

**ENVIRONMENTAL ACCOUNTING  
SUSTAINABLE DEVELOPMENT  
INDICATORS**

25 - 27 September 2005, Prague

**Jan Evangelista Purkyně University in Ústí nad Labem  
Charles University in Prague**

*International conference organised under projects:*

*VaV 1C 4/17/04 Application of Environmental Accounting  
Funded by the Ministry of the Environment of the Czech Republic  
and*

*INFOSDEV EVG3-CT-2002-80007: Information on Sustainable Development - Education,  
Economic Instruments and Indicators  
Funded by the European Commission*

## **Proceedings**

**Editor:** Iva Ritschelová

**Translation:** František Granát

**Cover:** Tomáš Mikulénka

**Layout and typesetting:** Egor Sidorov

**Text is the responsibility of the authors.**

**© Iva Ritschelová and the authors of the papers.**

**ISBN 80-7044-676-5**

## Participative and Integrative Techniques to Improve Multidisciplinary Communication: a Precursor to Producing Sustainability Profile Indicators

Stefanos Dodouras<sup>1</sup>, Peter James<sup>2</sup>

### Abstract

Multidisciplinary approaches are a prerequisite for identifying sustainability profile indicators. Real-world situations are often ill-defined and involve vast amounts of vague data, factors which together weaken communication between actors and stakeholders and make their management even more complex. Available data can vary in quantity and quality, and is often vague and empirically un-testable, even though it is considered to be essential to reflect accurately the state of the different components of sustainable development. Given that sustainable development requires the integration of different strands of knowledge, and that sustainability frameworks do not always reflect the complexity of real-world situations, it follows that there is a need to create a flexible integrated appraisal process in order to utilise imprecise information. This in turn will result in more efficient multidisciplinary communication and hence more informed decision-making processes. However, the real-world is full of irregularities and complexities and the main point might not be whether the real-world is complex, but how to communicate the knowledge gained from different sciences. Using a case study based on the 2004 Olympiad, the authors reveal that the concept of sustainable development can become even more difficult to unravel when complex real-world relationships are to be modelled. The employment of fuzzy concepts, as a soft systems methodology, was trailed in the case study. Results obtained emphasised the importance of the continuing efforts to integrate multidisciplinary issues into the decision-making process. The fuzzy concepts employed added to the understanding of integrated assessment tools and contributed to the development of a new integrated appraisal system which considers real-world situations, takes account of the inherent uncertainty and leads to improved communication.

### Introduction

In the real world, limited information is available regarding the management of complex situations. Sustainability problems rarely observe disciplinary boundaries and as such the different components of ill-defined situations cannot be examined in isolation. Sustainable development is a multidisciplinary concept and therefore there is a need to integrate often limited results obtained from different approaches. Innovation could occur through a functioning network of communications that would aim to reconfigure existing knowledge and place it in a different framework (Gibbons et al., 1994; Cooper, 2002). Integrated assessments offer a systematic approach for the appreciation of the gaps in disciplinary knowledge that, in the past, have often been the cause of poor communication and analysis.

<sup>1</sup> Research Institute for the Built and Human Environment, School of Environment and Life Sciences, University of Salford, Greater Manchester, M5 4WT, UK, E-mail: [S.Dodouras@pct.salford.ac.uk](mailto:S.Dodouras@pct.salford.ac.uk)

<sup>2</sup> Research Institute for the Built and Human Environment, School of Environment and Life Sciences, University of Salford, Greater Manchester, M5 4WT, UK, E-mail: [P.James@salford.ac.uk](mailto:P.James@salford.ac.uk)

This should be taken to imply that there is a need to find ways of improving existing wisdom and producing new knowledge. Thus, an important concern is how different individuals can communicate and understand each other more effectively so that sustainability profile indicators can be identified more efficiently and decisions can be taken more reliably.

