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Types and Influential Factors of Consumers' Non-Purchasing Ecological Behaviors

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ABSTRACT

This article presents an examination of non-purchasing ecological behaviors and their influential factors. The results indicate that consumers who engage in recycling, pro-environmental post-purchasing behavior and pro-environmental activities are highly educated people. Among them, those who are mostly involved in recycling and the non-energetic, rather traditional, activities are mostly influenced by their positive attitudes towards recycling, as well as by their social responsibility. Those who adopt more energetic, more active, behaviors are mostly influenced by their beliefs that they hold power over politicians and politics. It was also found that those who are engaged in one type of non-purchasing pro-environmental behavior are more likely to engage in another type as well. Copyright © 2006 John Wiley & Sons, Ltd and ERP Environment.

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Introduction

In research on consumers' ecological behavior we usually focus on ecological purchasing behavior, i.e. choosing ecological alternative products. There are however some other types of behavior, so far rather neglected by ecological marketing research, although they too are pro-environmental behaviors. Among these, recycling behavior has been the only one that has attracted much academic interest. Recycling is a post-purchasing behavior, while there are other post-purchasing behaviors that may contribute to the environmental protection such as expanding products' life-span and therefore reducing over-consumption and producing less litter (Peattie, 1995, p. 89). There are also other pro-environmental activities, which are not directly related to purchase or post-purchase. They can be ecological activities either taken by an individual alone, such as preferring public transportation instead of a private car, or by an individual together with other people, such as participating in pro-environmental demonstrations.

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As environmental protection requires multi-disciplinary cooperation, marketing science can offer its own contribution to the sustainable economic development by investigating the types and the determinants of ecologically conscious consumer behavior (ECCB) (Roberts, 1996; Tilikidou *et al.*, 2002). The non-purchasing pro-environmental behaviors can be included in the concept of ECCB, as they can be undertaken by consumers in their everyday lives in favor of the environment. It has been previously claimed that consumers who are at least partially involved in pro-environmental actions might be more likely to become in other actions too, such as pro-environmental purchasing behavior, or reduction of over-consumption (Peattie, 1995, p. 79). In this sense either business or public organizations need trustworthy information with reference to which determinants motivate consumers to become involved in non-purchasing pro-environmental behaviors.

In light of the above, this study was designed to focus on the examination of the above mentioned non-purchasing ecological behaviors, investigate their influential factors and reveal their interrelationships, if any.

Review of the Literature

Previous research findings, concerning the impact of demographics upon recycling behavior, do not follow a common pattern (Shrum *et al.*, 1994; Schultz *et al.*, 1995). In reference to attitudes positive relationships have been identified in a number of cases (McGuiness *et al.*, 1977; Kallgren and Wood 1986; Shrum and McCarty, 2001; Tilikidou and Delistavrou, 2004). There have been studies that followed suggestions by Ajzen and Fishbein (1977) and indicated that specific recycling attitudes are better correlated to recycling behavior than general social attitudes or general pro-environmental attitudes (Shrum *et al.*, 1994; Martin and Simintiras, 1995; Balderjahn, 1988; Tilikidou, unpublished doctoral dissertation, p. 151). Davies *et al.* (2002) found a positive association between attitudes and intention to recycling but intention was not found to be directly associated to behavior. Davies *et al.* (2002) examined the reasoned action and planned behavior models (Ajzen and Fishbein, 1980; Ajzen, 1991) as well as the social–psychological model of altruistic behavior (Schwartz, 1977) and suggested that the intention–behavior hypothesis should be abandoned.

As to psychographics, implications have been made to examine as many personality variables as possible in order to illuminate the psychological aspect of recyclers (Ebreo and Vining, 2001; Shrum and McCarty, 2001). Positive relationships have been identified between recycling behavior and altruism by Gibbons and Wicklund (1982) and by Hopper and Nielsen (1991), self-actualization and aesthetics by Dunlap *et al.* (1983), altruistic feelings about the environment by Ebreo *et al.* (1999), locus of control, individualism and collectivism by Shrum and McCarty (2001) and materialism by Tilikidou and Delistavrou (2001, 2004).

There has been limited research that examines, besides recycling, other types of pro-environmental non-purchasing behaviors. Ebreo and Vining (2001), for example, examined the reuse of products in their 'waste-reduction' concept. Tilikidou and Delistavrou (2004) examined along with recycling behavior some other pro-environmental post-purchasing behaviors and found that materialism affects them both negatively; the negative influence of materialism was found to be stronger than the positive influence of recycling attitudes.

