

Tilikidou, I. and Delistavrou, A. (2001). Utilization of Selected Demographics and Psychographics in Recycling Behavior Understanding: A Focus on Materialism. *Greener Management International Journal*, Issue 34, Summer, pp. 75-93.

# **Utilization of Selected Demographics and Psychographics in Understanding Recycling Behavior: A Focus on Materialism**

by

**Irene Tiliidou\***

and

**Antonia Delistavrou\***

NOTE: The final text does not exist in e-form as it was revised by the editor

\* Irene Tiliidou, BSc, MBA, PhD

TEI of Thessaloniki, Department of Marketing, P.O. BOX 14561, 54101  
Thessaloniki

Tel. +3031791244, FAX: +3031791180

E-mail address: etilik@mkt.teithe.gr

\* Antonia Delistavrou, BSc, MSc

TEI of Thessaloniki, Department of Marketing, P.O. BOX 14561, 54101  
Thessaloniki

Tel. +3031791244, FAX: +3031791180

E-mail address: delistavrou@yahoo.com

**Dr Irene Tilikidou**, is an Associate Professor in Marketing with the Technological Educational Institution of Thessaloniki, Greece. She gives lectures in marketing. She has published textbooks and articles in journals. Her research interests are in the areas of ecological consumer behavior and recycling.

**Antonia Delistavrou**, is a part time lecturer in Marketing with the Technological Educational Institution of Thessaloniki, Greece. She gives lectures in marketing research. Her research interests are in the area of recycling behavior.

## **ABSTRACT**

This paper presents a research study, which aimed to understand better Recycling Behavior by utilizing selected demographic and psychographic characteristics. The results indicated that middle-aged, higher educated employees are more engaged in recycling activities in Greece. It was also found that although the attitudes – behavior link remains an indisputable reality, the investigation of appropriate psychographic characteristics, such as personal values, can provide better understanding and predicting of the consumers' recycling behavior. It was revealed that the consumers' level of materialism is a stronger predictive factor than the consumers' level of collectivism, while the consumers' level of individualism did not provide evidence of direct relationship with their recycling behavior.

## Introduction

The rapid increase of urban solid waste, which all contemporary societies face, is considered to be a major environmental problem. Visible environmental problems require drastic environmental protection activities. Environmental protection requires multi-disciplinary co-operation. Among other socio-economic sciences, marketing science aims to offer its own contribution to what is known as “*sustainable economic development*” (Van Dam and Apeldoorn, 1996). From the beginning of the nineties *ecological marketing*, a relatively new field, is viewed as a part of the societal marketing concept (Kotler, 1991, p. 15). Ecological marketing offers to any willing organization the know-how to adopt and implement an ecological strategy. For a successful implementation of an ecological strategy that targets consumers, the key element is consumer behavior. Rising public awareness and concern about environmental issues has drawn the attention of academic consumer behavior researchers during the last decades (Shrum and McCarty, 2001). Research subjects may refer to either pro-environmental purchase behavior and/or pro-environmental post-purchase behavior. Among other types of pro-environmental post-purchase behavior, such as product use change, re-use of products or packaging etc. (Peattie, 1995, p.89) the recycling of household solid waste is the most interesting topic.

Until recently the main method of dealing with urban solid waste was to “*remove it from sight*” (Shrum *et al.*, 1995). The traditional methods were either to burn the waste, a solution that produces air and land pollution, or to bury the waste into the landfills, a solution that pollutes the ground water. With regard to the latter method, besides pollution, a major problem for local authorities is to find appropriate space for landfill in the suburbs of a city. Such problems require effective, contemporary solutions. Recycling is argued to be one of these solutions that can be applied to overcome the litter problem. Recycling is considered to be beneficial as it minimizes the virgin resources and energy used, reduces air and water pollution and saves sanitary landfills space (Nyamwange, 1996). Recycling has been defined as “*the series of activities by which products or other materials are recovered from or otherwise diverted from the solid waste stream for use in the form of raw materials in the manufacturing of new products*” (E.P.A., 1993, p. 170).

Although recycling is a rather complex process that requires certain technological applications, it also incorporates a marketing aspect. From a marketing viewpoint recycling is an issue of distribution channels (Fuller *et al.*, 1996). The

channel involved in the recycling process is the so-called 'reverse' distribution channel (Zikmund and Stanton, 1971). In a 'reverse' distribution channel the 'recyclable' waste is the product. A recyclable product is usually a part of packaging that can be recycled and reformulated into the same raw material from which it was made. The 'recyclable' product goes from the consumer to the middlemen and back to the manufacturers (Sarmaniotis, 1987). In a 'reverse' distribution channel the consumer becomes the 'producer' of the 'recyclable' product, he becomes the first link of the channel, instead of the last one he usually is in any traditional, conventional distribution channel. In this sense, recycling is an issue of post-purchase consumer behavior, as it is an activity that consumers undertake after a particular purchase has been made or even after the product of this purchase has been used.

There is a broad agreement in the literature that, although consumers' awareness and concern about the litter problem is constantly increasing, participation in recycling programs is still rather low (Troy, 1994; Peattie, 1995, p. 154; Shrum *et al.*, 1996; Wong *et al.*, 1996). Greece among its other counterparts in the European Union has to comply to the directive 94/62/E.C. by taking the necessary measures in order to achieve by 31 December 2005 the following: a) 50% as a minimum by weight of packaging waste to be recovered b) 25% as a minimum by weight of the totality of packaging materials contained in the packaging waste to be recycled, with a minimum of 15% by weight for each packaging material. In Greece local authorities have launched recycling programs during the late eighties. Consumers' participation is lower comparatively with the other European countries (Sarmaniotis *et al.*, 1999). Thus, local authorities need trustful information about the characteristics of recyclers and non-recyclers in order to create effective strategies and encourage participation.

The international literature indicates that since the early seventies, but mainly during the last 15 years, academic research, related to recycling, has placed focus upon the investigation of the determining factors that can better describe and predict recycling behavior. This task has been proven remarkably difficult (Shrum and McCarty, 2001). Relevant literature reviews, such as those by Shrum *et al.* (1994), Schultz *et al.* (1995) and Tilikidou and Zotos (1999), agree that no revealed determinants of recycling, that are commonly accepted, have come into light yet. Research has to go further into investigating as many as possible independent variables, either demographic or psychographic, in order to reveal the most powerful of them at a certain time and place.

