



Strategic environmental assessment performance factors and their interaction: An empirical study in China



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ABSTRACT

Strategic Environmental Assessment (SEA) has been seen as a preventive and participatory environmental management tool designed to integrate environmental protection into the decision-making process. However, the debate about SEA performance and effectiveness has increased in recent decades. Two main challenges exist in relation to this issue. The first is identifying the key influencing factors that affect SEA effectiveness, and the second is analyzing the relationship between SEA and these influencing factors. In this study, influencing factors were investigated through questionnaire surveys in the Chinese context, and then a Structural Equation Model (SEM) was developed and tested to identify potential links and causal relationships among factors. The associations between the independent factors were divided into direct and indirect causal associations. The results indicate that the decision-making process and policy context directly affect SEA implementation, while information and data sharing, public participation, expertise and SEA institutions are indirectly related with SEA. The results also suggest that a lack of cooperation between different sectors is an obstacle to the implementation of SEA. These findings could potentially contribute to the future management and implementation of SEA or enhance existing knowledge of SEA. The results show that the proposed model has a degree of feasibility and applicability.

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1. Introduction

Strategic Environmental Assessment (SEA) is being promoted through laws in many parts of the world with the aim of integrating environmental considerations into the decision-making process and improving sustainable development. However, after several decades of international implementation, SEA currently faces increasing pressure from planners and decision makers regarding its value (Fischer, 1999; Stoeglehner et al., 2009; Partidario and Clark, 2000; Bina et al., 2011), and its effectiveness is being questioned (Sadler and Verheem, 1996; Retief, 2007; Fischer and Gazzola, 2006; Cashmore et al., 2008). Over the past decade, the study of SEA effectiveness has made remarkable progress because of the growing breadth and depth of studies and empirical cases. The effectiveness debate in relation to SEA has focused primarily on procedural issues, essentially good practice, as well as criteria or indicators. Evaluation of effectiveness is generally divided into two broad categories: outcome evaluation and process evaluation. Outcome evaluation assesses performance using a series of indicators such as

objectives and targets. Process evaluation evaluates processes relative to indices of best practice. Both outcome and process evaluation are important components of assessing SEA effectiveness. In 2002, the International Association for Impact Assessment (IAIA) formally adopted a set of performance criteria for the assessment of SEA (IAIA, 2002) to establish the characteristics of a “good quality SEA”. The performance criteria were described according to six categories: integrated; sustainability-led; focused; accountable; participative; and iterative. These six criteria mainly focused on SEA procedures, the achievement of SEA, and SEA cost–time effectiveness. After evaluating transport and spatial/land use policies, plans and programs (PPPs) based on the IAIA’s Performance Criteria, Fischer (2002a, 2002b) found that the Performance Criteria are not equally valid for every SEA. Additionally, Fischer and Gazzola (2006) argued that context criteria (institutional framework, cooperation and public participation) and methodological criteria should be distinguished when evaluating SEA effectiveness. Theophilou et al. (2010) applied substantive and transactive indicators to evaluate the SEA in EU operational programs. Bina et al. (2011) identified the need for a broader set of effectiveness criteria going beyond the substantive and procedural dimensions to also include the incremental dimension.

As for China, Planning Environmental Impact Assessment (PEIA, the most common form of SEA in China) has become a legal requirement

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and has been strongly promoted since the Law of the People's Republic of China on Environmental Impact Assessment (the EIA Law) became effective in 2003. After more than a decade of work, remarkable progress has been made on SEA implementation in terms of both theoretical study and practical application; however, as in many other countries, the system of SEA in China has begun to take shape with the emergence of practical and institutional constraints. Researchers and practitioners have devoted much attention to problems and challenges in the implementation of SEA in China. Most criticism revolves around such issues as the inadequacy of third-party participation, a lack of transparency in decision-making, inadequate consideration of alternative analyses, and a lack of high-quality baseline data in the SEA process, all of which have considerably affected the effectiveness of SEA implementation in China and have become the main concern related to China's SEA development in the international EIA literature (Zhu et al., 2005; Bao et al., 2004; Bina et al., 2011; Zhu and Ru, 2008; Wang et al., 2010; Tang et al., 2007).