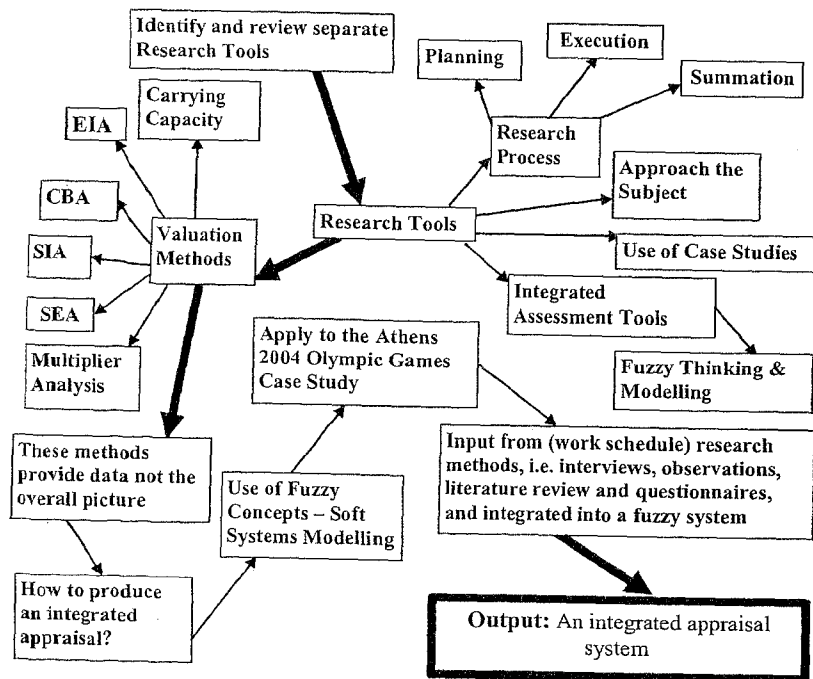
The importance of thinking in a much more integrated way about the linkages between the environmental, social and economic strands of sustainable development has long been established (Porritt, 2002). However, most of the extant valuation methods provide data but not the overall picture, and this prompts the question of how integration might be achieved. Couple this with the observation that traditional methods of research are not readily adaptable for dealing with ill-defined, real-world situations, and one is drawn to the conclusion that, when discipline boundaries are crossed, mono-disciplinary patterns cannot improve the understanding of the increasingly complex phenomena (Hauge and Eriksen, 2002). Multidisciplinary communication is an ongoing process that requires a reorientation of many concepts and seeks to reduce the degree of uncertainty, but such a process is also one that comes with many difficulties since it involves a large number of interrelated factors (Checkland, 1999). Soft Systems Methodology (SSM), including fuzzy modelling, can deal with a lot of relatively complex problems because of its participative and temporal nature. In other words, SSM can bring together multidisciplinary work, understand and operationalise the problem in question and allow stakeholders to monitor their actions as the project proceeds. Mega sport events provide an ideal situation (i.e. both complex and time constrained) in which to test the integration of different methodologies.

Mega sport events have emerged as a significant catalyst of change and can act as a key instrument of development policies at local, regional and perhaps national level (Dodouras and James, 2004). In this respect, few, if any, events can match mega sport events. In the case of the 2004 Olympiad, the nomination of Athens, like in many other past host cities, generated endless debates about the impacts that the event would bring with it. Based on the dimension of public support, this paper aims to contribute to thinking on what can improve the efficiency of the wide array of formal assessment tools and, subsequently, result in more informed planning and decision-making processes. It summarises the complex, real-world relationships that emerged and developed over the pre-event period of the 2004 Olympiad, recognises that these areas (i.e. host cities/regions) provide the opportunity to introduce the concept of fuzzy modelling, and demonstrates how soft systems modelling can be used to break communication barriers between stakeholders.

### 1. Athens 2004 Olympiad – the case study

A crucial step in the development of a useable technique for conducting integrated impact appraisals is to build on case study experience. The use of case study research is a valuable method at all stages of the theory building process (de Vaus, 2001) and can assist in understanding complex issues and extended experience to what is already known through previous research (Yin, 1984). For this study, the case study method was used to determine the data collection and analysis techniques. Data collection and fieldwork were organised as illustrated in Figure 1. A wide range of primary data was available thanks to organisations related to the 2004 Olympics, i.e. ministries, councils and other institutions. Also, information about the preparatory work and the hosting of the event (e.g. cultural and environmental programmes) was collected from the Athens 2004 Organising Committee, local authorities and published opinion polls.

Figure 1: Overview of the research process



Source: Dodouras and James, 2002

When the sustainability impacts of mega sport events are likely to be significant not only at a local but also at a national level, it is important to gather the views of those living outside the borders of the host city. For the study reported in this paper, a questionnaire survey assisted in gaining an understanding of a complex real-world situation and the meanings that a range of individuals brought to it. The study boundary area was the entire country of Greece, excluding Athens. The tasks of attaining a respective response rate and the sample being representative were not impossible, because the rest of the country was considered as a single study area (i.e. it was aimed to get at least one response from as many different Greek cities as possible). Having stratified the population according to their sex, age, place of birth, place of residence and occupation, a total of 350 people were issued with questionnaires. This sample size may be small, yet that is unimportant because high response rates do not necessarily improve the precision of survey result (Jones and Lang, 1980) and, most importantly, the target was to recognise the complexity of mega sport events, rather than to criticise the decision to host the event in Athens. The data from this sample will be aggregated so that patterns may be observed (Moffatt et al., 2001).