This research study aimed to investigate recycling behavior in relation to specific recycling attitudes and selected demographic and psychographic characteristics. Such a model aimed to reveal the most powerful determinants of recycling behavior at Thessaloniki region. It has been previously advocated that consumer behavior can be better understood in terms of personal values (Granzin and Olsen, 1991; Richins, 1994; Shrum and McCarty, 2001). Following this suggestion focus was placed to the psychographics, as to which *Individualism* and *Collectivism* were chosen, previously used by Shrum and McCarty (2001), while *Materialism*, which was also selected, is for the first time introduced and examined in consumer behavior related to recycling.

## **Review of the literature**

Most of the papers so far conclude that determining the characteristics of recyclers and non-recyclers is not an easy task (Vining and Ebreo, 1990; Gamba and Oskamp, 1994; McCarty and Shrum, 1994; Sarmaniotis *et al.*, 1999). Demographic characteristics, which are undoubtedly the best segmentation tool, are considered rather poor predictive factors of recycling behavior. Previous research findings are rather ambiguous or even contradictory (Shrum *et al.*, 1994; Schultz *et al.*, 1995). Reviewing results regarding *age* Shrum *et al.* (1994) commented that recycling had been a relative novelty ten to fifteen years ago, while nowadays it is becoming a mainstream, so everyone, regardless of age, participate in recycling. It is questionable though, whether this is the case in Greece as well, where only a minority of consumers participate in recycling (Delistavrou, 1999; Sarmaniotis *et al.*, 1999). In most cases *sex* has not been indicated as a discriminative factor (Arbuthnott, 1977; Antil, 1984; Vining and Ebreo, 1990; Sarmaniotis and Tilikidou, 1994, p. 88). *Education* and *income* provide similar patterns. Most of the studies too failed to prove significant relationships between recycling behavior and either income (Koenig, 1975; Shrum *et al.*, 1995; Sarmaniotis and Tilikidou, 1994, p. 88) or education (Koenig, 1975; Webster, 1975; Arbuthnott, 1977; Vining and Ebreo, 1990; Shrum *et al.*, 1995; Sarmaniotis and Tilikidou, 1994, p. 88). There have been though some, few in number studies, in which a positive relationship between recycling behavior and income, was found such as those by Webster (1975), Vining and Ebreo (1990), Delistavrou (1999)

and Tilikidou (2001). A positive relationship too between recycling behavior and education was found in a number of studies regarding the same geographical area of Greece (Sarmaniotis and Tilikidou, 1994, p. 88; Delistavrou, 1999; Tilikidou, 2001).

Attitudes – behavior link is probably the most researched issue in recycling related research. Positive relationships have been indicated in some cases (McGuinness *et al.*, 1977; Kallgren and Wood, 1986; Tilikidou, 2001), while in others no relationship was found (Oskamp *et al.*, 1991; Ebreo and Vining, 1994). McCarty and Shrum (1994) and Shrum and McCarty (2001) have indicated a negative relationship between recycling *inconvenience* and recycling behavior and a positive relationship between recycling *importance* and recycling behavior. There is an agreement in the literature that specific recycling attitudes are better predictive factors than general social attitudes or general pro-environmental attitudes (Shrum *et al.*, 1994; Martin and Simintiras, 1995; Schlegelmilch *et al.*, 1996).

Hopper and Nielsen (1991) suggested that social norms, which represent the values and attitudes of significant members of a community, might influence recycling behavior if adopted on a personal level and hence become personal norms. It is still questionable though what activates personal norms to translate into consumer behavior. A clear majority of the previous research findings suggests that psychographics are better predictive factors than demographics in consumer research. A number of studies have examined the influence of personality or trait-type variables on recycling behavior (Shrum *et al.*, 1994; Delistavrou, 1999; Tilikidou, 2001) Among others, positive relationships have been indicated 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) and *locus of control* by Shrum and McCarty (2001).

### **Recycling and psychographics**

McCarty and Shrum (1994) and Shrum and McCarty (2001) followed the ‘values-attitudes-behavior’ approach in order to understand better recycling behavior. They were the first to introduce in recycling behavior research the constructs of *Individualism* and *Collectivism*. They treated these constructs as fundamental values of a person and revealed indirect, through recycling attitudes, relationships with recycling behavior. Their model was based on the idea that a consumer is not likely to receive any immediate benefit by engaging into recycling behavior. But the

importance of immediate benefits can be considered as being individualistic. On the other hand people, who consider the implications of their behavior upon others and upon the society, can be characterized as collectivists. Thus, they suggested that a behavior such as recycling, which includes focus on social benefits, may be faced as a “function of individualism and collectivism” (Shrum and McCarty, 2001). A rather relevant to Individualism and Collectivism constructs is the concept of *Materialism*. A number of authors have conceptualized materialism or aspects of materialism. Moschis and Churchill (1978, p. 607) have defined materialistic attitudes as orientations emphasizing possessions and money for personal happiness and social progress. Richins (1987, p. 352) describes materialism as “. . . the idea that goods are a means to happiness; that satisfaction in life is not achieved by religious contemplation or social interaction, or a simple life, but by possession and interaction with goods”.

It has been previously claimed that materialism might be found related to any type of pro-environmental behavior (Tilikidou, 2001). According to Richins and Dawson (1992) and Richins (1994) materialism is a value that represents the individual perspective, which regards a central role of possessions in his/her life, happiness and success. It can reasonably be assumed then, that consumers’ attitudes and beliefs relevant to material goods and pleasures relates to their recycling behavior, since recycling behavior aims to environmental protection. Environmental protection, as noted earlier, is associated with sustainable development, which requires drastic decrease of over-consumption and consequently affects consumers’ relationships with material goods and pleasures. Consumers, who obtain satisfaction and happiness by material possessions and who are self-centered, are probably less likely to obtain satisfaction by engaging in pro-environmental activities (such as recycling behavior), which, as Shrum and McCarty (2001) pointed out, benefit more the society in general and the future generations than the individual performing the behavior. In this research effort it was considered that an interesting path to follow was to include a construct of materialism together with, the above mentioned, individualism-collectivism construct in the same survey and examine the relationship of each construct with a self-reported recycling behavior scale. In addition, a specific recycling attitudes construct was added to the model and the examination was also assisted by selected demographic characteristics.



