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## An analysis of the Composition of the Intellectual Agents as Policy Driving Forces on the Environmental Impact Evaluation of Land Uses.

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An Analysis of the Composition of the Intellectual Agents as Policy Driving Forces on the  
Environmental Impact Evaluation of Land Uses

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keywords: land use change, environmental impact evaluation,  
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AN ANALYSIS OF THE COMPOSITION OF THE INTELLECTUAL AGENTS  
AS DRIVING FORCES ON ENVIRONMENTAL IMPACT EVALUATION  
FOR LAND USES

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Purpose of Study

A closely intertwining relationship exists between land uses and the environment. When land uses change for better or for worse, the environment changes accordingly, as land use is the most important factor affecting the environment (ASPO 1973). The wide spread environmental problems now exist around the world thus are a result of the uncontrolled urban land use expansion that follows a form of vicious cycle. (Fan, 1998) Good land use planning, on the other hand, will lead to better environment, through a benevolent cycle of land use change.

This benevolent cycle of land use change may be depicted in a scenario where the high quality land uses-- including very low density residential, parks and other open spaces; plus land resources such as well maintained agricultural land and forests. These high quality land uses are usually limited, and must be maintained through restrictions deriving from good planning.

These high quality land uses then function to conserve the premium part of the total land resources, through land use planning schemes that improve the quality of land uses by intelligent re-use, and by conservation of those land uses that already possess a high quality.

Such quality land uses then form a cohesive land use pattern judged suitable through integrated regional evaluation. The result of such evaluation would in turn provide assurances to the continued existence of these high quality land uses, and thus provide the essential means to support an ideal living environment.

The above description points out that there exists a circularity among changes of land uses that would be beneficial to the living environment, as illustrated in Figure 1. Such circularity is complex, as it would be comparable to the circularity which exists among elements of development and economic geography, as is vividly described by Krugman [1].

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**Figure 1.** A Conceptual Benevolent Cycle of Land Use Change

(to be inserted)

The circularity relationship in the conceptual benevolent cycle of land use change as depicted in Figure 1 has a significant side link, or short cut, for a group of unique environments that possess extraordinary quality. These include from scenic areas such as the Grand Canyon and man-made features such as the Great Wall, to the unique land resources such as Antarctica. These extraordinary environments require special protection measures, including land subsidies, to insure their remaining intact in the world's land use inventory.

As economic development brings increased choices in material well being, preservation and up-grading of environmental quality brings increased choices in the living environment—which has be generally deteriorating worldwide. Since both economic development and environmental quality bring progress [2], there should be no point to force a choice between the two.

Unfortunately, the above statement has not been true in many cases. In much of real life, communities, regions and countries seem often to have to make a choice between economic development and the gaining of environmental quality.

Part of this fault may rest on the academic community which has failed to provide a way by which a set of environmental preservation criteria can be achieved that is in harmony with economic development. Such criteria are a necessary part of regional integrated evaluation.

This study finds it is useful to help construct such a set of criteria by surveying and finding out how environmental impact evaluation is implemented, and who are behind the selection of criteria for changes of land uses and thus the environment. The following is the result of this study.

### Study Design

This study chooses the basin of the still relatively tranquil upper Dahan Stream, which is the main tributary of Tansui River that flows through Taipei metropolitan area, as its study area. A set of questionnaires is designed for experts and scholars relating to the field of environmental impact evaluation, environmental policy, and the study of evaluation systems.

Questionnaires of a closed type were used in fieldwork. These were grouped in two parts. The first part serves to survey the general opinion on environmental impact evaluation, including individual involvement in environmental evaluation, viewpoints on evaluation systems and processes proposed, the result of analysis, and things that need to be improved.

The second part of the questionnaires uses a point grade system to indicate concerning agents of the above said evaluation system, including public and private developers and agencies concerning evaluation, their influence, and an assessment of effects of implementation of the evaluation.

Survey samples are chosen from environment related academic institutions and departments, associations, and academic entities. The criteria of choice of individuals to receive the questionnaires include level of concern for environmental protection, research in related fields, and for those that have participated in actual environmental evaluation work.

The recipients of the questionnaires are mostly those individuals hold a position of college lecturer or higher, to resemble an expert survey. But a few questionnaires were sent to masters or doctoral students engaged in evaluation projects.

Among the 226 questionnaires sent out, 163 went to scholars in academic institutions. The rest went to environmental related governmental administrative personnel, heads of government, and civilian environmental protection associations. The latter included the Environmental Protection Administration of the R.O.C., the Economic Planning Council, the Water Resources Bureau, and the private Environmental Protection Union, etc.