With regard to pro-environmental activities, Corraliza and Berenguer (2000) included in their broad concept of 'environmental actions' some non-purchasing items such as 'taking bags for reuse when going shopping' and 'signing petitions supporting environmental protection organizations'. Bohlen *et al.* (1993) developed a scale of 'political action', which included items such as 'supporting environmental pressure groups', 'writing to newspapers about green issues' etc. This scale was later used by

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Schlegelmilch *et al.* (1996), who found that political action was a determinant of green purchasing behavior. Blake (2001) used the same term, 'political action', to include a larger set of items, such as 'donate money to support an environmental cause', 'work to elect an environmentalist candidate' and 'join an environmental group', and found that political action and personal values, namely post-materialism and environmentalism, were related to consumers' environmental concern.

Tilikidou (unpublished doctoral dissertation, p. 145) found that pro-environmental participative activities were related positively to education, income and occupation (professionals), while pro-environmental individual activities were related to age, education and occupation (employees). Both behaviors were found to correlate positively to attitudes and able to be predicted by recycling behavior. This research was judged to be preliminary as the scales contained a rather small number of items, they were rather weak in terms of validation and the relationships found were not very well established (Tilikidou, unpublished doctoral dissertation, p. 209).

Objectives

Jackson (2005) recently provided a comprehensive review of the theoretical models that have guided ecologically related consumer research so far. The analytical presentation of the relevant theoretical debate is far beyond the scope of this paper. It is noted in brief that following a rather synthetic approach in this study, the non-purchasing pro-environmental behaviors were assumed to be influenced by (a) specific attitudes towards recycling activities, (b) selected personality variables, which are oriented to pro-social feelings and beliefs, and (c) demographics, as they are considered to be the best market segmentation tool. In addition, taking into consideration previous findings in the same geographical area (Tilikidou, unpublished doctoral dissertation, p. 198), the different types of non-purchasing pro-environmental behaviors were assumed to be related to one another. The following research objectives were set.

- To examine to what extent Greek consumers adopt a set of non-purchasing ecological behaviors, namely recycling behavior, pro-environmental post-purchasing behaviors and pro-environmental activities.
- To examine the ability of demographics to describe these behaviors.
- To examine the impact of attitudes upon these behaviors.
- To investigate the impact of personality variables upon these behaviors.
- To reveal the inter-relationships between and among all three non-purchasing ecological behaviors.

Methodology

A survey was conducted among 420 households in the Thessaloniki urban area. The sampling method was a two-stage area sampling in combination with the systematic method (Tull and Hawkins, 1993, p. 544; Zikmund, 1991, p. 471). The sampling frame was a map of the Thessaloniki urban area. In the first stage, 30 city blocks were randomly selected. In the second stage, the investigated households in each block were selected through the systematic method (one every 10 apartments). One adult member of the household served as interviewee. Detailed instructions to the interviewers secured the probability sampling in all steps. The survey instrument was a structured questionnaire containing 69 variables in total, administered through personal interviews by trained senior marketing students.

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Questionnaire Content

For the items' wording of the following variables see the appendix.

Recycling behavior was examined by four items, one for each recyclable material. In an effort to gain better measurement accuracy, the usual self-reported frequency scale was not used. The items were measured on a seven-point percentage scale asking what percentage of each household's litter usually went to the recycling bins.

Following Peattie's definition (1995, p. 89), *pro-environmental post-purchasing behavior* was examined through five items, measured on a seven-point frequency scale.

The previously mentioned scale of *pro-environmental activities* (Tilikidou, unpublished doctoral dissertation, p. 108) was extended by the addition of some items and the re-wording of others in an effort to gain a broader understanding of this type of behavior. The procedure resulted in a 13-item construct, measured on a seven-point frequency scale.

The *recycling attitudes* multi-item variable was investigated through 18 items measured on a seven-point Likert scale. This scale, containing 15 items, was initially developed by Tilikidou (unpublished doctoral dissertation, p. 117). It has been used in a number of studies providing evidence of well accepted reliability and validity coefficients (e.g. Tilikidou and Delistavrou, 2001, 2004). In this study an effort was made to improve the scale further by the addition of three items. It provided a Cronbach's (1951) alpha of 0.90.

The effort to improve these three scales was based on the papers that were mentioned in the literature review section.

With regard to the personality variables, two psychographic scales were selected. (a) The socio-political control scale *Spheres of Control* (Paulhus, 1983), consisting of 10 items measured on a seven-point Likert scale. The measure examines 'the consumers' perceptions about their own ability to affect and control the national and global socio-political evolutions' (Robinson *et al.*, 1991, p. 428). Paulhus (1983) reported a Cronbach alpha of 0.81, while in this study alpha was found to be 0.78. (b) The *Doubt About Self Determination* scale (Scheussler, 1982), consisting of 14 items. In this study it was measured on a seven-point Likert scale. The construct measures 'whether a person feels shaped by social circumstances rather than capable of shaping them, with a high score reflecting the belief that the social world is unresponsive to planning and work' (Robinson *et al.*, 1991, p. 306). The initial alpha value was 0.80, while in this study it was found to be 0.84.