So, it was assumed that consumers, who hold higher than their counterparts recycling attitudes and collectivistic values, should be more engaged in recycling behavior, while on the contrary consumers, who hold higher than their counterparts individualistic as well as materialistic values, should be less engaged in recycling behavior. With regard to demographics no preliminary assumption was made as the literature did not provide a clear and solid direction to follow.

## **Methodology**

### ***Sample and procedure***

The data of the study were collected through a survey by personal interviews of members of households in the urban area of Thessaloniki Greece. The population of the selected area is N=247,668 households, the sample size was n=424 and the sampling method was a combination of the two stage area sampling together with the systematic method (Zikmund 1991, p. 528). Undergraduate students of the Marketing Department of Thessaloniki TEI were employed as interviewers and a part-time lecturer was assigned as a field manager. The instrument of the survey was a structured questionnaire that included 38 variables.

### ***Variables measurement***

All the included in the questionnaire measures are presented in Table 1. *Recycling behavior* was the main dependent variable of the study. In order to measure recycling behavior, four self-reported items were used, measured on a 5-point frequency scale from 1=Never to 5=Always. It is noted that each item used represents one of the recyclable materials, for which there are recycling programs at consumers' disposal. Other recyclable materials such as fabric, batteries, organics etc were not included, as no relevant recycling programs are delivered in Greek neighborhoods yet. *Recycling Attitudes* were measured on a 15-item measure, developed by Tilikidou (2001). It was measured on a 5-point Likert scale from 1= Strongly Disagree to 5=Strongly Agree. When this attitudinal measure was previously applied in the same geographical area (Tilikidou, 2001), it had resulted in a Cronbach's alpha value of 0.8840 indicating 'exemplary' reliability according to Robinson *et al.* (1991, p. 13). In that study, its validation was examined through correlation with Obermiller's (1995) similar measure and the coefficient found was 0.682, indicating satisfactory

convergent validity according to Tull and Hawkins (1993, p. 314). The measures of *Individualism* and *Collectivism* were adopted from Shrum and McCarty (2001). The first construct contained 3 items and the second one contained 5 items, all measured on a 5-point importance scale with anchors of 1= Not at all Important to 5=Extremely Important. The measure of *Materialism* was adopted from Richins (1987). It contains 6 items, all measured, in this study, on a 5-point Likert scale from 1=Strongly Disagree to 5=Strongly Agree. During its development process factor analysis revealed that 4 items tapped a personal materialism factor with an alpha of 0.73 and two items tapped a general materialism factor with an alpha of 0.61 (Robinson *et al.*, 1991, p. 123). As to demographics gender, age, education, income and occupation of the respondent were selected. The scales were adopted from the National Statistical Service of Greece (N.S.S.G., 1993 and 1997).

## **Results**

For the data analysis SPSS 8.0 and SYSTAT 9.0 software packages were used. The data collection provided 424 usable questionnaires. The demographics of the sample were tested though chi-square and no significant differences with the relevant variables of the population were found. All variables were examined in two forms: one continuous and one categorical (Table 2). In order to transform the variables into a categorical form all variables were recoded into 5 categories. The continuous dependent variable of Recycling Behavior takes theoretical values form 4 to 20 and resulted in an alpha value of 0.6017. It indicated mean=8.96 and std. dev.=3.39 (Table 2). The relevant categorical variable indicated that only the 12.5% of the respondents can be characterized as frequent recyclers as they scored more than 14 in all the recyclable materials, while the 69.8% of the respondents scored less than 10. It has to be taken into consideration that there is a 17.7% of the respondents who reported an ‘occasional’ engagement into recycling activities, as they scored from 11 to 13 (Table 3). It is also noted that consumers seem to be more engaged in recycling paper (see item B01, mean: 3.11), somewhat less in recycling aluminium cans (see item B02, mean: 2.26) and to an even lesser extent they seem to engage in recycling plastic bottles and glass (see items B03 and B04, means: 1.66 and 1.94 respectively) (Table 1).

**Take in Table 1, Table 2, Table 3**

With regard to Recycling Attitudes the continuous relevant variable takes theoretical values from 15 to 75 and resulted in an alpha value of 0.8356. It indicated mean=61.74 and std. dev.=6.39 (Table 2). The relevant categorical variable indicated that 55.7% of the respondents scored from 52 to 63 while 35.8% from 64 to 75 (Table 3). It is noted that a high level of attitudes was reported, considerably higher than the level of behavior. This observation confirmed once more the 'gap' between behavior and attitudes, which previous research findings have many times indicated (Kallgren and Wood, 1986; Shrum *et al.*, 1994; Ölander and Thøgersen, 1995; Sarmaniotis *et al.*, 1999; Tilikidou, 2001). The larger means were obtained by the items A09 and A01, indicating that consumers agree to the importance of recycling, as a great help to environmental protection, followed by the items A04 and A12, which concern the natural resources conservation and the reduction of the litter going to the landfill sites. The smaller mean was given by the item A07, which indicates that the major problem for participation in recycling is the inconvenience of sorting out and transporting the materials to the recycling bins. This finding may be explained by the fact that the recycling bins are few in the investigated area and the consumers are usually obliged to use their car in order to transport the materials. It is also pointed out that, when fuss caused by the recycling effort is joined with the obtained benefit as in items A03 and A11, the relevant attitudes increase. Furthermore, it seems that the participation of other people (elsewhere called 'social norm') influences the individual's willingness as item A10 indicates (Table 1).

With regard to the measure of Materialism the continuous variable takes theoretical values from 6 to 30 and resulted in an alpha value of 0.6946. It indicated mean=17.74 and std. dev.=3.96 (Table 2). The relevant categorical variable indicated that the larger percentage of the respondents (43.2%) reported average level of Materialism (Table 3). The larger means were obtained by the items C04 and C01 (Table 1), which express the consumers' desire to buy more things and to possess really nice things.

As to the measure of Collectivism, the continuous variable takes theoretical values from 5 to 25 and resulted in an alpha value of 0.7722. It indicated mean=16.39 and std. dev.=2.59 (Table 2). The relevant categorical variable indicated that a rather small percentage (11.8%) of the respondents scored less than 13, the largest percentage (54.5%) scored from 14 to 17, while there is also a considerable

percentage (33%) of respondents, who scored more than 18 (Table 3). The results indicated an average with a tendency to high level of Collectivism.