The respondents were asked to stress their opinions regarding the degree of agreement with the hosting of the event in Athens, the kinds of impact and their significance, and the lack of communication between different activity centres.

Data collected from the 350 questionnaires and a series of semi-structured interviews with key stakeholders including academics, civil servants, members of the Olympic Organising Committee and representatives of other agencies were used to produce a soft systems model of sustainability impacts. Follow-up interviews tested and refined this model with a range of stakeholders. The modelling process included transcribing and verification of the interviews using NVivo©-1.1. Data exploitation and interpretation led to the development and comparison of several fuzzy maps using Inspiration©-7.5. These models were copied using Microsoft®Word-2000.

When it comes to cities competing to host mega sport events, it is the size of these short-term attractions that leads to large-scale impacts (Hylton et al., 2001). However, the complexity of real-world situations, where human affairs are involved, implies that new ideas need to come forward, alternative directions need to be acknowledged, and ways of understanding and coping with the puzzling difficulties of the planning and decision-making processes must be identified.

## 2. Athens 2004 Olympiad – Different views

In 1996, an opinion poll conducted on behalf of the Athens 2004 Candidate Committee revealed that 96 % of Athenians supported the bid. The percentage of agreement was higher among respondents aged 18–24 (98.7 %) and 65+ (98.9 %), those with elementary (98.0 %) and secondary (97.6 %) education, and middle (97.6 %) and low (99.0 %) income earners (Dodouras, 1999). Although concerns were expressed about the alarming regional imbalances and massive commercialisation, the views of the general public, which were gathered occasionally in the pre-event period, showed that the Greeks were still in favour of the event mainly because of the potential economic and marketing benefits (TA NEA, 1997; Eleftherotypia, 2003).

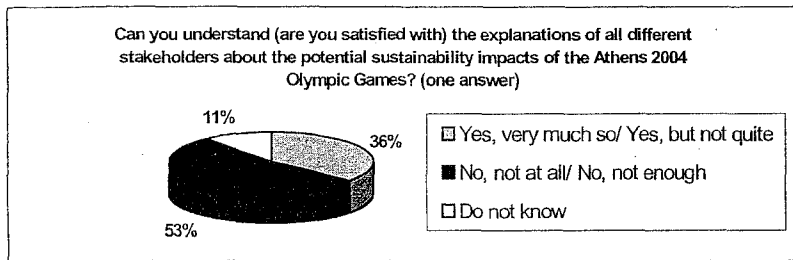
In 1999, a questionnaire survey (Dodouras, 1999) revealed that a small majority of the people of the Greek periphery waited with anticipation for the event (52 %). The percentage of agreement was higher among respondents aged 28–40 (59 %), those with elementary education (75 %) and high income earners (71 %). In 2001, a public opinion poll conducted by KAPA Research affirmed that most Greeks acknowledged that during the last two decades the country had made significant progress in sports and culture, but still lacks adequate health and education systems, while the division between the social classes has expanded (Lakopoulos, 2001). Further, in 2003 another opinion poll that was published in Eleftheros Typos, a popular Greek newspaper at national level, revealed that the public ranked the total cost, the environmental impacts and the construction of new infrastructures as their main areas of concern (Demertzis, 2003). Contrary to the timely completion of projects and a gradual improvement regarding environmental concerns, confidence in the transparent management of national and EU funds fell as time moved towards the initiation of the Olympics.

Analysis of the first three questions of a questionnaire survey carried out for this study revealed that the majority of the respondents were in favour of the Olympics (68 %). However, almost half of them (49 %) suggested that the main sustainability impacts of the event would not be positive; only 13 % argued that the event would positively affect the entire country of Greece.

Further, when they were asked to decide which of 'environment', 'economy' and 'society' would be most significantly affected by the event, the majority replied that the 'environment' (63 %) and 'society' (66 %) would be positively affected in contrast to the 'economy' (65 %). Correspondingly, most of those who argued that 'society' would be positively affected suggested that this would happen during the event at a national level (34 %); the majority of those who stressed that the Olympics would adversely affect the economy believed that this would be felt at a national level after the end of the event (78 %), whereas 24 % of those who believed that the environment would be positively affected stressed that this would happen at regional level and during the post-event period.

