

YUNG-JAAN LEE AND RAYMOND DE YOUNG

INTRINSIC SATISFACTION DERIVED FROM
OFFICE RECYCLING BEHAVIOR:
A CASE STUDY IN TAIWAN

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ABSTRACT. Despite the fact that more and more researchers have devoted themselves to recycling studies in varied settings, virtually no research has been conducted to study the causal relationships between intrinsic satisfaction and individual recycling behavior in office settings. In addition, little research has tried to explore whether there is only one index of intrinsic satisfaction or several distinct indices. This paper examines the dimensionality of intrinsic satisfaction. It also explores the causal relationships between intrinsic satisfaction and office recycling behavior. Data from field surveys conducted in 32 different organizations in Taiwan were analyzed. The findings indicate that there are at least two distinct factors regarding intrinsic satisfaction — participation and frugality. These data suggest that intrinsic satisfaction can be derived from office recycling activities, not only being predictors of office recycling behavior.

INTRODUCTION

In encouraging environmentally responsible behavior, extrinsic motivations, especially economic incentives, have been shown to play a role (e.g., Geller *et al.*, 1982; Jacobs and Bailey, 1982–1983). However, some have suggested that they may only be effective temporarily (Katzev and Johnson, 1987) and, more seriously, they have been shown to undermine the exploration of alternative strategies (e.g., Stern and Gardner, 1981; McClelland and Canter, 1981). The most common means of encouraging conservation behavior include providing information (Gray, 1985; Weigel, 1983, 1985) and providing incentives (Cone and Hayes, 1980; Geller *et al.*, 1982). Both have proven to have limitations particularly when one is interested in durable behavior change (Burn and Oskamp, 1986; Katzev and Johnson, 1987; Stern, 1992; Stern and Gardner, 1981). It seems one cannot give people the right motives any more effectively than one can force awareness and interest in the issues. One researcher of conservation behavior has come right to the point (Katzev, 1989):

... Powerful external justifications, such as highly persuasive messages or large monetary incentives, will never lead to long lasting changes in recycling behavior because they do not foster the development of sufficiently strong internal mechanisms of control — mechanisms which would lead individuals to permanently value recycling and, thereby, continue to find it satisfying when these powerful justifications are no longer present.

This phenomenon suggests the need for consideration of other factors that can encourage environmentally responsible behavior.

The usefulness of looking beyond strong external forces for conservation motives has been suggested by numerous researchers. Reichel and Geller (1981) suggest that conservation behavior be expected and valued; “such norms may even be internalized by individuals so that conserving behaviors become intrinsically reinforced.” One such approach has been explored which involves a curiously simple concept. For many conservation behaviors, people do them because they enjoy doing them. They are sources of personal contentment. For instance, it has been found that recycling and reusing materials are related to intrinsic satisfaction from frugality and a sense of participation (De Young, 1986; Oskamp *et al.*, 1991). In another study, people reported deriving personal satisfaction from carefully using resources and avoiding waste (De Young, 1985–1986). In a different setting, it was found that personal satisfaction is associated with socially responsive professional behavior (Harrison, 1982).

All these findings suggest that intrinsic satisfaction can be derived from ordinary activities. However, no similar studies have been conducted in office settings, nor have any explored the causal relationships between intrinsic satisfaction and office recycling behavior. This paper investigates the dimensionality of intrinsic satisfaction, and, using a path analysis technique, examines the causal linkages among intrinsic satisfaction and office paper recycling and reusing.

METHODS

The Samples

The survey data presented here are from a 1991 study done in Taiwan focused on office recycling practices in the Taipei metropolitan area. In order to study Taiwanese office workers' intrinsic satisfaction and

recycling practices, a total of 32 organizations were identified, and within each, questionnaires were administered to office workers. In organizations employing fewer than 30 employees all workers were given questionnaires, whereas in organizations employing more than 30 employees only a sample were given questionnaires. A total of 2000 questionnaires were distributed and 1788 were collected, representing a response rate of 89.4%.

Of the 32 Taiwanese organizations, 15 organizations have recycling programs and 17 do not. Of the 15 organizations with recycling programs, 11 (73%) started their programs in 1991, indicating that office recycling is a relatively new activity in Taiwan. Selected demographic characteristics of the respondents are shown in Table I.

