

FACTORS INFLUENCING INDIVIDUAL RECYCLING BEHAVIOR IN OFFICE SETTINGS

A Study of Office Workers in Taiwan

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ABSTRACT: This study explores office recycling behavior and its antecedents through a survey administered to 1,788 workers in Taipei, Taiwan. The instrument measured household and office recycling behavior, commitment to and motives for recycling, and the convenience of carrying out recycling in their office settings. Prior experience was shown to be an excellent predictor of office-based conservation behavior. However, to be effective, prior experience must be of the same specificity as the office behavior being predicted. Thus prior experience with general household recycling was effective at predicting general office recycling behavior, but was unable to predict more specific recycling behavior. Likewise, prior experience with a particular material—in this instance paper—predicted office conservation behavior with respect to that material alone. Organizational commitment and individual commitment were found to be modest predictors of office-based conservation behavior, although economic motivation was not found to be a particularly effective predictor of such behavior. Implications for office-based recycling programs are discussed.

It has been suggested that industrialization—the current mode of development in the world—involves an increased consumption of paper and paper products with a concurrent increase in the fraction of the waste stream comprising these items. There

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is also a conceptual link between increased industrial development and deforestation in less developed countries. A recent study has documented just such effects in the rapidly growing Taiwan economy (Lee, 1992).

Businesses have an essential role to play in promoting recycling and source reduction. The commercial and industrial settings account for a significant percentage of total resource consumption (Stern, 1992). The commercial sector alone generates approximately 40% of the United States' municipal solid waste (League of Women Voters, 1993), and businesses are major consumers of paper and paperboard products. Fortunately, in many parts of the developed and developing world, office recycling in general, and paper recycling in particular, are becoming commonplace activities (see, e.g., International Facilities Management Association, 1990).

This article examines the recycling behavior of individuals in office settings in the capital city of Taipei, Taiwan. Specifically, the article investigates the relationships among a number of variables, including recycling in the office and at home, individual and organizational commitment to recycling, economic motivation to recycle, and intrinsic satisfaction. The role of convenience in promoting recycling at the office also is explored.

BACKGROUND

Support has grown for the notion that conservation behavior is likely to be overdetermined (having multiple antecedents) and that specific conservation behaviors may have distinctly different antecedents (Cook & Berrenberg, 1981; Oskamp et al., 1991). This article reports on several independent antecedent variables identified in previous research on conservation behavior in general and recycling in particular.

EXPERIENCE WITH RECYCLING BEHAVIOR

Since research on recycling began in the mid-1970s, it has documented increasing amounts of waste materials being re-

cycled at home. Much of this experience has involved the recycling of common household materials, including newspapers and glass and metal containers. Macey and Brown (1983) report that for conservation behavior that is highly repetitive (such as recycling newspapers and food containers) adoption is best predicted by past experience with that behavior. In this article, we extend this association and explore whether past experience with recycling in one setting will be a predictor of recycling in another setting. We predict that respondents who actively engage in recycling at home are more likely to actively recycle at work than their co-workers who do little home recycling.

COMMITMENT TO RECYCLING

It has been suggested that conservation behavior may be modeled as a form of altruistic behavior guided by social and personal norms. This approach to studying conservation behavior is based on the norm-activation model developed by Schwartz (1977; Stern, Dietz, & Black, 1985-1986; Stern, Dietz, & Kalof, 1993). Under this model, one's behavior is motivated by a commitment to the well-being of others. Such an approach has proven useful in studying a number of environmentally responsible behaviors, including recycling (Hopper & Nielsen, 1991; Oskamp et al., 1991; Vining & Ebreo, 1992). In this article, it is hypothesized that organizational commitment to recycling (the social norm) would influence individual commitment to recycling (one's personal norm) and that both forms of commitment would have a positive influence on recycling behavior in office settings.

