. Any integration must be flexible enough to include new standards (Barden and Bannister, 2002).

2.2. Fuzzy Logic

Economic impacts, and usually the positive ones, clearly receive the greatest attention by those concerned with evaluating the costs and benefits associated with a particular event (Rithcie and Aitken, 1984; Cicarelli and Kowarsky, 1973; Ritchie and Lyons, 1987). While these impacts are extremely relevant and often very important, an honest assessment of the value of a particular mega sports event must also include estimates of the negative impacts, such as commodity price increases and real estate speculation that may be associated with the event (Tortopidis, 1997). The positive elements of the environmental impacts most commonly catalogued relate to the new facilities that might not have been politically or financially feasible without the event. On the negative side, growing attention is being focused on the environmental damage due to development for mega sports events (Tolios, 1997). Social research is also necessary to estimate the likely social consequences of any policy decision towards the goal of sustainable development. Social (and psychological) research is essential because the economic and environmental policy tools can be determined. This should be done with the maximum economy of means and with the minimum adverse effect on other social, environmental and economic goals (Clayton and Radcliffe, 1996). The simplest approach to any kind of problem is to identify, understand and discuss the particular goals/targets and then reach a point where several recommendations about what needs to be changed can be made.

Fuzzy logic has rapidly become one of the most successful of today's technologies for developing sophisticated control systems. The reason for which is very simple. Fuzzy logic addresses such applications perfectly, as it resembles human decision making with an ability to generate precise solutions from certain or approximate information. Despite the fact that to address such problems fuzzy logic is purely based on mathematical and logic-based approaches, this research will only use some concepts of fuzzy logic. Fuzzy sets are dependent on the rules given. The greater the number of rules, the ‘smarter’ the answer gets. In other words, once the strengths and weaknesses of existing methodologies and impact assessment tools are considered, then fuzzy maps and sets will be employed so that the findings of the research can be illustrated, without however following a particular mathematical function or being justified by a particular mathematical rule or equation.

2.3 Integrated Assessment Tools

Integrated assessment is the practice of combining different strands of knowledge to accurately represent and analyze real world problems of interest to decision-makers. The body of existing knowledge is often insufficient for construction of an accurate representation of real world problems. Integrated assessment offers a systematic approach to the identification of these interstices in disciplinary knowledge that have often frustrated analysis in the past. Thus, integrated assessments

have increasingly been the source of new directions and critical questions to be answered by the disciplinary sciences. Ultimately, what distinguishes integrated assessment from disciplinary research is its policy dimension, aiming to inform decision-makers on the complexity of real world problems (Dowlatabadi and Rotmans, 2002). Integration is a process of better understanding the links and different interests and trade-offs involved in trying to reach a desired aim or goal. Integration for sustainability can be achieved only through the specific contribution and shared responsibility for each of its components. The lack of integration has been widely recognized (EU, 1998).

According to Parson and Fisher-Vanden (1995) integrated appraisal and assessment seek to provide information of use to some significant decision-maker rather than merely advancing understanding for its own sake; and bring together a broader set of areas, methods, styles of study, or degrees of certainty, than would typically characterize a study of the same issue within the bounds of a single research discipline.

The subject matter might not necessarily be how much impact will there be but whether the impact of one activity is greater than that of another. The major challenge emerging is how to integrate these approaches. Perhaps, the issue here is which concerns need to be integrated and addressed when analysing the environmental, economic and social assessment of an activity or a project; and this is important because the decision-making process can rely on this integration. It is unlikely to be a single best way, methodologically or procedurally, in which the problem of integration can be addressed but there are two polar case of integration, the "weak" and the "strong". Lee and Kirkpatrick (1997, p. 11) stated *…in the 'weak' case, separate forms of assessment are undertaken and the decision-making authority possesses very considerable discretion in how it uses these when making its decision…in the "strong" case, the environmental, social and economic assessments are fully integrated with each other for the duration of the appraisal process and the decision-making authority is explicitly required to use – and show it has used – the overall appraisal in reaching its decision….* It can be argued that each of these approaches has its advantages and disadvantages, there is not a complete integrated assessment system or tool. It is expected that this research will adopt the "weak" form of integration. Furthermore, by employing the concept of fuzzy logic and apply and test it in a big project such as the Olympic Games, this will add to the understanding of the integrated assessment tools.