TABLE I
Demographic characteristics of respondents

Characteristics	Distribution
Gender	49.8% male, 50.2% female
Age	36% were under 30 years old, 42% in their 30s, 13% in their 40s, 6% in their 50s, 3% age 60 or over
Education	1% had not completed high school, 14% high school grads, 23% junior college grads, 45% had completed university, 17% had completed graduate school or more
Job	14% managerial, 27% professional, 3% researcher, 6% secretary, 41% clerk, 2% janitor, 7% temporary and other

The Survey

The survey instrument was divided into several sections, constructed to tap the extent to which office workers are committed to recycling behavior — in the office and at home — and to measure their intrinsic satisfaction with respect to recycling and conservation. The series of questions forming indices of intrinsic satisfaction were adapted from De Young (1986). The instrument was first written in English, and then translated into Chinese and printed on recycled paper.

The survey asked the respondents to self-report their recycling behavior. Recycling behavior questions were divided into office settings

and home settings and included items on paper recycling, paper source reduction, and encouraging co-workers to recycle. These items were 3-point scales ranging from *never* to *frequently*.

A series of 15 items were included in this study to assess intrinsic satisfaction. The respondents were presented with one general stem question that read as follows, "Please indicate how much satisfaction or enjoyment you get from the following activities," followed by 15 statements. All questions were scored on a five-point Likert scale, which had a lower tag of "strongly disagree" and a upper tag of "strongly agree."¹

RESULTS

Materials Recycled at Home and at Work

Household recycling behavior in the U.S. varies by the type of material under consideration. According to recycling researchers and practitioners, there is a sequence in the prevalence of materials being recycled at home with newspapers recycled most often followed by glass containers, metal cans, and then other materials (De Young, 1990). In order to determine whether this sequence exists and the magnitude of household recycling in Taiwan, office workers were asked about their recycling practices at home as well as at work.

As shown in Table II, household recycling is widely practiced in Taiwan, at least among the sample of office workers in Taipei. Four in 5 respondents said they recycled newspapers at home, whereas glass containers were recycled by nearly half (45%) of the Taiwan respondents, and a third indicated that they recycled aluminum cans. Reports of materials recycled in the Taiwanese household followed precisely the U.S. sequence noted above.

Household recycling is not new to the Taiwanese. The practice was widely encouraged following World War II when the government recognized that natural resources were in short supply and the country was economically underdeveloped. People saved and re-used their few consumer products for economic reasons. This was substantiated by the respondents who reported a relatively long history of household recycling (22% of respondents reported that they have been engaged in household recycling for over three years).

TABLE II
Percent of Taiwanese respondents who recycle at home and at work

Home Recycling*		Office Recycling†	
(n = 1788)		(n = 1788)	
Newspapers	82%	Computer/Office Paper	89%
Glass Containers	45%	Glass Containers	34%
Aluminum Cans	35%	Aluminum Cans	29%

* The question was "And how often do you do the following at home?" The three response categories were: regularly, occasionally, and never. Data reported here cover the regularly and occasionally responses.

† The question was "Here are some questions about recycling and the re-use of things found around offices. Please indicate how often do you do the following while at work." The three response categories were: regularly, occasionally, and never. Data reported here combine the regularly and occasionally responses.

Approximately the same sequencing of waste materials that are recycled at home are recycled at the office. As seen in Table II, about 9 in 10 office workers indicated that they recycled computer/office paper at work, a third said they recycled glass containers, while a somewhat smaller proportion (29%) recycled aluminum cans.

Intrinsic Satisfaction: One Index or Two Indices?

In order to explore the indices involved in intrinsic satisfaction, an exploratory principal component factor analysis with orthogonal varimax rotation was first conducted, using a minimum eigenvalue of 1.0 to determine the number of factors. Exploratory factor analysis usually reflects the fact that beyond the identifications of the items or measures and the number of factors to be analyzed, the researcher does not specify the structure of the relationships among the observed measures in the model (Long, 1983).

The analysis identified two coherent indices — satisfaction gained from frugality and participation — each described below. (See Table III, $\alpha = 0.82$ and 0.81 , respectively.)² Frugality is a theme closely tied to survival on a finite and vulnerable world. Survival, now more than ever, requires the prudent use of remaining resources. Without thoughtful and cautious consumption many options for maintaining our prosperity will vanish. The necessity of being frugal is at the core of a thriving society. While such a value is needed more urgently now than

ever, it need not be adopted solely for its utilitarian nature. It is indeed fortunate that frugality is perceived by the respondents as a coherent dimension and that, based on their endorsement of the category, they derive a sense of personal satisfaction from frugal actions.