ECONOMIC MOTIVATION TO RECYCLE

There has been extensive research on the use of monetary incentives as reinforcers of recycling behavior. No clear consensus has emerged on the durability of this technique. Monetary reinforcers generally are reliable at initiating conservation behavior (see Geller, Winett, & Everett, 1982), although there

have been some findings to the contrary reported by McClelland and Canter (1981). Some researchers have noted that although monetary incentives are able to initiate conservation behavior, they seem unable to produce durable behavior change; conservation behavior returns to baseline levels after the reinforcement is terminated (Dwyer, Leeming, Cobern, Porter, & Jackson, 1993; Katzev & Johnson, 1987). The cost-effectiveness of such a technique also has been challenged (Jacobs & Bailey, 1982-1983; Jacobs, Bailey, & Crews, 1984) and a few studies have reported no correlation whatsoever between economic orientation and conservation behavior (Hines, Hungerford, & Tomera, 1986-1987). This is an admittedly complex issue—one that is becoming an important topic in the field of conservation behavior. One part of the issue is the degree to which one's economic orientation is associated with one's adoption of conservation behavior. We hypothesize that the extent of an individual's economic motivation to recycle will have no significant bearing on his or her office recycling behavior.

INTRINSIC SATISFACTION

Granzin and Olsen (1991) have documented a wide range of noneconomic motivational predictors of conservation behavior. Included in this approach to explaining the reasons people have for pursuing conservation behavior is a concern for the preservation of natural resources (Vining & Ebreo, 1990; Vining, Linn, & Burdge, 1992). However, also included is the notion that many common everyday activities provide a sense of direct personal fulfillment and satisfaction. People derive noncontingent enjoyment in carrying out many ordinary repetitive behaviors, including, it seems, some that involve resource conservation (De Young, 1985-1986, 1986; De Young & Kaplan, 1985-1986). The larger issue here is whether Bandura's (1986) idea on the self-regulation of behavior might be applied to everyday conservation behavior. The research reported here investigates whether intrinsic satisfaction is derived from recycling behavior. We hypothesize that respondents who actively recycle will

derive a greater sense of personal satisfaction than their co-workers who recycle far less.

CONVENIENCE

An organization must provide the essential infrastructure of a recycling program (e.g., storage, collection, transport) before such behavior can become commonplace, but beyond the bare essentials, an organization can encourage a high level of participation by the careful design and management of its physical setting (Marans, Lee, Guagnano, & De Young, 1992; Marans & Lee, 1993). The issue here is one of convenience: How easy is it to carry out a repetitive behavior given a particular office layout? Vining and Ebreo (1990) report that nonrecyclers are more likely than recyclers to perceive recycling as inconvenient. De Young (1988-1989) found that those respondents who found the handling of recyclables to be inconvenient were also less likely to recycle. This article explores whether the layout of the office recycling system can facilitate or impede the recycling of office waste products. We predict that the convenience of recycling in an office will have a modest but positive impact on recycling behavior.

METHOD

The data for this article come from a survey of organizations and office workers in Taipei, the capital of Taiwan. The survey instrument was first written in English and was pretested in the United States.¹ Before translating the instrument into Chinese, a visit was made to Taipei to conduct site visits and informal interviews. During the site visits, interviews were conducted with office workers, staff members, opinion leaders (e.g., the Consumers' Association), and government officers (e.g., Taiwan Environmental Protection Administration) regarding office recycling practices and the format of the survey instrument. Based on these site visits and interviews, slight revisions were made to the survey instrument. The final instrument was eight

pages long, with an introductory letter, ensuring that all individual responses would be kept strictly confidential.²

SAMPLE

This article is a part of a larger study of the influence of organizational context on individual conservation behavior and, in particular, the role of sponsored recycling programs (Lee, 1992). As part of the larger study, 10 different types of organizations were identified (see Table 1). Organizations differed in their designation as governmental or nongovernmental organizations, as well as whether they currently sponsored a recycling program. Each site was further categorized based on whether its activities were primarily related to the environment. The nongovernmental category also identified local versus multinational organizations.

A total of 32 organizations in the Taipei metropolitan area were selected; within each, survey instruments were administered to their employees.³ Of the 32 Taiwanese organizations, 15 have recycling programs in place. Of the 15 organizations with recycling programs, 11 (73%) started their programs in 1991, suggesting that office recycling is a relatively new activity in Taiwan. In organizations employing fewer than 30 people, all employees were given survey instruments. For those employing 30 or more people, a probability sample of workers was surveyed. A total of 1,788 survey instruments were returned, representing a response rate of 89.4%.⁴