Last, with regard to the measure of Individualism, the continuous variable takes theoretical values from 3 to 15 and resulted in an alpha value of 0.6394. The rather low internal consistency estimate of Individualism is attributed to the limited number of items in the measure (Spector, 1992, p. 31). It indicated mean=9.08 and std. dev.=2.91 (Table 2). The relevant categorical variable indicated that the 32.2% of the respondents scored more than 11 (high level of Individualism), while the 30.6% scored less than 7 (low level of Individualism). The relevant majority of the respondents reported (37%) average level of Individualism (Table 3).

One-way ANOVA was then employed between Recycling Behavior and the demographic variables. As no statistically significant results were obtained, the demographic variables were downgraded as follows: Age into 4 categories (15-24, 25-34, 35-44 and >45); Education into 3 categories (elementary, high school and degree); Income into 3 categories in million Drs. (<2.5, 2.5 – 5.5 and >5.5) and Occupation into 5 categories (professionals, employees, retired, housepersons and others). The homogeneity of variance for each demographic variable was tested through Levene's test. The differences between the means of the categories of each demographic variable were examined through the Least Significant Difference test.

A statistically significant relationship was found between Recycling Behavior and Age ( $p < 0.1$ ) indicating that the largest score is obtained by consumers of 35 to 44 years old (Figure 1). The relationship between Recycling Behavior and Education was also found to be statistically significant ( $p < 0.1$ ) indicating that consumers holding a degree scored higher in the Recycling Behavior items (Figure 2) Occupation was also found to be related to Recycling Behavior and the relevant relationship found ( $p < 0.1$ ) indicated that employees were those who scored higher in the Recycling Behavior items (Figure 3).

### **Take in Figure 1, Figure 2, Figure 3.**

Pearson's parametric correlation was then calculated (Table 4) and indicated the following statistically significant ( $p < 0.000$ ) relationships: A positive, moderate ( $r = 0.362$ ) relationship between Recycling Behavior and Recycling Attitudes; a negative, also moderate but higher ( $r = -0.436$ ), relationship between Recycling

Behavior and Materialism and a positive, weak ( $r=0.205$ ) relationship between Recycling Behavior and Collectivism. The relationship between Recycling Behavior and Individualism was found to be insignificant (Table 4).

#### **Take in Table 4**

Multiple regression of Recycling Behavior versus Recycling Attitudes, Materialism, Collectivism and Individualism was then employed (Table 5). Stepwise method resulted in a equation with two significant predictive variables: Materialism and Recycling Attitudes. The adjusted R square was 0.251, meaning that 25.1% of the respondents' Recycling Behavior can be explained by the interactive ability of Materialism and Recycling Attitudes.

The resulting equation was:

$$\text{Recycling Behavior} = 5.841 - 0.365 \text{ Materialism} + 0.263 \text{ Recycling Attitudes}$$

The equation indicates that for every unit that respondents' Materialism decreases their Recycling Behavior will increase by 0.365 units if the other predictor variable remains constant; it also indicates that for every unit that the respondents' Recycling Attitudes increases their Recycling Behavior will increase by 0.263 if the other predictor variable remains constant.

#### **Take in Table 5**

In order to obtain additional information Hierarchical cluster analysis was employed. Cluster analysis makes no distinction between dependent and independent variables. Cluster analysis groups cases or variables on the basis of absolute differences (distances) across a series of variables (Sudman and Blair, 1998, p. 558). Hierarchical cluster analysis is used to group variables into relatively homogeneous groups (Malhotra, 1999, p. 610). This technique can verify the face validity of the constructs used in a model and provides fruitful information about the relationships of association among the variables.

A three-cluster solution seemed to be interpretable (Figure 4). In the first cluster the items B04, B02, B03, C05 and C06 are joined together, while in the second cluster the items A07, B01, A10, A11, C01, C02, C03, D08, D07 and D06 are joined together and last in the third cluster the items C04, D01, D04, D05, D03, D02, A15, A14, A13, A12, A09, A01, A04, A03, A05, A06, A08 and A02 are joined together.

#### **Take in Figure 4**

In the first cluster it is observed that the three items of the Recycling Behavior (which regard the less frequently recycled materials) fall very close to the two items of Materialism (C05, C06). According to Richins (1987, p.352) these two items formulate the second factor of Materialism, which expresses a General Materialism.

The second cluster starts with the negatively scored item A07 of Recycling Attitudes, which refers to the inconvenience of recyclers. The most frequent item of Recycling Behavior, the item B01 (recycling of paper), comes next and it is followed by the other two negatively scored items of Recycling Attitudes (A10, A11). Then the items C01, C02 and C03 follow. These items together with the item C04 according to Richins (1987, p. 352) formulate the first factor of Materialism that express a Personal Materialism and it is very interesting that in this cluster they are followed by the items D08, D07 and D06, which according to McCarty and Shrum (1994) formulate the measure of Individualism. It is obvious that Personal Materialism and Individualism are very close in terms of meaning. It is revealed that the issues concerning the inconvenience of recycling, the unwillingness to participate in the relevant activity, since it is not the social norm and the emphasis on the fuss that recycling although beneficial causes, are joined together with Individualism and mainly with Personal Materialism. Thus, this cluster formulates a set of attitudinal-psychographic factors, which surround the most frequently recycling behavior item, the paper. Since the other three recycling behavior items are joined together with the items of General Materialism in the first cluster, it seems that Materialism, attitudes that concern inconvenience and Individualism in declining importance influence consumers' participation.

The third cluster starts with the remaining item (C04) of Personal Materialism, which is the 'softest' in meaning item of Materialism (Table 1). Then, all the items of the measure of Collectivism are placed and they are joined together with all the positive items of the Recycling Attitudes measure. The position of the items indicates face (content) validity to both Collectivism and Recycling Attitudes constructs. It seems that attitudes, that concern the importance of recycling to the environmental protection as well as the benefits of recycling, are closely associated with personal values that concern group (society) participation.

In overall from the study of the distances between the items in all three clusters it is observed that Materialism is the most affecting factor of Recycling Behavior, being closely associated with negative Recycling Attitudes and Individualism. It is also observed that positive Recycling Attitudes are closely associated with Collectivism.