Respondents also reported deriving personal satisfaction from direct involvement in purposeful activities. This is consistent with the suggestion of Ellis and Gaskell (as reported in Stern and Gardner, 1981) who propose that a motive for conservative behavior may come from so intangible a factor as the desire to be an active participant. This aspect of intrinsic satisfaction is also compatible with a view of humans as adaptive, information-generating and information-utilizing creatures (Kaplan and Kaplan, 1982, 1989). As Cantril (1966) points out, people want to directly experience a sense of their own worth, they want to know that they are making a difference. And there is ample reason to believe that this sense of being needed, of having a change to make a difference, is a necessary not optional part of our existence (Kaplan, 1990). These findings support the conclusion from a curbside recycling study (De Young, 1985—1986) that there are distinct intrinsic satisfaction indices.

Table III also shows the indices identified in the behavioral items. This table shows that, both at work and at home, there were two separate behavior indices. For office behavior, there were two indices: recycling in general and paper source reduction ($\alpha = 0.77$ and 0.69 , respectively). For household behavior, the two indices were household recycling in general and household paper recycling ($\alpha = 0.87$ and 0.70 , respectively). These findings tend to support the conclusion from a recent curbside recycling study that there are no general factors of environmentally responsible behaviors (Oskamp *et al.*, 1991).

In order to confirm the notion that there are two distinct intrinsic satisfaction indices, a confirmatory factor analysis, using the LISREL program (Linear Structural Relationships — LISREL VI, Joreskog and Sorbom, 1986), was conducted. In confirmatory factor analysis, one imposes significant constraints on the solution including the number of factors and which measures will be allowed to load on which factors. The analysis program then identifies the best available loadings. Statistical tests are performed to determine the appropriateness of the

TABLE III
Indices in intrinsic satisfaction and recycling behavior

Index name and items included	Mean [†]	Std. Dev.	Alpha (α)
Frugality (Intrinsic Satisfaction)* Consuming a minimum amount of resources Finding ways to avoid creating waste Keeping things working long past their normal life Repairing rather than throwing things away	4.11	0.53	0.82
Participation (Intrinsic Satisfaction)* Helping to make sense out of the world Fitting into our place in the natural scheme of things Taking actions which can change the world	4.21	0.60	0.81
Office Recycling in General** Recycle newspapers Recycle glass bottles Recycle aluminum soft drink cans Recycle PET bottles	1.60	0.53	0.77
Office Paper Source Reduction** Use the unused side of paper for notes, messages, and copies Make double-sided copies on the copying machine Recycle office memos, computer printout, etc.	2.40	0.49	0.69
Household Recycling in General*** Recycle aluminum soft drink cans Recycle glass bottles/cans Recycle PET bottles	1.55	0.62	0.87
Household Paper Recycling*** Use the unused side of paper for notes and messages Recycle newspaper Recycle paper/paperboard	2.36	0.57	0.70

* The stem question read, "Please indicate how much satisfaction or enjoyment you get from the following activities." A five-point Likert scale was used with higher means denoting higher endorsement for the category.

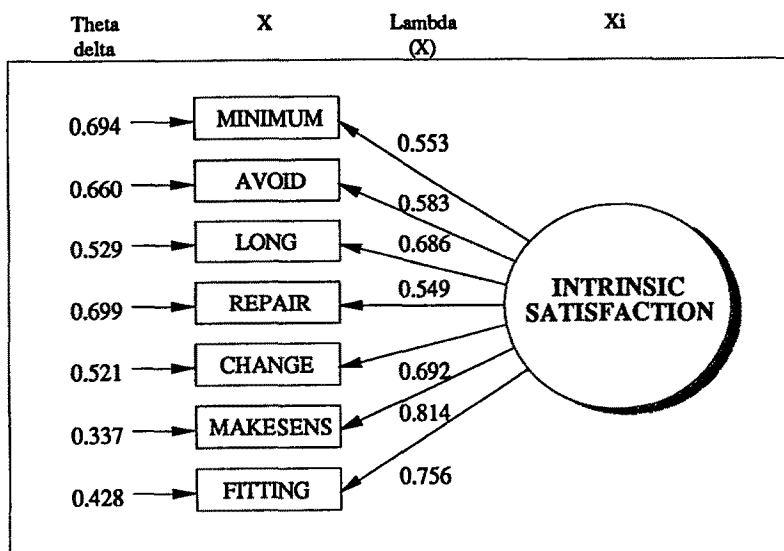
** For office recycling, the stem question read, "Here are some questions about recycling and the re-use of things found around offices. Please indicate how often you do the following while at work." A 3-point scale was used ranging from regularly to never.