THE SURVEY INSTRUMENT

The survey instrument was divided into several sections; each section was constructed to tap the extent to which organizations and officer workers are committed to recycling, to measure respondents' motives with respect to recycling behavior, satisfaction they derive from acting in frugal ways, and the degree to which the office layout makes recycling easy. The survey asked the respondents to self-report their household and office-based recycling behavior. The recycling questions

TABLE 1
Number of Sampled Offices and Office Workers

<i>Site Categorization</i>	<i>Sites With Recycling Programs</i>	<i>Sites Without Recycling Programs</i>	<i>Subtotal</i>
Government			
Environmentally related	4/214	3/132	7/346
Other	2/91	4/251	6/342
Nongovernment			
Multinational	4/422	3/145	7/567
Local			
Environmentally related	2/149	4/129	6/278
Other	3/77	3/178	6/255
Subtotal	15/953	17/835	32/1788

NOTE: Values shown are number of offices/number of office workers surveyed.

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*.

In attempts to assess the respondents' general commitment for recycling, the office workers were asked to indicate to what extent they agree or disagree with a series of eight items concerning such things as the effort people should take toward recycling at work, whether recycling should become an essential way of life, whether more information about recycling should be made available at work, and whether there was too little concern about the environment among one's co-workers. All of these items were scored on a 5-point Likert-type scale, ranging from *strongly agree* to *strongly disagree*.

A series of items were included to assess recycling motives. Respondents were asked to rate whether they would need a monetary incentive before they would recycle, whether they feel that recycling benefits only people in the recycling business, whether recycling is a trivial activity, and whether office recycling is worthwhile only if they were paid to do so. All of these items were scored on a 5-point Likert-type scale, ranging from *strongly agree* to *strongly disagree*.

The survey instrument also included two items that related to the convenience of recycling in the office. The respondents were asked to indicate whether they agree or disagree with the

following statements using a 5-point Likert-type scale: "The arrangement of my workplace makes it easy for me to recycle" and "It is convenient for me to recycle at work."

Finally, a series of items measuring intrinsic satisfaction from frugality were adapted from De Young (1986). Demographic characteristics, such as gender, age, education, job description, and years of work, also were obtained.

DATA ANALYSIS

After a series of descriptive and bivariate analyses, the respondents' data were analyzed in two stages. First, the respondents' answers to the survey instrument items were analyzed with a metric factor analysis program (using orthogonal varimax rotation and minimum eigenvalues of 1.0). Then the identified categories were analyzed using LISREL, the structural equation model. LISREL is a general computer program for estimating the unknown coefficients in a set of linear structural equations. In its most general form, the model assumes that there is a causal structure among a set of latent variables (Jöreskog & Sörbom, 1986). Structural equation models with latent variables have proven useful in measuring and testing hypothesized causal structures among variables in the behavioral sciences (Anderson, 1987; Bagozzi & Yi, 1988; Jöreskog & Sörbom, 1986). Structural equation models allow assessment of the goodness of fit of a model to data, as specified by the degree to which the correlation (or covariance) matrix of measurement variables reproduced by the model differs from its input matrix. Use of latent variables in structural equation models allows estimation of relationships among theoretically important constructs that can avoid the effects of measurement unreliability (Raykov, Tomer, & Nesselroade, 1991). When appropriately and carefully used, this methodology has potential for theory development, construct validation, and theory testing (Anderson, 1987; Anderson & Gerbing, 1988; Bentler, 1978). This program was used to test the specific hypotheses outlined above by examining the causal linkages among predictor variables and office recycling behavior.

RESULTS AND DISCUSSION

PRIOR EXPERIENCE WITH RECYCLING

Household recycling in the United States varies by the type of material being considered. According to practitioners, there is a sequence to the prevalence of materials being recycled at home with newspapers recycled most often, followed by glass containers, metal cans, and then other materials. 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 2, household recycling is widely practiced in Taiwan, at least among the sample of office workers in Taipei. Of five respondents, four said they recycled newspapers at home, 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 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 recycled and reused their few consumer products for economic reasons; there were modest financial incentives for recycling and new products were prohibitively expensive. This was substantiated by our respondents who reported a long history of household recycling.

The respondents also report approximately the same sequence of waste materials are being recycled at the office as at home. As seen in Table 2, about 9 in 10 office workers indicated that they recycled computer and office paper at work, a third said they recycled glass containers, and a somewhat smaller proportion (29%) recycled aluminum cans.