Results

The results were tested through *t*-test and no statistically significant differences with the relevant population parameters were found.

Recycling behavior takes theoretical values from 4 to 28, and provided a mean of 8.3714 (std dev. = 4.3301), indicating low compliance of the respondents with recycling activities (Table 1). It is observed (Table 2) that consumers seem to be more engaged in recycling paper and much less (in declining order) in recycling aluminum cans, glass and plastic bottles.

Pro-environmental post-purchasing behavior takes theoretical values from 5 to 35, and provided a mean of 17.9095 (std dev. = 4.7843), indicating a rather moderate consumer engagement (Table 1). It is observed (Table 2) that consumers seem to maintain timeworn products, donate to charity and re-use products more frequently than reducing their speed when driving or selling products second-hand (in declining order).

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Variables	Range	Average	Mean	Std deviation
Recycling behavior	4–28	16	8.3714	4.3301
Post-purchasing behavior	5–35	20	17.9095	4.7843
Pro-environmental activities	13–91	52	43.3936	12.2525
Recycling attitudes	17–119	68	97.6214	11.702
Spheres of Control	10–70	45	34.9500	8.7317
Doubt About Self-Determination	14–98	56	47.2929	12.9413

Table 1. Descriptive statistics

Items	Whole sample		Cluster 1 (136 cases)	Cluster 2 (284 cases)
	Mean	Std deviation	Centers	Centers
Recycling behavior				
B01	3.6095	2.0366	4.92	2.98
B02	1.9143	1.4401	2.63	1.57
B03	1.3810	1.0072	1.74	1.21
B04	1.4667	1.2267	1.91	1.25
Pro-environmental post-purchasing behavior				
E01	2.3357	1.3232	3.21	1.92
E02	4.5238	1.4856	5.19	4.20
E03	1.8762	1.2062	2.82	1.43
E04	4.5619	1.6198	5.52	4.10
E05	4.6119	1.3430	4.96	4.45
Pro-environmental activities				
A01	2.3650	1.4816	3.92	1.62
A02	2.6452	1.5831	4.43	1.79
A03	3.9952	1.4994	5.29	3.38
A04	2.5810	1.4788	4.02	1.89
A05	2.2310	1.4693	3.81	1.48
A06	4.5476	1.3054	5.53	4.08
A07	4.5714	1.4132	5.63	4.06
A08	6.1905	0.9756	6.53	6.03
A09	5.5143	1.2804	5.62	5.46
A10	3.1119	1.8081	4.32	2.53
A11	2.1333	1.3770	3.61	1.43
A12	1.8881	1.3052	3.03	1.34
A13	1.6190	1.1957	1.99	1.44

Table 2. Descriptives of all behavioral items

Pro-environmental activities takes theoretical values from 13 to 91, and provided a mean of 43.3936 (std dev. = 12.2525), indicating a rather moderate involvement of consumers in the whole set of these behaviors (Table 1). Consumers reported at a considerable level that they avoid throwing rubbish on the ground and making noise; also, at a moderate level, that they watch and listen to ecological media programs, they have discussions about environmental problems and read articles in magazines and newspapers (Table 2). They do not seem to be very much used to preferring public transportation instead of

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		Recycling behavior	Post-purchasing behavior	Pro-environmental activities
Recycling behavior	*r*	1.000	0.433	0.417
	p		0.000	0.000
	n	420	420	420
Post-purchasing behavior	*r*	0.433	1.000	0.633
	p	0.000		0.000
	n	420	420	420
Pro-environmental activities	*r*	0.417	0.633	1.000
	p	0.000	0.000	
	n	420	420	420
Recycling attitudes	*r*	0.508	0.344	0.450
	p	0.000	0.000	0.000
	n	420	420	420
Spheres of Control	*r*	0.171	0.349	0.451
	p	0.000	0.000	0.000
	n	420	420	420
Doubt About Self-Determination	*r*	−0.183	−0.046	−0.180
	p	0.000	0.342	0.000
	n	420	420	420

Table 3. Pearson's correlations

their private cars, taking part in demonstrations for environmental protection, donating money to ecological groups, taking part in cleaning shores or parks, offering work voluntarily or planting trees (in declining order). It is noteworthy that consumers hardly ever take their own bags to the supermarket in order to avoid over-consumption of plastic bags.

Analysis

One-way ANOVA was first applied to examine the mean differences in each of recycling behavior, pro-environmental post-purchasing behavior and pro-environmental activities across each one of the demographic characteristics. It was found that education provided statistically significant ($p < 0.05$) differences in all three behavioral variables. The findings indicate that consumers who hold a higher education degree engage in all these types of behavior more than their counterparts do. Income provided statistically significant ($p < 0.05$) differences only in pro-environmental post-purchasing behavior. It was found that consumers earning 7500–19 000€ are more engaged in this type of behavior than those of lower or higher incomes. None of the other demographics provided any statistically significant relationships.