*** For home recycling, the stem question read, "And how often do you do the following at home?" A 3-point scale was used ranging from regularly to never.

[†] According to Pairwise T-Test, the two means for Intrinsic Satisfaction (4.11 and 4.21) are significantly different at the probability level of 0.001. For Recycling Behavior, the two pairs of means (1.60 and 2.40 for office recycling; 1.55 and 2.36 for household recycling) are significantly different at the probability level of 0.001.

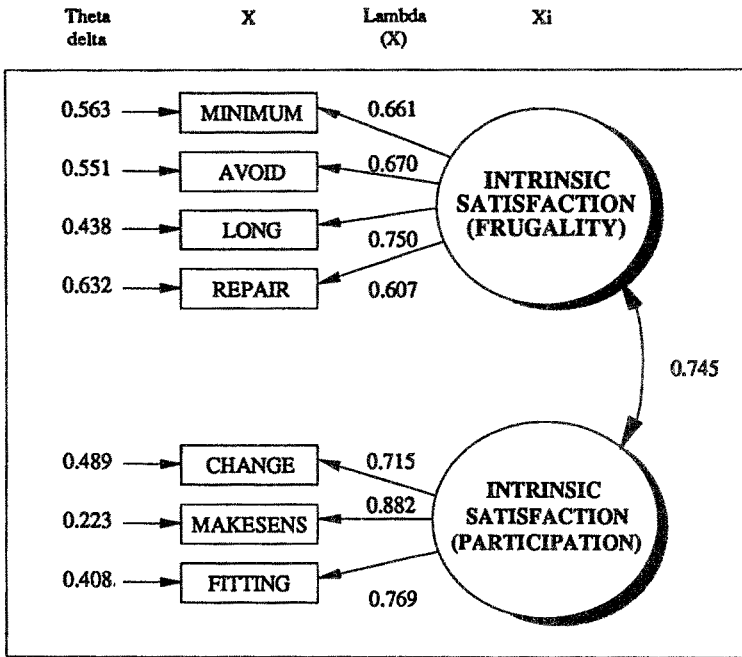
researcher's model, in terms of reproducing the observed relationships between the measures. The results from two LISREL analyses are presented in Figure 1 and Figure 2. These two analyses differ on the number of factors the program was told to solve for. The result shown in Figure 1 assumes there was only one intrinsic satisfaction index, whereas Figure 2, assumes there were two distinct indices — intrinsic satisfaction from frugality and participation.

There are several criteria one can choose from to evaluate the fit of the LISREL model. No single statistic can provide a definite answer for deciding whether one model is better than the other one. Nonetheless, when reporting the LISREL results concerning the fit of a model, one should at least present the following measures: (a) chi-square value, (b) degree of freedom, and (c) adjusted goodness-of-fit index (AGFI) (Raykov *et al.*, 1991). One should also list the Critical Number (CN) value (Hoelter, 1983) and root-mean-square residual (RMSR). The results of these measures are presented at the bottom of both Figure 1 and Figure 2.



FFT: $df = 14$ $X^2 = 667.16$ $X^2/df = 47.654$ $CN = 64$ $AGFI = 0.784$ $RMSR = 0.072$

Fig. 1. Confirmatory factor analysis of intrinsic satisfaction: One index.



FIT: $df = 13$ $X^2 = 239.97$ $X^2/df = 18.46$ $CN = 165$ $AGFI = 0.927$ $RMSR = 0.041$

Fig. 2. Confirmatory factor analysis of intrinsic satisfaction: Two indices.