To examine the prediction that prior household recycling experience will lead to greater office recycling behavior, indexes were developed reflecting the degree to which people in the sample engaged in both household and office-based recycling

TABLE 2
Percentage of Taiwanese Respondents Who Recycle at Home and at Work

<i>Household Recycling^a</i>		<i>Office Recycling^b</i>	
Newspapers	82	Computer/office paper	89
Glass containers	45	Glass containers	34
Aluminum cans	35	Aluminum cans	29

a. The question was worded: "How often do you do the following at *home*?" The three response categories were "regularly," "occasionally," and "never." Data reported here include those who indicated the regularly and occasionally categories ($N = 1,788$).

b. The question was worded: "Here are some questions about recycling and the reuse 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 response categories ($N = 1,788$).

behavior. The respondents answered eight questions about recycling and reuse of different office materials. There are three responses possible for each question: "regularly," "occasionally," and "never." If respondents answered "regularly," then they were assigned a score of 2; if respondents answered "occasionally," they were assigned 1; and if they answered "never," they were assigned 0. Using the respondents' answers to the eight questions, an office recycling behavior index was created with individual scores ranging from 0 to 16. Similarly, a home recycling behavior index was created using the same procedure. Based on the distribution of index scores for office and home recycling, respondents were grouped into three categories to characterize their household and office recycling practices. These were frequent recyclers, occasional recyclers, and infrequent recyclers.

As shown in Table 3, about one in six respondents (16.3%) in Taiwan were classified as frequent recyclers at work, two thirds recycled occasionally, and nearly one in five were classified as infrequent recyclers. In the household setting, two thirds (64%) were classified as frequent recyclers, about one quarter were occasional recyclers, and less than 1 in 10 were classified as infrequent recyclers. These data suggest that the Taiwanese office worker is more actively involved in recycling at home than at his or her place of work.

TABLE 3
Office and Household Recycling in Taiwan (In percentages)

	<i>Frequent Recyclers</i>	<i>Occasional Recyclers</i>	<i>Infrequent Recyclers</i>
Office recycling behavior	16.3	66.2	17.5
Household recycling behavior	64.0	26.9	9.1

NOTE: N = 1, 754.

To test the prediction that those who were frequent recyclers at home would recycle more at work, analyses were performed with household recycling behavior as the independent variable (categorical data) and reported scores on office recycling behavior as the dependent variable (ordinal data).⁵ There is a significant relationship between home recycling and recycling at work among Taiwanese office workers ($F = 387.8$, $df = 2, 1751$, $p < .0001$). Those who actively engage in recycling at home are more likely to actively recycle at work than are their co-workers who do little home recycling.

PREDICTING OFFICE RECYCLING BEHAVIOR

Dimensional Analysis

Table 4 shows the categories derived from the factor analysis of the respondents' answers to the conservation behavior items. These data suggest that both in the household and at the office there are two separate categories of conservation behavior. For the household, the two categories dealt with recycling in general and paper recycling ($\alpha = 0.87$ and 0.70 , respectively).⁶ For the office setting, one category covers recycling in general and the other covering paper source reduction ($\alpha = 0.77$ and 0.69 , respectively). These findings support the conclusion from a recent curbside recycling study that environmentally appropriate behavior is multidimensional (Oskamp et al., 1991). The respondents do not report a single generic construct for recycling behavior; instead, they organize this behavior into categories based on the materials involved and the location of the behavior.

TABLE 4
Categories of Conservation Behavior^a

<i>Category Name and Items Included</i>	<i>Mean</i>	<i>SD</i>	<i>α</i>
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
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, and so on	2.40	0.49	0.69

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

In the same manner, factor analyses were performed on items measuring commitment, economic motivation, intrinsic satisfaction, and convenience of recycling. The eight attitudinal items were found to form two categories: organizational commitment and individual commitment ($\alpha = 0.62$ and 0.84 , respectively). The data for the organizational commitment category were reversed so that higher scores reflect higher levels of commitment. The four items related to motives were found to constitute a single category: economic motivation ($\alpha = 0.78$). The four items about intrinsic satisfaction were found to form one category: intrinsic satisfaction from frugality ($\alpha = 0.82$). Two questions about the general ease of recycling, given the existing office layout, were found to form a single category: convenience

of recycling ($\alpha = 0.69$). Table 5 shows the category names, items contained in each category, category mean, standard deviation, and alpha score.