Ninety-two of the total questionnaires mailed out was returned. Among the returned questionnaires, nine were either incomplete or inaccurate, rendering the effective questionnaires to 83 [3]. Information contained in the returned effective questionnaires was fed into computer applying an SPSS package for statistical analysis. In the case where the small samples do not provide sufficient numbers for analysis, approximation is applied to reveal the general situation of the event.

### Statistical Analysis

Based on an SPSS analysis of 83 effective returned questionnaires, a disproportional background concentration appeared to be in two professions--educators and researchers, and public administrators, with 49.4% and 32.5% respectively.

This result reduces the other five professional categories--researcher in public institution (4.8%), private consultant (6.0%), public administration and teaching (2.4%), public administration and research (2.4%), teaching and consulting (2.4%); all under six percent and become insignificant, which reflects a diluting effect crossing of two professions. (Table 1)

**Table 1.** Percentage of Professionals Surveyed, by Category

<b>Count</b>	<b>Category</b>	<b>Frequency</b>	<b>Value Percentage</b>	<b>Cumulative Percentage</b>
1	Teaching and Research	41	49.4	49.4
2	Public Administration	27	32.5	81.9
3	Public Institute Research	4	4.8	86.7
4	Private Consultant	5	6.0	92.8
5	Teaching & Pub. Adm.	2	2.4	95.2
6	Pub. Adm. & Research	2	2.4	97.6
7	Teaching & Consulting	2	2.4	100.0
	Total	83	100.0	100.0

Table 1 shows that public administration personnel are most responsive in returning the questionnaires, indicating that environmental protection agencies are indeed serious about environmental impact evaluation problems.

Relationship of the above distribution of professionals in ecological field are subsequently analysed. The result is shown in Table 2.

**Table 2.** Distribution of Professionals by Relationship to Ecological Concerns

	<b>Frequency</b>	<b>Value Percentage</b>	<b>Cumulative Percentage</b>
Directly related	27	32.5	32.5
Indirectly related	31	37.3	69.9
Indirectly loosely related	21	25.3	95.2
Unrelated	4	4.8	100.0
Total	83	100.0	100.0

Table 2 indicates that over 75% of those questioned are closely related with ecological field. Only a very small (4%) percentage questioned are unrelated to ecological concerned fields.

Further analysis shows that scholars, or those related with academic fields, are mostly related to the ecological field, while public agencies only have close contact with this concern, but unrelated to this field.

Thus the four major groups of environmental experts in Taiwan are, in descending order: 1) scholars directly related to ecological field, 2) government agencies in close contact with ecological concern, 3) scholars in close contact with ecological concern, and 4) scholars with loose contact with ecological concern. (Table 3)

**Table 3.** Professional Relationship with Ecological Concern

<b>Count</b>	<b>Group 1</b>	<b>Group 2</b>	<b>Group 3</b>	<b>Group 4</b>	<b>Row Total</b>
1	15	13	11	2	41
2	6	14	5	2	27
3	1	2	1	-	4
4	3	1	1	-	5
5	-	-	2	-	2
6	-	1	1	-	2
7	2	-	-	-	2
Column Total	27	31	21	4	83
% Total	32.5	37.3	25.3	4.8	100.0

The next analysis shows how experts involve in the environmental evaluation work, in a time sequence. According to the questionnaires, it can be seen that since

1976-1980 these experts started to get involved significantly in environmental evaluation. Most of them are scholars, comprising three quarters of all of those involved in evaluation.

During 1981-1985, the number of experts involved in environmental protection doubled. The fastest growing number were those of governmental agencies, comprising 37% of total number involved, while the scholars comprises 30% of the total. Up to the more recent five years (1986-1990) the proportions for scholars and governmental workers had become about equal, each comprises one-third of the total number involved in the protection of the environment. The rest were private consultants or related institutions such as social associations.

The above analysis indicates that scholars lead in those concerning environmental problems, about five years ahead of governmental workers. But the number of government workers, after realizing the importance of environmental protection, expanded much faster than that of the scholars.