## **Discussion**

The results indicated that middle-aged, employees, who hold a degree, who mainly value materialism less, hold stronger specific recycling attitudes and share stronger collectivistic values, are those consumers who engage in Recycling Behavior more than their counterparts. More specifically, with regard to age, the result found is inconsistent with previous research in the same geographical area, the main body of which had not indicated any statistically significant relationship so far (Sarmaniotis and Tilikidou, 1994, p. 88; Delistavrou, 1999; Tilikidou, 2001). It is noted though that there is an exception of one relevant study (Sarmaniotis *et al.*, 1999) in which the same category or respondents' age (35-44 years old) was found to engage more in Recycling Behavior. The result of this study is also inconsistent with Shrum's *et al.* (1994) opinion regarding the USA, that everyone participates in recycling. As to occupation, the result found in this study is consistent with previous research findings in the same geographical area (e.g. Sarmaniotis *et al.*, 1999; Tilikidou, 2001), which also indicated that employees are those who are used to recycle more than their counterparts. The same consistency is observed regarding education since almost all reviewed studies in the same geographical area (e.g. Sarmaniotis and Tilikidou, 1994; Delistavrou, 1999; Sarmaniotis *et al.*, 1999; Tilikidou, 2001) indicated that consumers with higher education are more involved in recycling. It is noted though, that this result is inconsistent with the relevant findings of studies in other countries, which have not found any relationship between Recycling Behavior and education, as the review of the literature indicated.

With regard to attitudes, the result found confirms the great majority of the previous research findings, which indicated that specific recycling attitudes constructs correlate positively at a rather moderate level with Recycling Behavior, as mentioned in the review of the literature. With regard to psychographics Collectivism was found

to correlate positively, although weakly to Recycling Behavior, while Individualism was found to be unrelated. These results are not directly comparable with those obtained by Shrum and McCarty (2001), who succeeded in revealing indirect (through attitudes) relationships between Recycling Behavior and Collectivism/Individualism. In this study only Collectivism was found to be related to Recycling Behavior positively, as expected, although rather weakly. Individualism failed to provide any clear statistically significant relationship with the main dependent variable. This construct, short as it is, probably needs improvement of its internal consistency. It is interesting though that hierarchical clustering revealed that this measure is closely associated in terms of meaning with Personal Materialism.

However, the most interesting finding of this study, is obtained by the revealed relationship between Recycling Behavior and Materialism, which was indicated by all the statistical techniques used. Materialism provided the relevantly higher correlation coefficient with Recycling Behavior, it was found to be the stronger predictor variable in multiple regression and hierarchical clustering revealed the close association of its items to the items of Recycling Behavior and to the inconvenience items of Recycling Attitudes. So, it is apparent that consumers' personal values, concerning the possession of material goods and the happiness they perceive to obtain through money, are the main constrains for their engagement in recycling. It seems logical to conclude that consumers who hold high personal materialistic values, such as buying many nice things, are not those people who would understand the importance and the concept of sustainable development, which requires drastic decrease of over-consumption and demands conservation. They are not the kind of sensitive people who would be self-motivated by their personal values to undertake the inconvenience to sort out and transport their waste to the recycling bins.

## **Conclusions**

Recycling in Thessaloniki is not a wide spread activity in which, all the citizens of this city are frequently engaged. Recycling can not be considered the 'social norm' in the region, as it is in other European countries, or the mainstream as Shrum *et al.* (1994) reported for U.S.A. In fact, in Thessaloniki there is a 30% of consumers, who are engaged in recycling from occasionally to more frequently, while



recycling of paper is the most frequent post-purchase activity that the consumers of Thessaloniki undertake to contribute to the environmental protection.

This research found that selected demographic and psychographic characteristics, the most powerful of which is Materialism, could help in the better understanding of Recycling Behavior. We now know that age, education and occupation can describe recyclers in the region. It was also revealed that although attitudes-behavior link remains an indisputable reality, the investigation of appropriate psychographic characteristics could provide better understanding and/or predicting of the consumers' recycling behavior. The incorporation of Materialism as the stronger predictor of Recycling Behavior, even stronger than Recycling Attitudes, in the multiple regression equation, together with the higher correlation coefficient obtained by Materialism, than the one obtained by Recycling Attitudes or Collectivism, indicates that the specific psychographic characteristic is the strongest influential factor. Thus, the major finding of this piece of research, is that the consumers' who value more the possession of material goods and feel more happy by obtaining more money, do not bother to activate in order to contribute to the environmental protection by recycling waste materials. Of course, the relationship between the consumers' level of Materialism and their Recycling Behavior need further validation by further investigation either in the same or, of higher interest, in different geographical areas. In addition, it was revealed that the consumers' level of Collectivism seem to influence their compliance into recycling programs. It seems that consumers who take under consideration the implications of their actions upon others and the society in general are the most frequent recyclers. This last finding is consistent with the meaning of sustainable development, which by definition requires to take action considering its implications to others (e.g. future generations). It is not so surprising that, the consumers' level of Individualism did not provide evidence of direct relationship with their Recycling Behavior, as it is more difficult for the individuals to report focus on their personal rather than social benefits. Furthermore, the measure of Individualism, short as it is, did not provide extensive evidence of reliability.

In fact, all three psychographic constructs need improvement of internal consistency and further validation at a hope of achieving better measurement accuracy in the future. The Recycling Behavior scale too, faced in this survey the usual with the self-reported behavior scales difficulties in obtaining the desirable measurement

accuracy. As Ajzen and Fishbein (1977) commented, though self-reports of behavior are usually accurate, the accuracy can not be taken for granted. Especially in a social desirable case such as environmental protection, there is always a possibility of an over-reporting in the findings. Future research may try to obtain better accuracy by asking through survey the percentage of each, separate, waste material that the respondents recycle and compare the findings with the reported by local authorities relevant percentages in a certain geographical area at a certain time. Moreover, other aspects may enrich our understanding of recycling behavior if included in future research efforts. For example, very recently a pilot program concerning the recycling of organics was established in a suburb twenty kilometers outside the city of Thessaloniki. Since in many countries the recycling of organics through composting is the largest component of domestic waste recycling, a relevant future research effort might lead to potentially interesting implications for expanding the recycling of organics in the whole region. Other factors, for example the distance from the nearest recycling bin or the neighborhoods' effect, which were outside of the scope of this study, might provide interesting results, that can have an influence on the picture of ultimate recycling behavior.

At the moment local authorities and businesses in the area should take into consideration that their leading target group are middle-aged, better educated employees, people who value the importance of recycling as a great help to environmental protection although they find the activity very inconvenient. They are also people ready to help others and co-operate into group activities. But most of all, they are people with a low level of materialism, consumers who do not place the possession of many and expensive things in the center of their lives and happiness.