LISREL ANALYSES

This section explores the causal relationships among the categories identified in the dimensional analysis. Using the previously outlined hypotheses, a structural model was created. This model specified that five exogenous latent variables (organizational commitment, economic motivation, convenience/office layout, household paper recycling, and household recycling in general) would exhibit causal effects on four endogenous latent variables (individual commitment, office recycling in general, office paper source reduction, and intrinsic satisfaction from frugality).

Figure 1 shows the result of this model using the LISREL program. Before discussing the interrelations among latent variables, the issue of "model fit" should be considered. No single statistic is able to provide a definite answer as to the fit of a structural equation model. Therefore, it is appropriate to present several measures: (a) chi-square value, (b) degree of freedom, and (c) goodness-of-fit index (GFI) (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 Figure 1.

Plausible models usually are associated with chi-square values that are low for a given degree of freedom, with high descriptive goodness-of-fit indexes, as well as a low RMSR and a CN greater than 200 times the number of groups of respondents (in this case, CN has to be greater than 200 because there is only one main group of respondents). The unexplained variances are modest in this model. About half of the variance is unexplained for the individual commitment category, about one third for the office recycling in general category, 55% for the office paper source reduction category, and 74% for the intrinsic satisfaction category. Based on these criteria, the model in

TABLE 5
**Categories of Organizational Commitment, Individual Commitment,
 Economic Motivation, Convenience, and Intrinsic Satisfaction^a**

<i>Category Name and Items Included</i>	<i>Mean</i>	<i>SD</i>	<i>α</i>
Organizational commitment	2.99	0.89	0.62
There is little information about recycling at my place of work			
There is too little concern for environmental issues among my co-workers			
Individual commitment	4.39	0.45	0.84
People at work should make every effort to recycle paper			
Recycling seems like the right thing to do			
More information about the value of recycling should be available at my work			
Recycling should be an essential part of our way of life			
People should make every effort to use the unused side of paper for notes			
More information about how to recycle should be available at my workplace			
Economic motivation	1.95	0.63	0.78
Need money incentive for me to recycle			
Recycling only benefits people in the recycling business			
Recycling is a trivial activity for which some folks have time			
Recycling at work is worthwhile only if I get paid to do so			
Convenience of recycling	3.42	0.83	0.69
It is convenient for me to recycle at work			
The arrangement of my workplace makes it easy for me to recycle			
Intrinsic satisfaction from frugality	4.11	0.53	0.82
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			

a. For the first four indexes, the stem question read: "Please indicate to what extent the following statements are true for you." For *intrinsic satisfaction*, the stem question was worded: "Please indicate how much satisfaction or enjoyment you get from the following activities." A 5-point Likert-type scale was used with higher means denoting higher endorsement for the category.

Figure 1 is acceptable and can be used to examine the hypothesized relationships among the exogenous and endogenous variables. Figure 2 shows a redrawn version of the original