This finding indicates that in the following five years (1991-1995) more new experts in environmental protection would concentrate in governmental agencies, while the academic community may have saturated with such personnel. (Table 4)

**Table 4.** Time Sequence of Experts involved in Environmental Protection

	<b>Frequency</b>	<b>Percentage</b>	<b>Value Percentage</b>	<b>Cumulative Percentage</b>
1966-1970	1	1.2	1.4	1.4
1971-1975	4	4.8	5.6	6.9
1976-1980	12	14.5	16.7	23.6
1981-1985	24	28.9	33.3	56.9
1986-1990	11	13.3	-	-
Total		62.7	-	88.8
Approximation		83.0	100.0	100.0

## Result of Study

### A. Conclusions:

- a. There is a time sequence for the development of environmental protection movement

From the analysis of the above questionnaires for those participated in environmental impact evaluation work, it shows that from 1966 to 1975 was the conception stage of environmental movement in Taiwan--mainly on campuses of universities. The broader civil movement emphasizing the environment came in the later



stage between 1981-1985. The catalyzing incidents, in order of importance, are the increase of the so called "self-salvation" activities [4] in the populace, the advocating by the experts and scholars, the broad exposure by the media, and the general public's realization of the need of environmental protection.

The above analysis indicates that scholars are among the earliest promoters of environmental protection, and that they also drew highest public esteem. But the real promoting force of public concern for the environment rests in the populous' realization of the deterioration of environmental quality.

When residents found their immediate living environment have become unbearable, they revolt in various forms of self-salvation. The prolific reporting of these kind of news in the media also raised the public concern, and eventually led to a broad front against the existing environmental situation.

By comparison, the government's role in tackling the environmental impact evaluation issue is small. Among the returned questionnaires, only twelve indicate that this result is caused by governmental action. Within the twelve, seven are government employees. The government is seen lagging behind the general public in environmental protection initiatives.

A turning point of environmental protection into a major movement, then, based on the questionnaires, is an anti-Du Pond self-salvation movement in Chang-Hua County in mid-Taiwan a decade ago. Though precedingly, the Executive Yuan [5] had made a decision to require an environmental impact statement for all major development projects.

b. The implementation of environmental impact evaluation lacks effect

The questionnaires also show that whether there is a determined mind in the public and private developers, and in their higher decision-making bodies, is more important than the opinion provided by the evaluation itself.

Seventy-four point two percent (74.2%) responses show that the developer has his mind made up before an environmental impact evaluation is done. Sixty point six percent (60.6%) show that evaluation has some importance in their decision-making process. While sixty point nine percent (60.9%) show that they have confidence on an evaluation.

This result indicates: i) Developers who contract out an environmental impact evaluation study have pre-determined opinion. They only accept the results of evaluation selectively. ii) The consultant who does the study often sub-contracts and divides the items to be evaluated by different academic and/or engineering institutions and their experts. These tend to use different evaluation standards, rendering the result of the study to be lack of integration, which also invites the mistrust of the developer.

Under the influence of pre-determined developer, the independence of environmental impact evaluation consultants becomes questionable. About 20%

responses grade their independence below 40 points in a 100-point scale. Another 12.2% give a below passing grade (50 points), while 22% show a passing grade. Generally speaking, the points these responses gain concentrate between 50 to 80, indicating a relatively positive allowance of independence for the consultants.

The analyses lead to a new question: What result is there in an environmental impact evaluation report that the developers are most concerned? The questionnaires show that economic benefit/cost ratio ranks first (45.8%).

Next comes engineering feasibility (37.3%). Among the less concerned is the environmental conservation problem (26.5%) as well as media pressure (21.7%). This fact indicates that economic evaluation will still be dominant in the future, and that all other evaluations might best try to render it comparable to this aspect.

In this regard, engineering evaluation is the easiest to be made comparable, while residents' reaction which involve social evaluation may be the most difficult to convert. Only 1.2% of the responses indicates the social evaluation has reached an ideal level, which shows there is a need for further research.

#### c. Effects of the fragmentation of environmental impact evaluation

Environmental impact evaluation has been performed in Taiwan for about twenty years. Still its surveying techniques vary. Among which the engineering-technical type of evaluation is the most widely used (56.3%). This result far out-ranks the physical environmental type of evaluation (20.5%), which then followed by types of economic development (15.5%), natural ecology (8.4%), and human-social evaluation (1.2%).

Ranking the degree of influence of environmental impact evaluation, on the other hand, gives a totally different picture. It puts physical environmental impact assessment at the highest (57.8%), with future economic benefit/cost ratio (28.0%) and social impact (27.7%) together run a distant second. This shows that physical environmental deterioration, including man-made and natural disasters, is the most noticeable, and may be also Taiwan's biggest environmental problem.

As the implementation of environmental impact evaluation traditionally has two objectives; to find the feasibility of economic development and to reduce the environmental impact of such development. Questionnaires show that experts and scholars deem that environmental impact evaluation's influence on developers as unsatisfactory (54.8%), which proves the previous assertion of developer's pre-determination.