Local authorities, which have to comply to the EU directives to increase citizens' participation in recycling, should acknowledge the need for many more recycling bins around the neighborhoods to reduce inconvenience. The communication messages should be build upon the following ideas: a) the acknowledgement of the time and effort needed to sort out and transport the recyclable materials, b) the emphasis on the importance of recycling to the protection of the environment, c) the benefits of recycling (natural resources conservation, reduction of litter) d) the happiness derived by the participation in a group (society) activity and mainly to e) the promotion of anti-materialistic ideas such as the fact that

material possessions should mean less in comparison with the urgent need to protect the environment, the world's common home.

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**Table 1 : Descriptive statistics of all items**

Items		N	Mean	Median	Std. Dev.
<b>Recycling Attitudes</b>					
A01.	Recycling is important	424	4.4717	4.000	.5494
A02.	Each consumer can contribute to the solution of the litter problem in his/her district	424	4.1132	4.000	.7968
A03	Recycling benefits are worth-while my time and effort	424	4.2028	4.000	.6387
A04	Recycling helps to natural resources conservation	422	4.3483	4.000	.5965
A05	Government should issue regulations about the use of recycled and recyclable materials in products packaging	424	4.2005	4.000	.7687
A06	Consumers should force the producers to use recyclable materials in their products packages	424	4.0401	4.000	.7875
A07	It is rather inconvenient to sort out and transport the recycling materials *	423	3.2009	3.000	1.0731
A08	It is my personal responsibility to help recycling efforts	420	3.9810	4.000	.7276
A09	Recycling is a great help to environmental protection	422	4.5450	5.000	.6623
A10	It is useless to recycle as long as not many other people do the same *	424	3.6958	4.000	1.0826
A11	Recycling is more fuss than benefit *	424	4.0024	4.000	1.0234
A12	Recycling reduces litter going to the landfill sites	422	4.3436	4.000	.5953
A13	Recycling contributes to energy conservation	420	4.1714	4.000	.6728
A14	I get satisfaction by taking part into recycling	420	4.1071	4.000	.6843
A15	Recycling benefits return back to the society	421	4.1805	4.000	.7275
<b>Recycling Behaviour</b>					
B01	Recycle paper	424	3.1061	3.000	1.3049
B02	Recycle aluminium cans	424	2.2594	2.000	1.2878
B03	Recycle plastic bottles	424	1.6627	1.000	1.0044
B04	Recycle glass	424	1.9363	1.000	1.3866
<b>Materialism</b>					
C01.	It is important for me to have really nice things	424	3.6509	4.000	1.1773
C02.	I would like to be rich enough to buy anything I want	424	3.4741	4.000	1.2278
C03	I'd be happier if I could afford to buy more things	424	3.1863	3.000	1.2626
C04	It sometimes bothers me quite a bit that I can't afford to buy all the things I want	423	3.8156	4.000	.8510
C05	People place too much emphasis on material things *	423	1.7116	2.000	.6933
C06	It's really true that money can buy happiness	423	1.9102	2.000	.9522
<b>Collectivism</b>					
D01	Working hard for the goals of a group even if it doesn't result in personal recognition	424	3.8302	4.000	1.0335
D02	Being a cooperative participant in group activities	424	4.2642	4.000	.7966
D03	Readily helping others in need of help	424	4.3915	5.000	.7642
D04	Doing what is good for most of the people in the group, even if it means that the individual will receive less	421	3.8860	4.000	.9618
D05	Sharing with others	423	4.1111	4.000	.9233
<b>Individualism</b>					
D06	Being unique. different from others in many respects	424	3.2830	3.000	1.2717
D07	Being competitive with others	424	2.7665	3.000	1.3190
D08	Working independently from others	424	3.0283	3.000	1.2201