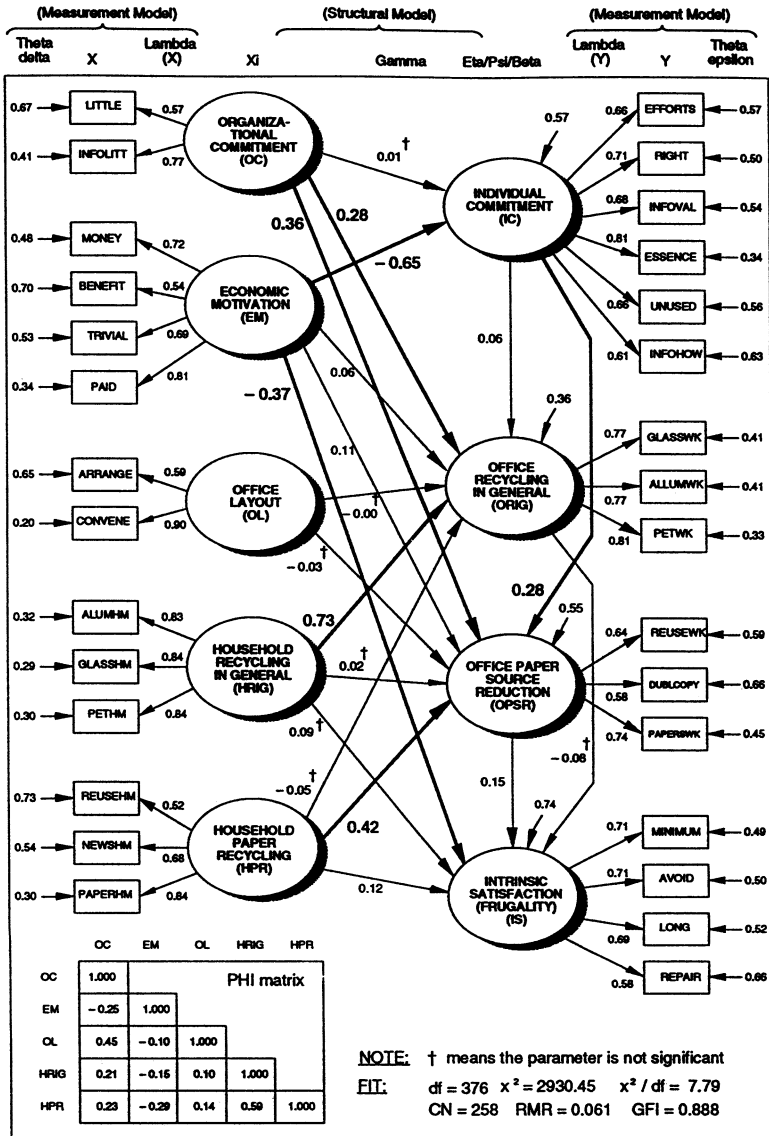


Figure 1: Interrelations Between Office Recycling and Its Antecedents

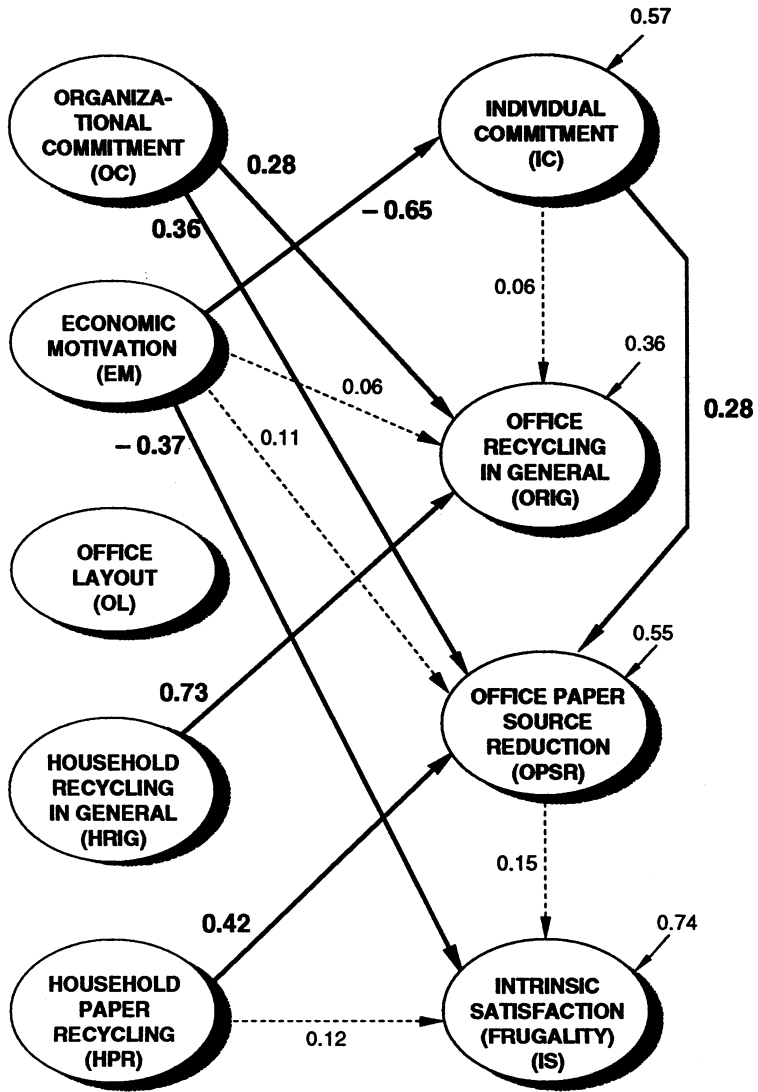


Figure 2: The Redrawn Causal Model

model. This diagram only shows the structural portion of the model. Strong relationships are depicted with bolder lines while nonsignificant relationships are eliminated.