3. INTEGRATED APPRAISAL SYSTEM - FUZZY MAPPING

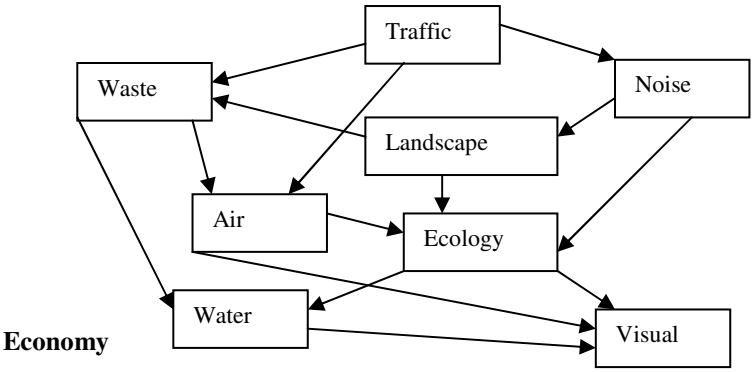
An integrated appraisal system will be a new way of communication. To achieve an effective communication there is a need to think strategically, integrate environmental, social and economic communications with the project's mainstream communications, assess and monitor the work being undertaken, consider the implications of other factors for the communication process, transparency and experiment when using new methods and approaches (Buckland, 1999). The sustainability agenda can only be addressed through integration both horizontally (cooperation between sectors) and vertically (cooperation between levels). The challenge of sustainability can be considered in both long and short term. Major changes in attitudes, in society and in the operation of economies are required in the long term. On the other hand, in the short term much can be achieved by taking small but wise steps in the right direction, determining the main aims to achieve sustainability and the main aims to reduce un-sustainability, designing carefully policies and mechanisms and identifying a set of basic principles on which the whole effort will be based (EU, 1998).

Effective decision-making related to sustainable development requires considerable learning on the path of both professionals and stakeholders. Since much of individual learning comes from direct personal experience – in other words feedback from a range of situations and actions – it is often difficult to understand the slowly evolving consequences of sustainable development in everyday terms. Environmental decision-making is a very arduous, multidisciplinary, and controversial matter upon which economists, technocrats, and policy makers do not generally agree. Economists, guided by the principles of social welfare maximisation theory, prefer to test a certain decision through an assessment of the benefits and costs which society will realise the decision. Conversely, technocrats resort to their own way of thinking, which in its simplest form attaches exaggerated importance to one or more technical factors relevant to a decision. Finally, policy makers, faced with an interplay of economic, technical, political and other factors, come up with decisions which may or may not be compatible with either way of thinking (Lekakis, 1984). Thus, it is important to use tools to gain a greater understanding of the way planning decisions affect society over time.

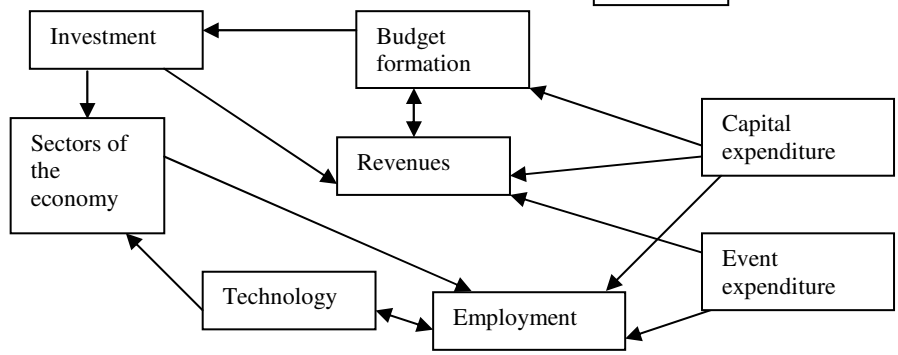
Integrated appraisal is the practise of combining different strands of knowledge to accurately represent and analyse real world problems of interest to decision-makers. Since these problems rarely observe disciplinary boundaries, integrated appraisals usually involve interdisciplinary research. In addition, the body of existing knowledge is often insufficient for construction of an accurate representation of real world problems. Integrated assessment offers a systematic approach to the identification of these interstices in disciplinary knowledge that have often frustrated analysis in the past (EC, 2000). Ultimately, what distinguishes integrated appraisal from disciplinary research is its policy dimension, aiming to inform decision-makers on the complexity of real world problems. Most of the activities taken place in research rely on measurements and measurement involve error and uncertainty.

A sustainability appraisal must be simple in its concept (i.e. in its relationship with established practices and in its handling of information), transparent (i.e. in its methodology and techniques, so that all involved can understand how and why policy proposal options have been chosen), systematic and accommodating (i.e. it is capable of entry at any level, depending on the history of pan making in the relevant area, and the skills, knowledge and resources available), flexible (i.e. it is capable of informing decision making within whatever overall policy framework exists in, or is set by, the plan making body), progressive (i.e. it can embrace additional and changing information and predictive techniques in an incremental way as knowledge and experience expand) and consistent (i.e. plans incorporating appraisal can link between tiered authorities across plan making boundaries). The development of a methodology for conducting integrated impact appraisal is still at an early stage, and major methodological issues remain to be resolved. Within an integrated management system, there will be a need to reconcile a wide range of technical and managerial interests. The fuzzy maps in Figure 3 are the same maps that the interviewees were shown and have commented upon. The next stage of the research is to assign significance and magnitude to these impacts and indicate these with simple plus and minus signs, and to identify interactions. It is expected that these figures will contribute to the improvement of communication, co-ordination and co-operation between all involved stakeholders, a most of the interviewees have stated. Based on the interviewees' comments the main weakness and at the same time potential of such a model is the need for spatial and time analysis.