Pearson's parametric *correlation* was employed to explore the existence, the direction and the strength of the potential relationships between pairs of the variables (Table 3). Recycling attitudes was found to correlate significantly ($p < 0.01$), positively and moderately with recycling behavior ($r = 0.508$), with pro-environmental activities ($r = 0.450$) and with pro-environmental post-purchasing behavior ($r = 0.344$).

Spheres of Control was found to correlate significantly ($p < 0.01$), positively and moderately with pro-environmental activities ($r = 0.451$) and pro-environmental post-purchasing behavior ($r = 0.349$), while weakly with recycling behavior ($r = 0.171$).

Doubt About Self-Determination was found to correlate significantly ($p < 0.01$), negatively as expected but weakly with recycling behavior ($r = -0.183$) and with pro-environmental post-purchasing behavior ($r = -0.180$).

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Model	Variables entered	Adjusted R^2	Unstandardized coefficients *B*	Standardized coefficients beta	*t*	Sig.	Tolerance	VIF
			Recycling behavior					
2	(Constant)	0.270	−11.206		−7.046	0.000		
	Recycling attitudes		0.175	0.498	11.821	0.000	0.984	1.016
	Spheres of Control		0.054	0.109	2.589	0.010	0.984	1.016
Model	Excluded variables							
2	Doubt About Self-Determination			0.016	0.361	0.718	0.848	1.18
			Pro-environmental post-purchasing behavior					
Model	Variables entered	Adjusted R^2	Unstandardized coefficients *B*	Standardized coefficients beta	*t*	Sig.	Tolerance	VIF
3	(Constant)	0.214	−2.993		−1.259	0.209		
	Spheres of Control		0.169	0.309	7.073	0.000	0.984	1.017
	Recycling attitudes		0.132	0.340	7.170	0.000	0.835	1.198
	Doubt About Self-Determination		0.035	0.094	1.992	0.047	0.848	1.180
			Pro-environmental activities					
Model	Variables entered	Adjusted R^2	Unstandardized coefficients *B*	Standardized coefficients beta	*t*	Sig.	Tolerance	VIF
2	(Constant)	0.366	−17.164		−4.086	0.000		
	Recycling attitudes		0.405	0.407	10.355	0.000	0.984	1.016
	Spheres of Control		0.562	0.400	10.191	0.000	0.984	1.016
Model	Excluded variables							
2	Doubt About Self-Determination			−0.014	−0.320	−0.749	0.848	1.180

Table 4. Multiple regressions between each behavioral variable and recycling attitudes, Spheres of Control and Doubt About Self-determination

It was also found that statistically significant relationships ($p < 0.01$) exist between the behavioral variables; recycling behavior indicated positive, moderate relationships with pro-environmental post-purchasing behaviors and with pro-environmental activities ($r = 0.433$ and $r = 0.417$ respectively), while pro-environmental post-purchasing behaviors and pro-environmental activities are highly correlated ($r = 0.633$).

Three applications of *multiple regression* (Table 4) revealed the following. (a) The interactive effect of recycling attitudes and Spheres of Control can predict the recycling behavior, explaining 27% (adjusted R^2) of the variance. (b) The interactive effect of Spheres of Control, recycling attitudes and Doubt About Self Determination can predict the pro-environmental post-purchasing behavior, explaining 21.4% (adjusted R^2) of the variance. It is noted that the relative magnitude of Doubt About Self Determination was very small in the equation. (c) The interactive effect of recycling attitudes and Spheres of Control can predict the pro-environmental activities, explaining 36.6% (adjusted R^2) of the variance (Table 4).

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Model	Variables entered	Adjusted R^2	Unstandardized coefficients *B*	Standardized coefficients beta	*t*	Sig.	Tolerance	VIF
			Recycling behavior					
2	(Constant)	0.218	0.147		0.188	0.851		
	Post-purchasing behavior		0.255	0.282	5.053	0.000	0.600	1.667
	Pro-environmental activities		0.084	0.238	4.270	0.000	0.600	1.667
			Pro-environmental post-purchasing behavior					
Model	Variables entered	Adjusted R^2	Unstandardized coefficients *B*	Standardized coefficients beta	*t*	Sig.	Tolerance	VIF
2	(Constant)	0.432	6.741		10.306	0.000		
	Pro-environmental activities		0.214	0.547	13.518	0.000	0.826	1.210
	Recycling behavior		0.226	0.205	5.053	0.000	0.826	1.210
			Pro-environmental activities					
Model	Variables entered	Adjusted R^2	Unstandardized coefficients *B*	Standardized coefficients beta	*t*	Sig.	Tolerance	VIF
2	(Constant)	0.423	13.700		7.743	0.000		
	Post-purchasing Behavior		1.425	0.557	13.518	0.000	0.813	1.230
	Recycling Behavior		0.498	0.176	4.270	0.000	0.813	1.230