To fully understand and ensure the implementation of SEA in China, improving effectiveness is crucial. This study investigates two concerns: (i) key issues and how they affect SEA implementation in China; (ii) the extent of influence and relevance of the issues associated with SEA effectiveness. This paper, based on a questionnaire survey, identifies seven potential key issues associated with SEA effectiveness. The Structure Equation Model (SEM) has been applied to identify the relevance and degree of influence of the factors associated with SEA effectiveness and the nature of these relationships. By analyzing the relevance of the factors in the SEM, this study attempts to create a better understanding of the influencing factors involved in SEA implementation. The aim is to identify important issues by identifying entry points for improving the implementation performance and effectiveness of SEA in China.

This paper is organized as follows: first, the research design and methods are explained, after which the influencing factors that affect SEA effectiveness are presented. Then, a SEM for SEA effectiveness index is proposed, and the SEA implementation factors and their relationship with SEA effectiveness are discussed. Finally, the limitations of this research are discussed, together with directions for future work on SEA.

2. Methodology

2.1. Questionnaire survey

To determine the potential influences on SEA implementation in China, this study conducted a questionnaire survey. The survey was organized and conducted by researchers from the Center for Strategic Environmental Assessment of Nankai University and the Center for Strategic Environmental Assessment in China of the Chinese University of Hong Kong. Factors were identified in the recent findings of the SEA effectiveness project (The project, entitled "The institutional hurdles of effective strategic environmental assessment practice in China", involved partners from China and Europe) and confirmed by literature review and consultation with experts. The questionnaire went through several reviews by SEA experts, who also piloted a draft questionnaire to ensure the questions were clear and unambiguous. A questionnaire comprising questions with pre-selected answers was used as the main research tool (Li, 2010). To ensure the scientific validity and accuracy of the survey results, semi-structured interviews with respondents were integrated with the questionnaire survey (Wang et al., 2012).

The survey was conducted in July 2013 among SEA researchers, planners, consultants, and government officials. The questionnaire was distributed via e-mail to 160 individuals who had experience with SEA, and 110 individuals completed the questionnaire for a response rate of 69% (comprising 13 individuals from government agencies, namely central and local authorities and environmental protection bureaus; 39 from environmental consultancies; 20 from

environmental research institutions; and 38 from universities, including a few who reflected on their role as consultants), as shown in Table 1.

Table 2 shows the questionnaire structure along with a detailed description of each issue. A list of influencing factors was developed that comprised seven indicators (SEA process and method, public participation, information and data, SEA consulting agency and department, decision-making institute, legislation and political context, and international experience) and 37 sub-indicators. The influencing factors were designed and integrated into a single comprehensive list drawing on numerous established international studies on SEA (Fischer, 2010; Wu et al., 2011; Therivel et al., 2009; Heinma and Pöder, 2010; Salvador et al., 2000). Respondents were asked about the importance of the indicators using a six-point scale (levels 1 to 6, from strongly disagree to strongly agree). The questionnaire attempted to balance comprehensiveness and feasibility, and the factors were simplified to reduce the possibility of misinterpretation.

2.2. Analytical methods

Two types of analytical methods were used to examine influencing factors and their associations. First, descriptive statistical analysis was used to provide a preliminary description of the SEA influencing factors. Then, SEM was applied to highlight the interactions and relevance between the factors associated with SEA effectiveness. Notably, SEM is subject to potential limitations. This study encompasses important factors that influence SEA implementation, and measurement of other factors could yield different results.

3. Results and discussion

3.1. Influencing factors that affect SEA

Table 3 presents the importance of various influencing factors and their classifications. The results show that generally, three indicators—information and data (5.39), decision-making process (5.32), and legislative and political context (5.28)—are most important to SEA implementation. Expertise and SEA institutions (5.08) and public participation (5.05) are of moderate and similar importance to SEA, followed closely by process and methods (5.01). The indicator considered of least importance is international experience (4.52). The standard deviations for the indicators indicate the dispersion of results in the samples.

Table 2 represents a more detailed breakdown of the figures. The main explanations are summarized as follows:

3.1.1. SEA process and methods

According to the indicator of process and methods, more than 76% of respondents argued that three aspects would result in an ineffective SEA process: "SEA is too late to take part in the decision-making process" (4.76), "lack of certain mechanisms in facing uncertainties" (4.59), and

Table 1
The basic circumstance of the samples.

		N (number)	(Percent) %
Sex	Male	58	52.7
	Female	52	47.3
Age	20–30	54	49.1
	30–40	31	28.2
	40–50	19	18.2
	Above 50	7	5.5
Education	Bachelor's degree	18	16.4
	Master's degree and above	92	83.6
Affiliation	Government authority	13	11.9
	EIA unit/private consultancy	39	35.5
	Environmental research organizations	20	18.2
	Colleges and universities	38	34.4
Total		110	100

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