Commitment

According to the analysis, the respondents' reported scores on the organizational commitment category were not causally linked to their scores on the individual commitment category as was hypothesized. This finding is not consistent with the Schwartz norm-activation theory, which predicts that a social norm would have a direct effect on a personal norm and as a result indirectly change behavior. However, organizational commitment was moderately predictive, in a direct linkage, of both general office recycling behavior and office paper source reduction. Higher scores in the individual commitment category were associated with higher scores on office paper source reduction. These data suggest that, in the office setting, the amount of organizational support for recycling need not first alter personal norms to influence individual recycling behavior, but can instead directly affect recycling behavior.

Economic Motivation

The respondents' reported scores on the economic motivation category had very weak positive relationships with both the office recycling in general and office paper source reduction categories. This is generally consistent with our hypothesis, which predicted no significant relationship would emerge, and with previous observations (e.g., Hines et al., 1986-1987). The respondents' scores on the economic motivation category also had a very strong negative causal linkage with their reported scores on the individual commitment category and a moderate negative linkage with scores on the intrinsic satisfaction category. Taken together, these data indicate that economic rewards are not needed to promote nor are effective at encouraging workplace recycling behavior. In fact, an economic approach to the promotion of office recycling behavior may have a significant

negative effect on an individual's commitment to an office recycling program.

Experience With Recycling Behavior

The reported scores on the household recycling in general category had a very strong positive causal linkage with the reported scores for the office recycling in general category, but no significant relationship with the office paper source reduction category and only the weakest linkage with the intrinsic satisfaction category. A similar pattern emerged for the predictive value of the household paper recycling category. This behavior category had virtually no causal linkage with the office recycling in general category and only the weakest linkage with the intrinsic satisfaction category. However, the household paper recycling category did have a significant and positive causal linkage with office paper source reduction behavior. These findings form a fascinating pattern that suggests the behavioral antecedents of office conservation behavior must be of the same specificity as the office behavior itself. Thus prior experience with general recycling behavior in the household or elsewhere will predict general office recycling behavior, but not more specific recycling behavior focused at the level of a particular material or office function. Likewise, prior experience with a particular material—in this instance paper—will predict office conservation behavior with respect to that material alone. This supports the finding that different conservation behaviors have different antecedent variables (Oskamp et al., 1991) and extends it by suggesting a need to be behaviorally specific when making predictions based on prior experience.

Intrinsic Satisfaction

There were only three significant predictors of the intrinsic satisfaction category. The economic motivation category had a strong negative causal linkage. This suggests that those respondents who reported needing an economic incentive to view recycling as worthwhile were less likely to derive personal

fulfillment from pursuing frugal behavior. Also predicting intrinsic satisfaction derived from frugality were the behaviors of household paper recycling and office paper source reduction. Although significant, these causal linkages were small. It is interesting to note, however, that there were no significant linkages between general recycling behavior—at home or in the office—and the intrinsic satisfaction category. One might speculate that it is the source reduction attribute of the two paper-related behavior categories that drive the causal linkages with the intrinsic satisfaction category. The office and household recycling in general categories were focused only on the recycling of materials. In contrast, the office paper source reduction and household paper recycling behavior categories included items that measured the mindful and prudent use of resources (e.g., reusing paper for notes, double-sided copying). The intrinsic satisfaction category measures the sense of contentment that is derived from just such attentive and thrifty resource use.

The unexplained variances for the endogenous latent variables are modest with the possible exception of the intrinsic satisfaction category. For this variable, the residual reached 74%. One possible reason why intrinsic satisfaction had such a high unexplained variance is the fact that only one type of conservation behavior was measured. The intrinsic satisfaction category measures the direct enjoyment derived from all forms of frugal activity. Recycling is but one such activity. It is speculated that the unexplained variance for intrinsic satisfaction can be reduced by the addition of other conservation behaviors to the causal model (Lee & De Young, 1994).