Table 5. Multiple regressions among the behavioral variables

In an effort to reveal the inter-dependence relationships among the behavioral variables, three additional multiple regressions were applied on each one of the behavioral variables, taken as dependent, versus the remaining two others, taken as independent (Table 5). The analyses indicated that (a) the interactive effect of pro-environmental post-purchasing behavior and pro-environmental activities can predict recycling behavior, explaining 21.8% of the variance, (b) the interactive effect of pro-environmental activities and recycling behavior can predict pro-environmental post-purchasing behavior, explaining 43.2% of the variance, and (c) the interactive effect of pro-environmental post-purchasing behavior and recycling behavior can predict the pro-environmental activities, explaining 42.3% of the variance. It is noted that in the last two cases the *R* squares are significantly higher than those concerning the ability of attitudes and personality variables to predict pro-environmental post-purchasing behavior and pro-environmental activities.

Cluster Analyses

The *K-means cluster analysis* (Ward and Euclidean distance) was first utilized as it classifies cases into relatively homogeneous groups, indicating for each group a distinct degree of involvement in the

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behavior under examination (Malhotra, 1999, p. 610). The most interpretable was a two cluster solution including all the behavioral variables, namely recycling behavior, pro-environmental post-purchasing behaviors and pro-environmental activities (Table 2). The first cluster contains 136 cases (32.4%), grouping those consumers who obtained cluster centers higher than their counterparts in all items; the second cluster contains 284 cases (67.6%), grouping those consumers who obtained lower cluster centers. The two clusters were named respectively *higher* and *lower involvement* in all non-purchasing ecological behaviors.

In an effort to gain a deeper understanding of the associations among all items of the behavioral variables with all items of recycling attitudes and Spheres of Control, *hierarchical clustering* was secondly employed. The items of the Doubt About Self-Determination measure were excluded, as the results, of both correlation and regression analyses, were rather poor. Hierarchical cluster analysis groups variables, not cases (Sudman and Blair, 1998, p. 558) in relatively homogeneous groups (Malhotra, 1999, p. 610). The analysis resulted into two interpretable clusters (see Figure 1 and the appendix).

In the first cluster two post-purchasing items appear, which concern the reduction of speed when driving (E01) and second-hand sales (E03); they are close to those items of pro-environmental activities that mostly concern voluntary participation in planning and work of ecological groups and organizations (A01, A02, A04, A05, A11, A12). All these behavioral items seem to be more closely associated with some items of Spheres of Control: those that express people's feelings about their power over what politicians and powerful citizens decide and do about the cost of living (H03, H04, H07, H08).

In the second cluster all the recycling items appear (B01, B02, B03, B04) together with the post-purchasing items concerning reuse (E02), donation (E04) and maintenance (E05) of products that have been already used; the activities items concerning the avoidance of leaving litter and making noise (A08, A09), and interest in receiving and sharing information about environmental problems (A03, A06, A07) as well as using public transportation instead of their private cars (A10) were also grouped in the second cluster. This set of non-purchasing ecological behaviors seems to be influenced most by almost all the items of recycling attitudes (C_i) and some items of Spheres of Control: those that express consumers' responsibility about global, national and political evolution and problems, such as wars and political corruption (H01, H02, H05, H06, H09 and H10).

Discussion

Findings concerning recycling supported previous research in the same geographical area (see, e.g., Tilikidou and Delistavrou, 2001). Consumers participate more in the recycling of paper than in the recycling of other materials. It was found that consumers recycle less than 50% of the paper they use and less than 10% of the other materials. This obviously happens because the paper-recycling program was the first launched and is more widely available and better promoted. There are not many recycling bins in the city for the other recyclable materials. Davies *et al.* (2002) previously suggested that recycling initiatives need to be convenient, visible and rewarding to be successful. With regard to the post-purchasing behaviors it has to be noted that we cannot be sure whether some of these behaviors are adopted by environmentally conscious consumers or by people who are traditionally used to undertaking these activities for the sake of charity and saving money, possibly out of habit (Jackson, 2005, p. 66). With regard to the pro-environmental activities it is observed that people adopt those activities that do not demand radical pro-environmental behavioral changes. Overall, the results of this study expand previous suggestions with reference to recycling (e.g. Davies *et al.*, 2002). Consumers are most likely to adopt any type of pro-environmental behavior where cost and/or inconvenience are minimized, as Peattie (1995, p. 93) and Ottman (1997, p. 23) previously suggested.