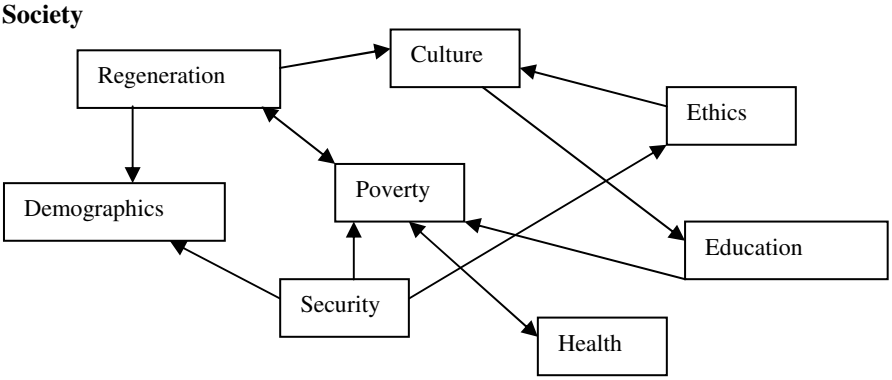
Environment



Economy



Society



Tourism

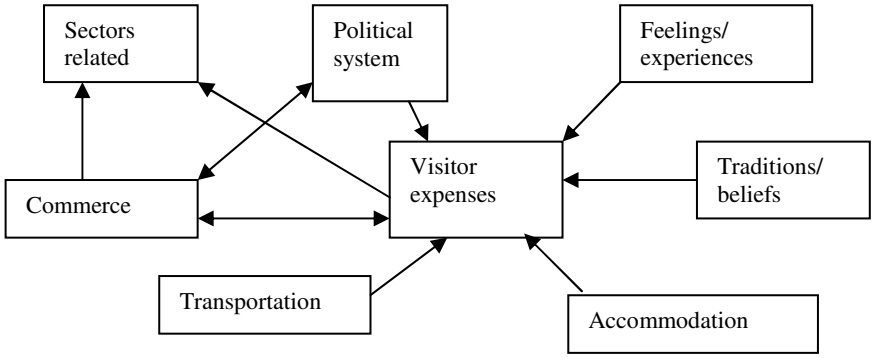


Fig. 3. *Potential sustainability impacts of mega-sport events.*

4. CONCLUSIONS

Sustainability is a basic organizing principle and as such deserves precise quantitative information for incorporation into credible indicators. However, there are important questions about the future such as how many people is the world able to sustain, at what level of technology, at what level of dignity, etc. According to Gough (2000, p. 24) *…there is not a single correct way or methodology for doing impact assessment that is broadly applicable – many different approaches can be appropriate depending on the temporal, political, social and scientific context of the assessment….* Integration for sustainability can be achieved only through the specific contribution and shared responsibility for each sector. Knowledge, information, indicators and measurements that facilitate public awareness, improve implementation and provide meaning to sustainability. Integration must be achieved at local, regional, national and international level. Coordination of policy at an appropriately early stage can therefore influence decision-making processes in a positive way. There are 'win-win' situations to be identified in the way sustainability impacts are identified, evaluated and managed and in the way these results are communicated. A new way of communication may bring about increased usage of certain policy directions and provisions and an adequate legislative basis for inter-sectoral policy review.

Sustainable development needs interdisciplinary action and drawing on many different views and sciences at the same time. Problems are no more than an opportunity disguised as a problem. Problems of every kind are nothing more than an opportunity that is there waiting for everybody to learn how to work together cooperatively in creative ways. Problems cannot be solved by trying the same way over and over again, and usually end up with nothing, no progress at all. Integrated assessment methodologies must find techniques for communicating model assumptions, methods and results to decision and policy makers and incorporating their concerns in an improved and more relevant model structure, leading to more appropriate policy outcomes. An important challenge facing integrated assessment methodologies is how to incorporate informal and practical knowledge into the assessment and how to include the real concerns of people rather than an expert's perception of what these concerns are or should be. This will require an improvement in the understanding of the interface between informal and formal knowledge - an area of inquiry that will require the involvement of social and political scientists within this process (Bailey and Gough, 1996). Integrated assessment methodologies offer an opportunity to develop coherent policy responses for issues with sustainability implications. The aim of integrated assessment methodologies is to draw upon the broad range of knowledge available within the scientific community, and the wider community, to enable informed and effective decisions to be formulated about different courses of action.

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