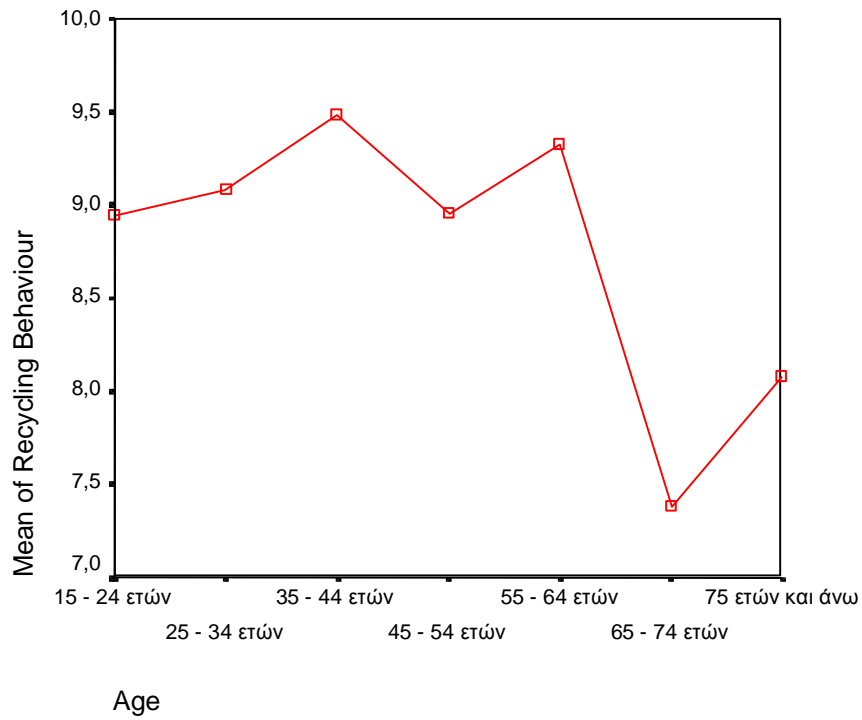
\* reverse coded items

**Table 2: Descriptive statistics of all continuous and categorical variables**

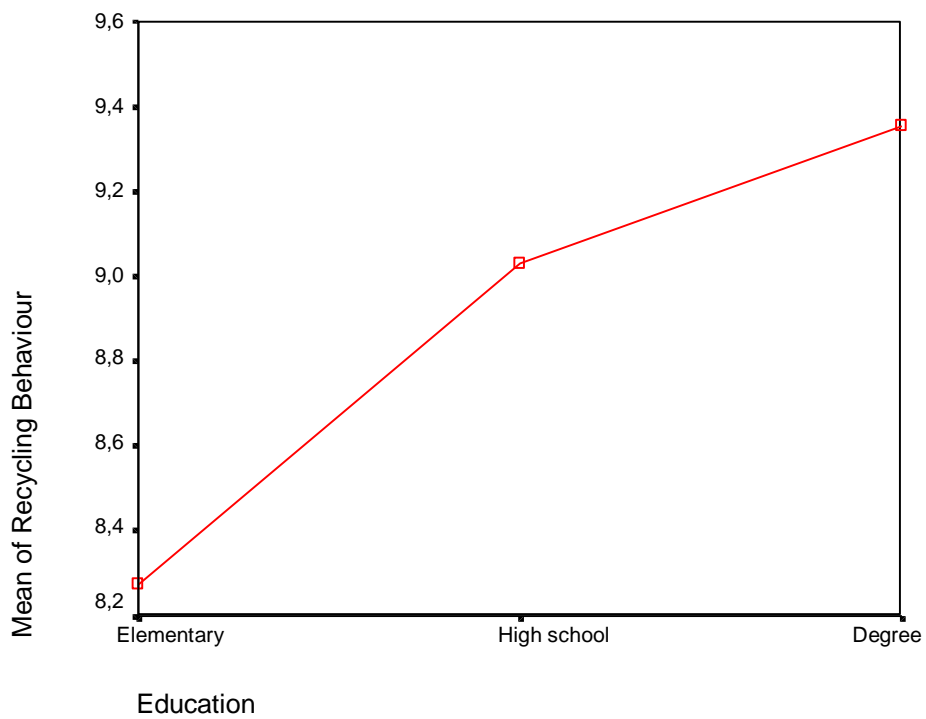
<b>Variables</b>	<b>N</b>	<b>Range</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Mean</b>	<b>Std. Deviation</b>	<b>Alpha</b>
<b>Continuous</b>							
<i>Recycling Behaviour</i>	424	4 – 20	4.00	20.00	8.9646	3.3863	.6017
<i>Recycling Attitudes</i>	410	15 – 75	33.00	75.00	61.7366	6.3876	.8356
<i>Materialism</i>	423	6 – 30	7.00	28.00	17.7400	3.9581	.6946
<i>Collectivism</i>	421	5 – 25	7.00	20.00	16.3895	2.5922	.7722
<i>Individualism</i>	424	3 – 15	3.00	15.00	9.0778	2.9061	.6394
<b>Categorical</b>							
<i>Recycling Behaviour</i>	424	1 – 5	1.00	5.00	2.0778	1.0591	
<i>Recycling Attitudes</i>	410	1 – 5	2.00	5.00	4.3146	.5775	
<i>Materialism</i>	423	1 – 5	1.00	5.00	2.9267	.8526	
<i>Collectivism</i>	421	1 – 5	1.00	4.00	3.1971	.6807	
<i>Individualism</i>	424	1 – 5	1.00	5.00	3.0212	1.1390	

**Table 3: Frequencies of the categorical variables**

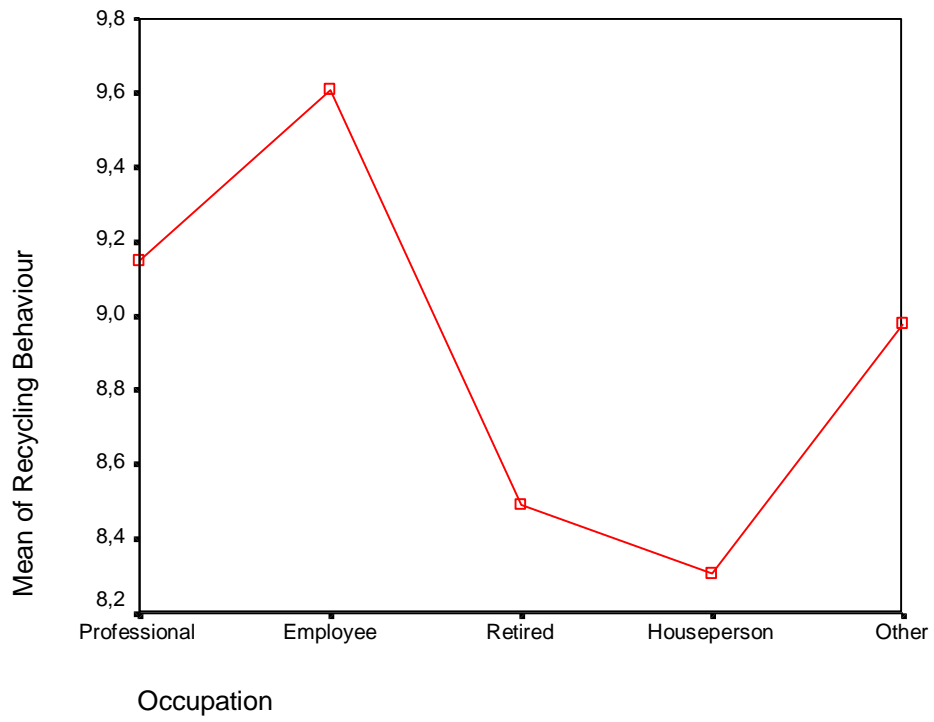
<i>Recycling Behaviour</i>	<b>Frequency</b>	<b>Percent</b>
4 – 7	155	36.6
8 – 10	141	33.3
11 – 13	75	17.7
14 – 16	46	10.8
17 – 20	7	1.7
Total	424	100.0
<i>Recycling Attitudes</i>		
15 – 27	0	0
28 – 39	1	.2
40 – 51	21	5.0
52 – 63	236	55.7
64 – 65	152	35.8
Total	410	96.7
<i>Materialism</i>		
6 – 10	17	4.0
11 – 15	113	26.7
16 – 20	183	43.2
21 – 25	104	24.5
26 – 30	6	1.4
Total	423	99.8
Missing	1	.2
Total	424	100.0
<i>Collectivism</i>		
5 – 9	7	1.7
10 – 13	43	10.1
14 – 17	231	54.5
18 – 21	140	33.0
22 – 25	0	0
Total	421	99.3
Missing	3	.7
Total	424	100.0
<i>Individualism</i>		
3 – 5	46	10.8
6 – 7	84	19.8
8 – 10	157	37.0
11 – 12	89	21.0
13 – 15	48	11.3
Total	424	100.0