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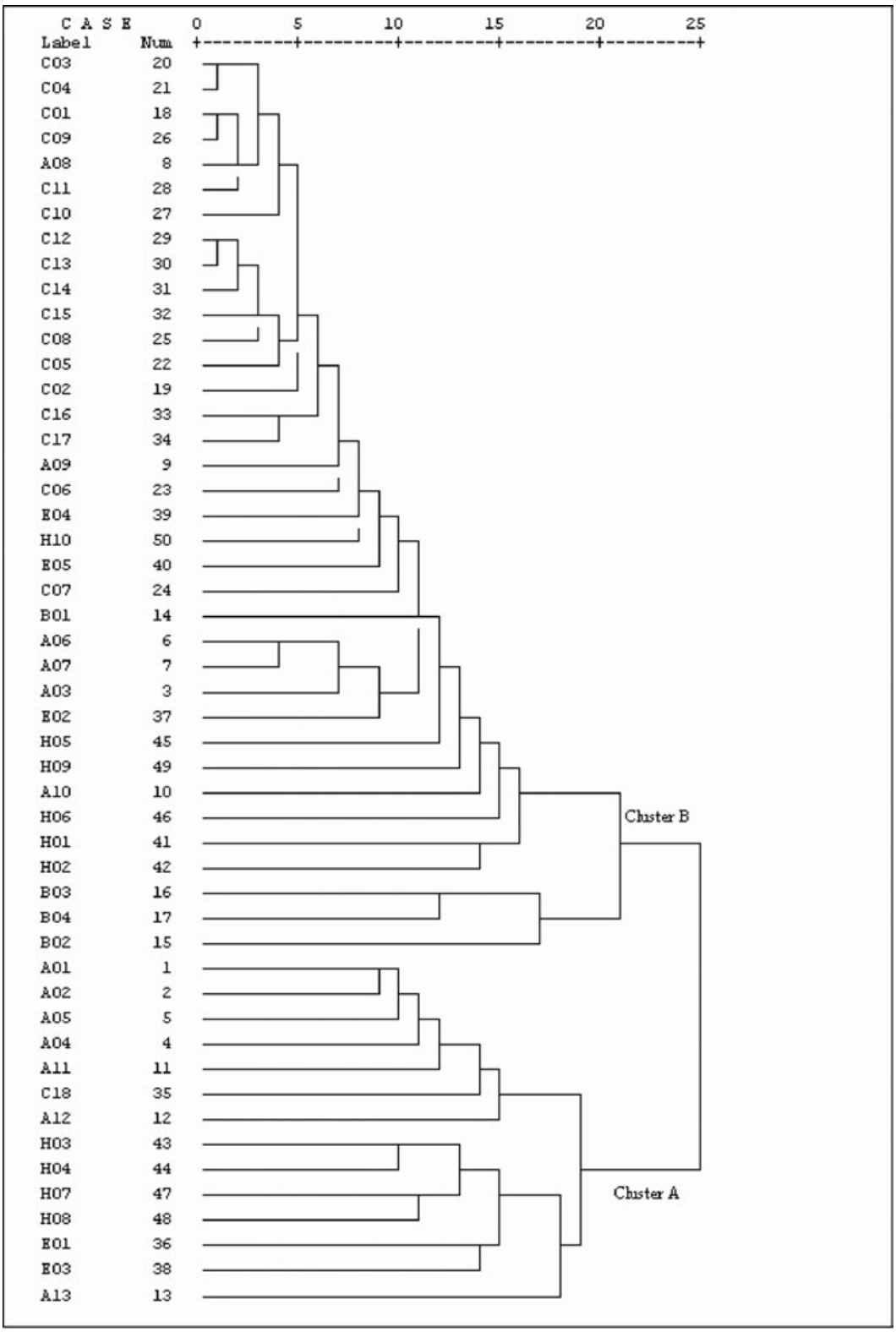

Figure 1. Hierarchical cluster dendrogram

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Discussing further pro-environmental activities, at least two items could be argued as providing over-reported results due to a tendency for social desirability. It is rather naive to accept that people almost always avoid throwing rubbish on the ground and making noise in such a dirty and noisy city. On the contrary, citizens seem rather honest in reporting their low involvement in activities usually organized by ecological groups or public authorities. It is also quite explicable that they did not report using public transportation in favor of the environment. It is an open secret that Greeks prefer to put up with the discomfort of traffic sitting in their cars than standing in the buses. Our claim is that this will be one of the behaviors that are most difficult to change, until reparative changes occur in public transportation. With regard to voluntary support in forestations and fires or flood the results are argued as an undervaluation of the reality. We all know that Greeks run and help in emergencies. On the other hand, some of them are probably not aware that what they are doing is of benefit to the environment. This might be viewed as a matter of 'heuristics' (Jackson, 2005, p. 64). In these behaviors it is very difficult to describe a clear division between environmental concerns and altruistic feeling towards the neighbors in need. Whatever the cognitive process might be it has to be made clear that all types of pro-environmental behavior are voluntary and need to be motivated and supported.