Plausible models are usually associated with chi-square values that are low for a given degree of freedom, with high descriptive AGFI, as well as a low RMSR and a CN greater than 200 times the number of groups (in this case, CN has to be greater than 200, since there is only one group). According to these criteria, the model in Figure 2 is a more plausible model than that in Figure 1. That is, the explanatory power of two intrinsic satisfaction indices is better than one intrinsic satisfaction index.

In addition, the values of Lambda(x) (factor loadings) are higher and the values of Theta delta (measurement errors) are lower in Figure 2 than those in Figure 1, which also suggests that the model with two separate indices is better than that constrained to one index.³ All these findings confirm the notion that these data form two distinct indices of intrinsic satisfaction.

Causal Linkages between Intrinsic Satisfaction and Office Recycling Behavior

While previous studies have found that there are significant relationships between intrinsic satisfaction and recycling behavior, no studies have explored the *causal* linkages between intrinsic satisfaction and office recycling behaviors. In order to test the hypothesis that intrinsic satisfaction can be derived from conservation behavior, not only being predictors of the behavior, two path analyses were conducted, using multiple regression models (Figure 3 and Figure 4). Figure 3 shows the result of path analysis, using intrinsic satisfaction as a predictor of office recycling behavior. In Figure 4, intrinsic satisfaction is assumed to be derived from office recycling behavior.

The path coefficients in path analysis tell one how strong the direct effects are in the model. In Figure 3, the path coefficient from frugality to office recycling is 0.128 and 0.086 from participation to office recycling. In Figure 4, the path coefficient from office recycling to

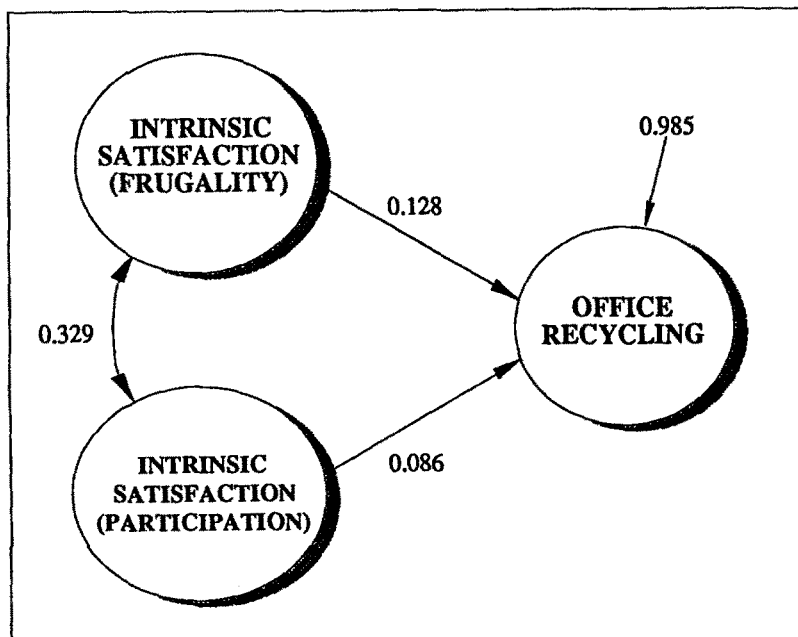


Fig. 3. Causal linkages: Intrinsic satisfaction as predictors.