**Figure 1: Mean plot between Recycling Behaviour and age**



**Figure 2: Mean plot between Recycling Behavior and education**



**Figure 3: Mean plot between Recycling Behaviour and occupation**

**Table 4: PEARSON’S CORRELATION COEFFICIENTS,  $r$ , OF ALL CONTINUOUS VARIABLES**

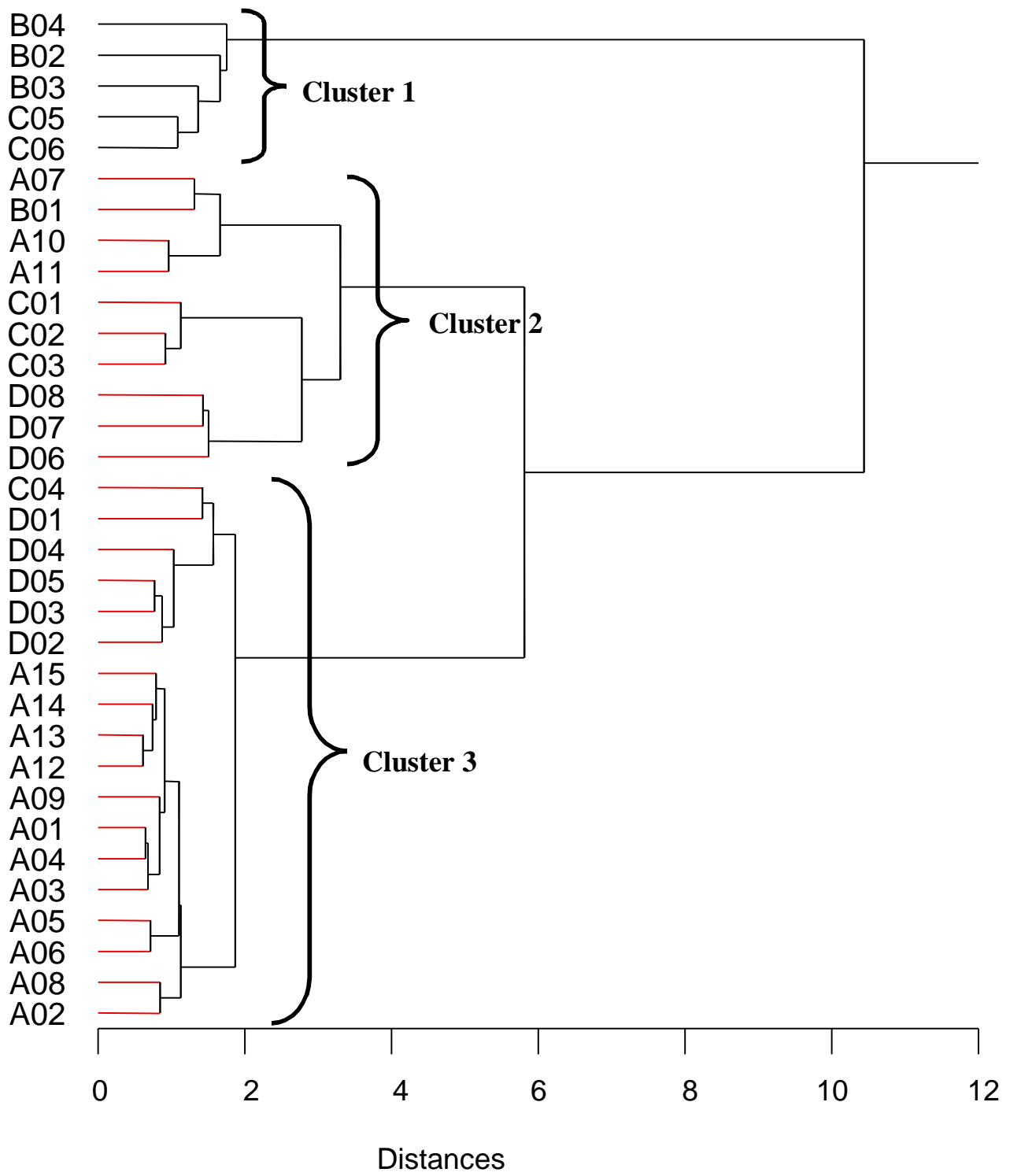
VARIABLE	RECYCLING BEHAVIOUR	RECYCLING ATTITUDES	MATERIALISM	COLLECTIVISM	INDIVIDUALISM
<b>Recycling Behaviour</b>					
$r$	1.000	0.362	-0.436	0.205	-0.071
$p$	.	0.000	0.000	0.000	0.144
$n$	424	410	423	421	424
<b>Recycling Attitudes</b>					
$r$	0.362	1.000	-0.274	0.413	-0.103
$p$	0.000	.	0.000	0.000	0.038
$n$	410	410	409	408	410
<b>Materialism</b>					
$r$	-0.436	-0.274	1.000	-0.269	0.182
$p$	0.000	0.000	.	0.000	0.000
$n$	423	409	423	420	423
<b>Collectivism</b>					
$r$	0.205	0.413	-0.269	1.000	-0.126
$p$	0.000	0.000	0.000	.	0.009
$n$	421	408	420	421	421
<b>Individualism</b>					
$r$	-0.071	-0.103	0.182	-0.126	1.000
$p$	0.144	0.038	0.000	0.009	.
$n$	424	410	423	421	424

Note:  $r$ , Pearson’s coefficient;  $p$ , significance level;  $n$ , sample size.

**(Όπως τροποποιήθηκε από τα proofs του άρθρου.)**

**Table 5: Multiple regression results**

Model	Variables entered	Adjusted R Square	Un-standardised Coefficients B	Standardised Coefficients Beta	t	Sig.	Tolerance	VIF
	(Constant)	.251	5.841		3.283	.001		
	<i>Materialism</i>		-.311	-.365	-8.158	.000	.923	1.083
	<i>Recycling Attitudes</i>		.139	.263	5.889	.000	.923	1.083
Model	Excluded Variables			Beta In	t	Sig.	Tolerance	VIF
	<i>Collectivism</i>			.015	.308	.758	1.239	.798
	<i>Individualism</i>			.025	.571	.568	1.040	.898



**Figure 4: Hierarchical cluster dendrogramme**