With reference to attitudes, the results confirmed the suggestion by Ajzen and Fishbein (1977) as well as previous research findings (Shrum *et al*., 1994; Tilikidou, unpublished doctoral dissertation, p. 151) that higher correlation coefficients are obtained when behavior and attitudes are measured on the same level of specificity. The measure of specific attitudes towards recycling, which provided exemplary internal consistency, was found to be the most powerful discriminative factor of recycling behavior, among the other independent variables. This result seems in contrast to the claim by Davies *et al*. (2002) that attitudes offer little guidance to predicting recycling behavior, although full comparison is limited by the differences in the research designs of the studies. However, this result is indeed in contrast to previous research findings in the same geographical area, which revealed that, although attitudes were capable of affecting recycling, values (materialism) provided stronger evidence of influence (Tilikidou and Delistavrou, 2001, 2004). On the other hand, the results of this study concerning the education level confirmed previous findings in the same area by Tilikidou and Delistavrou (2001) as well as those by Davies *et al*. (2002). The results concerning Spheres of Control are in line with the findings by Shrum and McCarty (2001). With regard to the other behavioral variables – pro-environmental post-purchasing behavior and pro-environmental activities – the relevant magnitudes of attitudes and Spheres of Control seem to be coequal, while both behaviors were found to be affected by education. The choice of Doubt About Self-Determination has not been successful.

As expected, inter-relationships were found *between* the behavioral variables. Two of the behavioral variables, the pro-environmental post-purchasing behavior and the pro-environmental activities, are more strongly correlated to one another than each one of them with the attitudinal or the personality variables. There is also evidence that inter-relationships exist *among* the behavioral variables, because they are better predicted by the other behavioral variables. However, recycling behavior is probably excluded from this pattern, as it is more strongly correlated to and better predicted by recycling attitudes.

Clustering the behaviors under examination was found to be a progressive path to follow. Additional information was revealed with regard to the insights of the subtle associations among aspects of behaviors and aspects of their influential factors. Hierarchical clustering indicated that the more energetic behaviors were grouped in the first cluster. They were found to be more closely associated with people's beliefs that they are powerful enough to press control over politics and politicians. In the second cluster the behaviors that do not have either any monetary cost, or an aspect demanding too much action, were grouped. These behaviors concern recycling and activities such as the expanding of products' life span and the interest in obtaining and sharing information about environmental problems. They were found

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to be closely associated with the dimension of Spheres of Control, which expresses consumers' feeling of responsibility about political global and national evolutions.

K-means clustering formulated the two clusters of higher and lower consumer involvement in the non-purchasing ecological behaviors. Although segmentation into more detailed clusters would be desirable, no other solution would lead to a visible interpretation in this study. It is noted that direct comparison to previous segmentation approaches (Roberts, 1996; Ottman, 1997; Tilikidou, unpublished doctoral dissertation; Roper, 2002) is avoided. This was judged to be highly risky due to the significant differences in the research designs, and also due to the differences in the behaviors under examination and their measurement process.

Conclusions

It is concluded that citizens who more frequently adopt pro-environmental non-purchasing behaviors are all highly educated people. These citizens are not numerous, nor are they strongly engaged in most of these behaviors. The non-purchasing ecological behaviors are all positively correlated to recycling attitudes and locus of control. Recycling behavior is better predicted by recycling attitudes, while post-purchasing behavior and ecological activities are better predicted by the other behaviors. Consumers who are mostly involved in recycling and the non-energetic, rather traditional activities are mostly influenced by their positive attitudes towards recycling as well as by their social responsibility. Those who adopt more energetic, more active behaviors are mostly influenced by their beliefs that they hold power over politicians and politics. It was also found that those who are engaged in one type of non-purchasing pro-environmental behavior are more likely to engage in another type as well. They are more or less the same people, as inter-relationships were found between and among recycling behavior, pro-environmental post-purchasing behaviors and pro-environmental activities.

The main limitation of this study is judged to be the absence of a measurement for social desirability, which is always a limitation in self-reported surveys. This may be the main reason for a possible over-evaluation especially, in the case of the attitudinal scores, and also in the case of certain pro-environmental activities that have been already discussed above (litter, noise). Such behaviors might be viewed as social norms, that ought to be adopted; the opposite of such a behavior is socially disapproved (Jackson, 2005, p. 59). Measuring social desirability in future might also add to the validation of the scales (Robinson *et al.*, 1991, p. 8). Future research, besides measuring social desirability, might also examine the potential relationships of the non-purchasing ecological behaviors with the purchasing ecological behavior in an effort to expand previous findings by Schlegelmilch *et al.* (1996) and Tilikidou (unpublished doctoral dissertation).

At this stage, it cannot be claimed by any means that the non-purchasing pro-environmental activities might be viewed as a mainstream subject in marketing research. Not that a definite picture of these behaviors and their determinants has been revealed. There is much to be added in our understanding of the cognitive, affective and psychographic links to pro-environmental behaviors. An overall look at the results of this study verifies Jackson's (2005, p. 18) argument about the difficulty and complexity of the change towards pro-environmental behaviors.