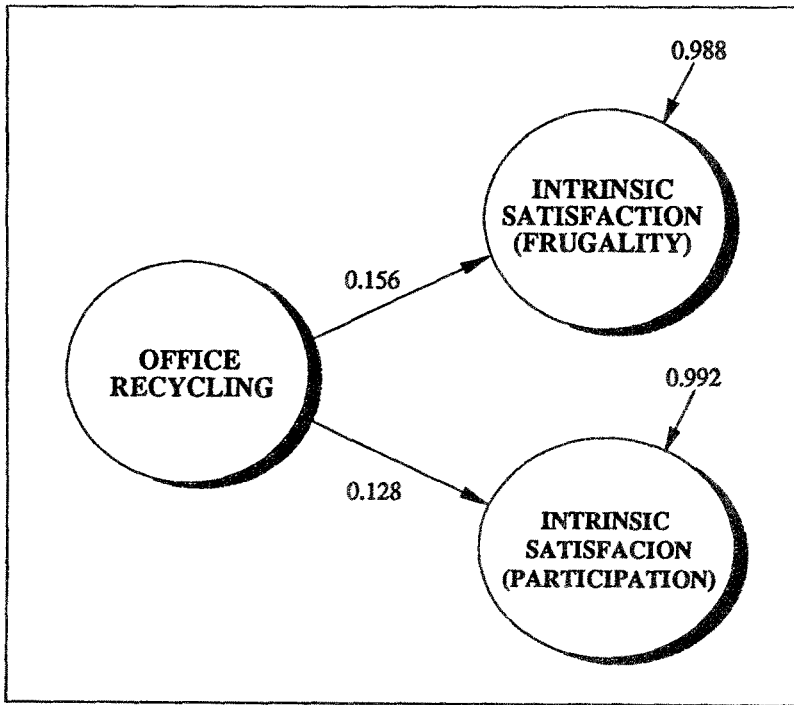


Fig. 4. Causal linkages: Intrinsic satisfaction as outcome variables.

frugality is 0.156, and 0.128 from office recycling to participation. The path coefficients in Figure 4 are higher than those in Figure 3, which is consistent with the notion that intrinsic satisfaction be treated as outcome variables. The unexplained variance in both models are very high: 0.985 for Office Recycling in Figure 3; 0.988 for Intrinsic Satisfaction from Frugality and 0.992 for Intrinsic Satisfaction from Participation.

DISCUSSION

The demonstrated interrelationship between intrinsic satisfaction and office recycling behavior offers exciting possibilities. It appears that these aspects of conservation behavior not only exist, but are valued by the respondents as well. Conservation behavior can be argued as vital to an individual's continued thriving on a finite and fragile planet. It is

thus essential that an individual not only be competent at carrying out conservation behavior, but to also find them pleasurable to do (Midgley, 1978). These behaviors ought to be, in other words, intrinsically satisfying. Individuals who did *not* find them so would presumably devote less effort to them and hence be less effective. In this sense patterns of satisfaction measured by Frugality and Participation impart an adaptive advantage to the individuals who possess them.

It is also important to distinguish intrinsic satisfactions from measures of environmental attitudes. The satisfaction constructs presented here go beyond being solely attitudinal in nature. Certainly satisfactions, like attitudes, are evaluative in nature, involving an affective reaction to some target behavior. However, satisfactions also include a motivational component. Respondents are not just indicating whether they think a particular behavior is a good idea. They report deriving a personal pleasure or enjoyment from carrying out office recycling behavior. Thus these satisfactions are likely measures of the respondent's intrinsic motive to conserve in the office setting.

These results are also consistent with previous research on intrinsic satisfactions. It appears both Taiwanese office workers and American homeowners are able to derive internal satisfaction from the very behaviors that we so often try to externally motivate. These findings also begin to suggest that intrinsic satisfaction may be a universal construct able to be applied to different settings and different groups of people. Future research should certainly explore this exciting possibility.

In this study, only the interrelationship between intrinsic satisfaction and office recycling behavior was investigated. This may explain why the unexplained variance are high in both path analyses. Since intrinsic satisfaction can be derived from many daily conservation activities, not just office recycling, subsequent research should investigate whether the unexplained variance can be reduced by including many conservation behaviors in the path analysis.

The use of measures of intrinsic satisfaction to better understand conservation behavior remains promising. As this understanding expands, it may turn out that promoting conservation behavior does not require "giving" people the right reward schedule but instead connecting motives they already have to the appropriate behaviors. Making this

connection between intrinsic motives and conservation is best viewed as a process of self-discovery — a process one might enhance but not force. People may need not so much to be told what to do as to be reminded.

NOTES

- ¹ A copy of the survey instrument is available by writing the author at:
Raymond De Young
School of Natural Resources and Environment
University of Michigan
Ann Arbor, MI 48109-1115, U.S.A.
- ² Alpha is a coefficient of reliability which measures the reliability of a test, or category of items, in the sense of its internal consistency.
- ³ The number 0.745 in the double-headed arrow in Figure 2 is a correlation coefficient. Since this coefficient is the result of a confirmatory factor analysis, it is different from that in Figure 3 (0.329), which is the result of a path analysis.

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YUNG-JAAN LEE

*Department of Land Economics,
National Cheng-Chi University,
Taipei 116,
Taiwan*

RAYMOND DE YOUNG

*School of Natural Resources and Environment,
University of Michigan,
Ann Arbor, Michigan 48109-1115,
U.S.A.*