Convenience

The reported scores on the office layout category had no significant relationships with office-based recycling behavior. In part, the lack of relationships may reflect the fact that objective measurements of the physical environment (e.g., the placement of recycling bins) were not available; only two subjective measurements were used for this latent variable. It has been suggested that facility layout should be measured by both objec-

tive measurements and objective measurements (Marans & Spreckelmeyer, 1981).

CONCLUSION

The results reported here suggest that the Taiwanese are recycling various materials at home, particularly newspapers. In contrast, workers in Taiwanese offices are generally less active recyclers. Several ideas emerge from this study that can be used to increase participation in office-based conservation programs.

The first is the powerful effect that prior behavioral experience has on subsequent behavior, even when the subsequent behavior is in a new setting. There are constraints to this effect, an issue we refer to as behavioral specificity. The prior experience must be with the same behavior as that being predicted or changed. In this study, the specificity was at the level of the materials being recycled. It should be explored whether this specificity might occur at other levels (e.g., the public nature of the behavior, the risks involved, the repetitiveness of the behavior). Programs attempting to increase participation in office recycling are advised to assess employees' prior experiences. One can determine the behaviors with which employees are most familiar through the use of surveys, interviews, and focus groups. Those behaviors with the greatest familiarity should become the initial focus of the new office-based recycling program.

A second important finding is the effect commitment has on promoting increased recycling behavior. Both organizational commitment (a social norm) and individual commitment (a personal norm) act to increase office-based conservation behavior. However, contrary to the sequencing postulated by the Schwartz norm-activation theory, organizational commitment need not affect individual commitment to change behavior, it seems able to directly modify behavior. This is an extremely useful finding because organizations have unmatched influence in setting the level of organizational commitment; less so

in altering individual commitment. Organizations are advised to focus their energies on creating a coherent and strong policy supporting conservation behavior if they want to increase such behavior.

Finally, organizations are cautioned against using economic motivation to encourage conservation behavior in the office setting. First and foremost, economic motivation is not among the powerful predictors of office-based recycling behavior. Further, it seems to work against promoting conservation behavior in such a setting by reducing an individual's commitment to such behavior and diminishing the intrinsic satisfaction one can derive from certain types of conservation behavior. Despite the economic nature of modern organizations, it turns out that economic motivation is not a prerequisite for employees to engage in recycling or source reduction behavior at the office.

In conclusion, it is important to acknowledge the limitations of these findings. One must bear in mind that this study focuses on office settings in the Taipei metropolitan area. To some extent, Taipei is different from other cities in Taiwan and other developing countries. Comparative studies in noncapital cities and other developing countries must be conducted to obtain a better understanding of the antecedents of office-based conservation behavior. In addition to survey-based studies, future research also must include evaluation research and intervention experiments using the findings of this and other studies.

NOTES

1. The questions on the survey instrument were pretested in a household recycling study in Fairfax County, Virginia. Simultaneously, a pretest of these same questions was conducted at a University of Michigan office building.

2. A copy of the survey instrument is available from Raymond De Young, School of Natural Resources and Environment, 430 East University Ave., University of Michigan, Ann Arbor, MI 48109-1115.

3. We selected 2 to 4 similar agencies or organizations in each category, according to the function and size of each organization. In the local environmentally related organizations with recycling programs, we sampled 11 organizations: 1 paper manufacturing company and 10 local environmental groups. Because these 10 environ-

mental groups were relatively small, we combined them into one group for analysis. Thus there were two "organizations" in this category.

4. Before administering the survey instruments, interviews were conducted with staff members who were in charge of managing paper consumption and waste disposal in organizations. In organizations where it was possible to directly communicate with office workers, each office worker was given a survey instrument in person and asked to fill it out; in organizations where direct contact was not possible, the managing staff members were asked to distribute the survey instruments. Organizations were visited 1 week later to collect the survey instruments. If office workers had not filled out the instruments, they were asked to complete the instruments and were told that the instruments would be collected in another week. Most office workers cooperated immediately. In some cases, sites had to be visited two or three times.

5. The score of office recycling behavior ranges between 0 and 16 on an ordinal scale. To investigate whether the various groups of people recycle differently in different office settings, we treated these ordinal data as continuous data and ran analysis of variance (ANOVA) tests.

6. Alpha is a coefficient that measures the reliability of a group of items in the sense of its internal consistency.

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