However, all these activities eventually contribute to the environmental protection and should not be underestimated. The importance of the subject is underlined by the fact that the winner of the 2004 Nobel Prize for Peace is Wangari Maathai of Kenya, for her work to promote forestation, protection of the environment and improvement of social conditions. This study has contributed – at least to some extent – to our relevant knowledge, as it has examined not only recycling behavior but also three types of non-purchasing ecological behavior and their inter-relationships; it has also provided a reliable

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measure of attitudes towards recycling and revealed the role of socially oriented values in the pro-environmental behavior.

Greece, along with its other counterparts in the EU, has to seriously consider and acknowledge the need to motivate consumers to act pro-environmentally. Governmental, non-profit and non-governmental organizations as well as local authorities should incorporate in their strategies creative campaigns aiming at increasing consumers' pro-environmental attitudes, social responsibility and consumers' perceptions of power over politicians and politics. As the different types of pro-environmental behavior were found to be inter-related, local authorities – in charge of recycling programs – should seek recyclers among members of ecological groups. At the same time ecological organizations and groups should target those consumers who are engaged in recycling by delivering ads or announcements near the recycling bins. They should also be involved in companies' promotional techniques, concerning for instance product containers that can be used as food storage or cutlery. Concertedly, as Jackson (2005, p. 18) suggested, policies that seek to promote pro-environmental behaviors will need to engage both with social context and with mechanisms of individual choice.

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Appendix

Recycling behavior

B01: Paper and newspapers.
B02: Aluminum cans.
B03: Plastic bottles.
B04: Glass.

Pro-environmental post-purchasing behavior

E01: Drive at lower speed to reduce the petrol consumption and the emissions of the car.
E02: Reuse part of a product or waste packaging for other needs instead of throwing them in the garbage (e.g. tubs of butter or yogurt, plastic bags, wrapping paper etc.).
E03: Sell second-hand products, no longer needed, instead of throwing them away (e.g. books, clothes, etc.).
E04: Donate to charity old clothes and shoes.
E05: Care and maintenance of consumer durables in an attempt to increase their lifespan and delay the need for replacement (i.e. clothes, furniture, electric machinery, linen).

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Pro-environmental Activities

A01: Take part in cleaning shore, parks, yards etc.
A02: Take part in environmental protection demonstrations.
A03: Buy ecological magazines and/or other printed material.
A04: Contribute money to ecological groups and organizations.
A05: Voluntarily work for ecological groups and organizations.
A06: Have discussions with my family and/or friends about environmental issues.
A07: Listen to the radio or watch television programs on ecology.
A08: Do not throw rubbish on the ground.
A09: Try to make less noise.
A10: Use public transportation instead of my car for reasons of reducing pollution.
A11: Take part in planting trees.
A12: Voluntarily run to help in cases of fire or flood.
A13: Take bags from home in order not to use the supermarket plastic bags.

Recycling Attitudes

C01: Recycling is important.
C02: Each consumer can contribute to the solution of the litter problem in his/her district.
C03: Recycling benefits are worth my time and effort.
C04: Recycling helps in natural resource conservation.
C05: Government should issue regulations about the use of recycled and recyclable materials in products packaging.
C06: Consumers should force the producers to use recyclable materials in their products packages.
C07*: It is rather inconvenient to sort out and transport the recycling materials.
C08: It is my personal responsibility to help recycling efforts.
C09: Recycling is a great help to environmental protection.
C10*: It is useless to recycle as long as not many other people do the same.
C11*: Recycling is more fuss than benefit.
C12: Recycling reduces litter going to the landfill sites.
C13: Recycling contributes to energy conservation.
C14: I get satisfaction by taking part in recycling.
C15: Recycling benefits return to society.
C16: I feel satisfaction when the packaging of a product that I buy is made of recycled paper.
C17: I feel satisfaction when the packaging of a product that I buy can be recycled.
C18*: I am less interested in an ecological packaging than in a safe and beautiful packaging.

Spheres of Control (Paulhus, 1983)

H01: By taking an active part in political and social affairs we, the people, can control world events.
H02: The average citizen can have an influence on government decisions.
H03*: It is difficult for people to have much control over the things politicians do in office.
H04*: This world is run by the few people in power and there is not much the little guy can do about it.
H05: With enough effort we can wipe out political corruption.
H06: One of the major reasons we have wars is because people don't take enough interest in politics.

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H07*: There is very little we, as consumers, can do to keep the cost of living from going higher.
H08*: When I look at it carefully I realize it is impossible to have any really important influence over what politicians do.
H09*: I prefer to concentrate my energy on other things rather than on solving the world's problems.
H10: In the long run we, the voters, are responsible for bad government on a national as well as a local level.

*Reverse coded items.

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