Actual record also shows that no approved development project has been canceled because of an unfavorable environment impact evaluation. The longest single test of this fact may be a two-year-long staged protest against the building a fifth naphtha cracker-- a replacement of two obsolete petro-chemical plants in Kaohsiung City in southern Taiwan, which has since been completed.

The government's task on that incidence has all been that to persuade the protesters to accept the necessity to build the new plant. Obviously, environmental impact evaluation has no decisive role in that development. Its best effect would be to serve as a reference point in the concerning officials' mind.

Another effect of environmental impact evaluation is to reduce would-be hazards during construction stage of a development project. Here evaluation has an initial positive contribution, but it is given only a passing grade, with 66.5% responses. Such evaluation also plays a role in reducing degradation of the environment (63.7%). Though not ideal, these effects indicate a demand for future improvement of evaluation techniques.

## B. Recommendations

Some recommendations can be made following the above analysis of the questionnaires used in the study concerning land uses, when considering their driving forces primarily from the intellectual community. Information source for the environmental impact evaluation desired derived a final average score of 49 points, which is far below an accepting level.

This fact indicates that a workable environmental impact evaluation system that promotes intelligent formulation of land use policy cannot be found without an improved and integrated evaluation framework. Strengthening basic research in the formation of a value system is also needed.

As the existing environmental impact evaluation studies are parceled out and done by agencies and individuals with different disciplinary training and specialties, a lack of integration becomes a major problem for more fruitful implementation (42.2%). Responses indicate that only 46.4% of such evaluation showed some integration in its process. This fact is also deemed as a serious flaw in making environmental impact statements (45.8%). Another 30.1% of the returns give indication that variation in evaluation standard and criteria is a problem that needs to be taken seriously, supporting this point.

Responses from questionnaires also indicate that among the problems from existing environmental impact evaluation, a serious one being the conducting agencies' biased stand. Eighty-one point nine percent (81.9%) responses show a need to develop an evaluation system to integrate the conflicting environmental issues. This result suggests a need for a more open type of evaluation process (55.4%), including to find a way to re-evaluate the conflicting issues (48.2%), and selection of suitable and trustful institutions to conduct the evaluation (43.4%).

The analysis of the questionnaires further indicates that lacking of basic research concerning evaluation criteria is a major reason for the environmental impact evaluation problems (48.2%). This leads to the evaluation's lacking of convincing authority. Time

pressure for the evaluators to come up with a result within limited time thus poses problem, limiting them from elaborating needed deliberation, which further leads to the evaluation's lacking of authority (31.3%).

The above analysis indicates that the existing driving forces for changes of land uses have not reached a comparable rational and systematic level that merit the intellectual agents supposedly to provide guide [6] to human actors that produce them. The lack of common viewpoints among the evaluators (47.5 points) only emphasizes the notion that improvement of the existing evaluation process to incorporate an integrated evaluation method is needed.

## Notes

1. Paul Krugman, in his effort to develop tools compatible to the knowledge accumulated, as pronounced in his Ohlin Lectures of 1992, has found a circularity in the relationship between the division of labor and the extent of the market. That is, the division of labor is limited by the extent of the market, but the extent of the market is in turn affected by the division of labor. This means that regions may experience self-reinforcing agglomeration. In a beneficial way, the land use change circularity depicted in this paper would also induce self-reinforcing land uses and environmental quality improvement.
2. As it is difficult to measure real progress in absolute terms taking a worldwide and historical view, the author chooses the increase of choice by people as the indication of real progress. The progress of transportation means from horse-drawn carts to automobiles increased speed but also air pollution. However, people in the horse power age may not choose automobile, while people today may choose either or both--an increase of choice.
3. The rather low rate of return of the questionnaires may be attributed to the all too frequent exercise of polling--seems to be a fad in Taiwan. This practice tends to reduce the interest of those inquired. The significantly faster pace of modern life in recent years reduces free time available of the general public who respond to questionnaires.
4. The so-called "self-salvation" movement in the Republic of China indicates those civil protesting activities which do not follow the rule of law, either for lacking of an existing appropriate law or of respect for the law.
5. This is the official name for the cabinet of the government in Taiwan. The Du Pond plant was not built, unfortunate at least to the multinational company.
6. Intellectual guidance is a distinct Confucian tradition, and contemporarily referred to in China, Hong Kong, Taiwan, Inc., by Willem van Kemenade (1997) when reiterating a statement by Fang Lizhi, the internationally renounced astrophysicist and vice rector of Hefei University for the Sciences in Anhwei province, now out of China because being an independent conscience in the political reform movement signaling human rights, prior to the Tiananmen tragedy in 1989.

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