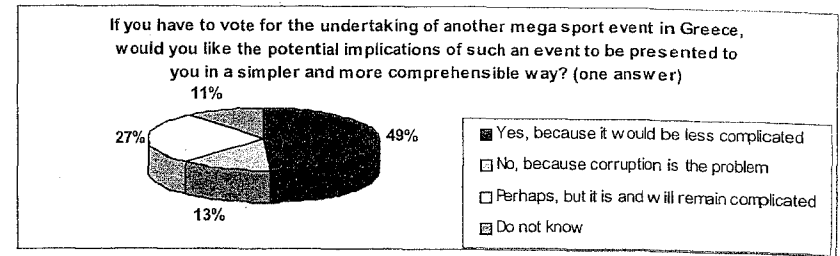
Consultation and participation involve information sharing among a multidisciplinary team of experts, decision-makers and the public. Conceivably, in the case of Athens, the public was insufficiently informed and could hardly understand the complexity of the event. For example, the participants of the questionnaire survey reported in this paper highlighted the lack of communication during the different stages of the project (see Figure 2) and revealed the need for a new integrated approach (see Figure 3), with 49 % of respondents indicating that a more comprehensible way of presenting the sustainability implications of mega sport events could encourage participation and enable the public to realise the risks involved.

Figure 2: Athens 2004 – Communication of sustainability management issues



The urgency for compromise between economic and environmental objectives is imminent, but the extent of its significance, it would seem, has not yet been realised. Multidisciplinary action is required for any ill-defined situation but for it to function, improved communication and collaboration are essential parts of this process. Based on the results of the questionnaire survey carried out for this study, it can be argued that reasonable doubts have been created with regard to the significance of the event's sustainability implications because of poor communication, ineffective collaboration and inability to prioritise. Further, realistic concerns were expressed about the future of the host community, since there was limited consultation and public participation in the planning and decision-making processes and it was generally accepted that there was not any official strategic plan with a long-term view on development.

Figure 3: Athens 2004 – Need for a new approach to presenting sustainability implications



Existing assessment techniques tend to examine sustainability issues in isolation and propose many different clarifications, often incomprehensible to other disciplines. The case study on the Athens 2004 Olympics revealed that straightforward thinking cannot eliminate the complexity of issues. Rather, there is a need to examine the components of real-world situations as actors that interact and play an important role in forming existing and future conditions. Developing scenarios through a process of participative systems thinking modelling are not predictions but they are devices for communicating distinct perceptions about alternative environments (Huss and Horton, 1987; Schwartz, 1991). The examination of written materials available to this study described the nature and identified numerous variables (i.e. implications) of mega sport events (see Table 1). In the process of creating generic scenarios, experimenting and developing the modelling process, the questionnaire and interview surveys were important steps in extracting further information. Further interpretation and analysis of these two types of data supported the development of a participative and integrated appraisal system that could improve multidisciplinary communication.

Table 1: Mega sport events – Identified variables

Impacts	Kinds of Impact
Socio-cultural	Regeneration, Education/Sports, Social Services, Cultural Exchange
Economic	Development, Employment, Investment, Budget Formation
Environmental	Energy/Waste, Noise/Visual, Air/Water, Landscape/Ecology
Psychological	Reputation, Pace of Life, Current Concerns, Sports Legacy
Tourism/Commercial	Facilities, Revenue, Tourism Legacy, Commercial Prospects
Transport	Natural Resources, Infrastructure, Access, Modes of Transport
Political	Policy Agenda, Strategic Plans, Propaganda, Decision-making

Combining outputs from the public opinion polls discussed here, questionnaires carried out for this study and supplemented by a series of interviews with the findings of a References review, it was possible to map out a soft systems model which illustrated the range of issues raised by these data sources (see Figures 4 and 5). These outline maps were developed into a series of more detailed models, which addressed different sectors contained within the overall model. Further, these models contained an indication of causal relationships suggested by the earlier data collection and analysis phases of this case study (see Figure 6).



### Conclusions

Unlike other aspects of daily life, sustainable development requires an understanding of complex processes that unfold over a long period of time. Integrated assessments must find techniques for incorporating distinct perceptions in a participative and communicative model structure that could lead to more understandable outcomes. If current knowledge and the real concerns of the public are not incorporated into the appraisal process, then just the experts' views on what the future directions are or should be are unlikely to produce high-quality sustainability profile indicators. SSM is not appropriate for all situations, but with the existing body of knowledge often being insufficient for construction of an accurate representation of real-world problems, soft systems modelling is likely to provide future possible advances in the context of integrated assessment tools.

Mega sport events are a little understood phenomenon. Given that the value of hosting mega sport events is not necessarily self-evident, the influence of public opinion becomes very important. Putting relationships together and supporting them with sound record files would enable stakeholders and decision-makers to appraise qualitatively the potential implications of different development pathways. SSM can raise questions like 'what are the implications?' or 'would it benefit?' rather than 'how much?'. Such a technique can shape the structure of the decision-making process since more proactive/practical approaches would be required before any decision is reached. Soft systems modelling, as an integrated appraisal system, can bring together multidisciplinary work, form the basis of discussion of the problem over a period of time, understand it, operationalise it and formulate appropriate strategies. In other words, it acts like a picture encapsulating the thoughts of all the involved/affected participants without the picture being blurred.

The whole notion of attaining sustainability is 'in the air' these days and many researchers are committed to its principles. This study was driven by its vision to examine the problem of complexity involved in real life situations, develop an understanding of their sustainability implications and create a setting that is accessible, understandable, maintainable and manageable. Perhaps sustainable development is an adventurous voyage to a never-reached destination, i.e. an ambiguous goal rather than a measurable target. New directions of development, institutional rearrangements, policy reform, and increased participation from a broad range of disciplines and strategic frameworks that recognise that one size does not fit all make this voyage even more challenging. One way of meeting this challenge is to transform the impact appraisal process, which in turn can improve multidisciplinary communication.

### References

1. Checkland, P., (1999), *Systems Thinking Systems Practice*, Wiley & Sons, Chichester, UK.
2. Cooper, I., (2002), *Delivering Sustainability Through ICTs: How Robust Are Virtual Research Teams?*, Draft paper presented to Building Sustainable Cities Conference, April 2002, Venice, Italy.
3. De Vaus, D., (2001), *Research Design in Social Research*, Sage, London, UK.
4. Demertzis, A., (2003), *Athens 2004 Olympic Games – Costs & The Environment The Prime Concerns Of The Greek Public*. In: Eleftheros Typos, (eds), *Greek Daily Political Newspaper*, 17 June 2003, Athens, Greece, 12 (in Greek).

5. Dodouras, S., (1999), *The Greek economy & the Athens 2004 Olympic Games: Examining the potential economic impact*, BSc (Hons) Economics 1999, Dissertation submitted to the Manchester Metropolitan University (MMU), Department of Economics, Manchester, UK.
6. Dodouras, S. and James, P., (2002), *The Sustainability Impacts of Mega Sport Events*, Abstracts Volume, Poster presented at the IAIA '02 Conference, The Hague, The Netherlands.
7. Dodouras, S. and James, P., (2004), *Examining The Sustainability Impacts Of Mega Sport Events: Fuzzy Mapping As A New Integrated Appraisal System*, Proceedings of the 4th International Conference of Postgraduate Research in the Built and Human Environment, April 2004, The University of Salford, Greater Manchester, UK, 97-108.
8. Eleftherotyia, (2003), *Public Opinion Poll With A Significance*, *Greek Daily Political Newspaper*, June 2003, Athens, Greece (in Greek).
9. Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P. and Trow, M., (1994), *The New Production Of Knowledge: The Dynamics Of Science & Research In Contemporary Societies*, Sage, London, UK.
10. Hauge, O. and Eriksen, L., (2002), *The Challenge Of Comparing Apples & Pears*, Paper presented at the IAIA '02 Conference, The Hague, The Netherlands.
11. Huss, W. and Horton, E., (1987), *Scenario Planning – What Style Should You Use?*, *Long Range Planning* 20 (4), 21-29.
12. Hylton, K., Bramhan, P., Jackson, D. and Nesti, M., (2001), *Sports Development: Policy, Process & practice*, Routledge, London, UK.
13. Jones, W. and Lang, J., (1980), *Sample Composition Bias & Response Bias In A Mail Survey: A Comparison Of Inducement Methods*, *Journal of Marketing Research* 17, 69-76.
14. Lakopoulos, G., (2001), *This Is Greece Of The (€) Euro*. In: TO VIMA, (eds), *Greek Weekly Political Newspaper*, 23 December 2001, Athens, Greece, A06-12 (in Greek).
15. Moffatt, I., Hanley, N. and Wilson, M., (2001), *Measuring & Modelling Sustainable Development*, The Parthenon Publishing Group, London, UK.
16. Porritt, J., (2002), *Moving Sustainable Development Centre Stage*, *Environment* 2002, MICG, London, UK, 06-08.
17. Schwartz, P., (1991), *The Art Of The Long View*, Doubleday, USA.
18. TA NEA, (1997), *Athens 2004 Olympic Games – Public Opinion Poll*, *Greek Daily Political Newspaper*, 24 September 1997, Athens, Greece, 07 (in Greek).
19. Yin, K., (1984), *Case Study Research Design & Methods*, Sage, London, UK.