

Sarmaniotis, C. and Tilikidou, I. (2000). Consumer Attitudes towards Recycling: Construction of a Reliable and Valid Multi-item Measure. *MEDIT*, no. 2, pp. 48-51. (Υποφάκελος 6 – Αντίγραφο 4)

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MEDIT,
I.A.M.,
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May 2, 1999

Dear Sir,

Please accept our paper, titled Consumer Attitudes Towards Recycling: Construction of a Reliable and Valid Multi - item Measure, for consideration in order to be published in your journal.

Thanking you in advance,

Yours Sincerely

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CONSUMER ATTITUDES TOWARDS RECYCLING:
CONSTRUCTION OF A RELIABLE AND VALID MULTI -
ITEM MEASURE

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ABSTRACT

Developing recycling programs requires the conduct of consumer recycling behavior research. Attitudes towards recycling is considered to be the most important predictor variable in relative international literature. The crucial point in attitudes measurement is assuring the validation of a sufficient measure.

The aim of this paper is to construct a reliable and valid multi - item measure of recycling attitudes. Following a validated procedure, factor analysis is employed, alpha-Cronbach and split-half reliability are calculated and convergent validity is assessed. A 13 item scale is obtained, which might be proved useful in future research on a local or an international level.

RÉSUMÉ

Pour développer des programmes de recyclage il faut étudier le comportement du consommateur envers le recyclage. A la littérature relative les attitudes envers le recyclage sont considérées être la variable la plus importante du comportement envers le recyclage. Le point crucial de la mesure des attitudes est d'assurer la validité d'une mesure suffisante. Le but de cet article est de construire une mesure complexe crédible et valable des attitudes de recyclage.

En suivant une valable procédure, l'analyse factorielle a été employée, l'alpha-Cronbach et le split-half crédibilité ont été calculés ainsi que la validité convergente a été évaluée. On a obtenu une échelle à 13 éléments, laquelle peut être beaucoup utile pour les études ultérieures, tant au niveau local qu'international.

CONSUMER ATTITUDES TOWARDS RECYCLING: CONSTRUCTION OF A RELIABLE AND VALID MULTI - ITEM MEASURE

In nineties environmental problems have obtained much importance on an international level. World anxiety about the limits of the physical environment is expected to culminate in the next decade. One of the current urgencies concerns the drastic decrease of the volume of urban solid wastes through the use of successful recycling programs. Recycling programs are being delivered in many countries with varying results. Recycling programs are available in Greece as well, but their results are far distant from their objectives.

Obviously recycling activity is our interest in this paper. It can be defined “as the series of activities by which products or other material are recovered or otherwise diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products...” (EPA, 1993, p.170).

Real life has shown that the solution of recycling problems requires interdisciplinary scientific approach. In this context the role of marketing is very important, because the key element for the success of recycling programs is consumer participation (McCarty and Shrum, 1994). Since marketing deals, among others, with researching and understanding perceptions, attitudes and behavior of consumers, its role is obvious.

Within the relevant literature one of the most researched subjects in studying consumer recycling behavior is the relation between attitudes and behavior. It is apparent that the desirable output of such studies is the prediction of recycling behavior through the analysis of relevant attitudes (Oskamp *et al*, 1991; Vining and Ebreo, 1992;Howenstine, 1993;Gamba and Oskamp, 1994). However such research studies have shown that the

prediction of recycling behavior through the use of general social attitudes and/or general proenvironmental attitudes is not effective (Shrum *et al*, 1994). Therefore it is evident a necessity for measures of specific attitudes towards recycling. Such a necessity has been indicated by Martin and Simintiras, 1995 and Schlegelmilch *et al*, 1996. Specific measures for recycling attitudes have been developed by the above mentioned researchers as well as by Howenstine, 1993; McCarty and Shrum, 1994; Obermiller, 1995. However, besides the fact that these attempts are few in number, there is always the problem of valid adaptation of a measure in a different place and time.

With reference to Greece there is i) scant research concerning recycling in general and ii) complete lack of research studies regarding development of measures of recycling attitudes. Therefore the aim of this paper is to develop a multi - item measure of specific attitudes towards recycling. We believe that this is the major need in the current phase of recycling research in Greece. Once the specific recycling attitudes measure is obtained, future research may effectively use it to investigate relationships to behavior. The task of examining relationships is beyond the limits of this paper. Consequently literature referring to relationships among relevant variables is not presented here. Thus, the exclusive concern of this attempt is the development procedure of a reliable and valid multi-item measure of specific recycling attitudes. In the context of the procedure relevant literature review was first done in order to specify the domain. Next an initial pool of items is developed. In order to reduce the number of items, they are checked for face validity. For further measure purification data from 198 households are factor analyzed. Moreover item - to - total correlation and Cronbach's alpha are used. The measure is also checked for reliability and validity.

MEASURE CONSTRUCTION PROCEDURE

The procedure followed for the construction of the measure combines literature relating to measure construction in marketing discipline in general (Churchill, 1979; Peter, 1979; Singh, 1990; Spector, 1992; Bearden *et al*, 1993) and literature for measure construction in ecological marketing studies (Bohlen *et al*, 1993; Stanley and Lansonde, 1996). However it should be noted that the procedure followed is based mainly on Churchill's studies, since Churchill's research studies have been the basis for the development of reliable and valid measures in marketing for two decades by most of the researchers (Churchill, 1979; Churchill, 1995, pp. 543-545).

I. *Domain specification*

In this paper the domain to be examined are the specific attitudes towards recycling. There are a lot of definitions about attitudes in general, but the common characteristic of all is assumed to be the preparation, the readiness, the tendency to react. In particular attitude is not behavior, but a prerequisite of behavior (Siomkos, 1994, p. 151). More specifically an attitude can be described as "the predisposition to respond to an object which is characterized by its stability to a positive or to a negative direction and which is a result of the learning - knowledge process" (Allport, 1935, pp. 798 - 844).

We argue that the content of the research domain should include most of the beliefs about issues relating to recycling. Literature review suggests that these issues, can be categorized in the following components (Goldenhar and Connell, 1993; Pelton *et al*, 1993; Ottman, 1993, pp. 76 -

77; Schultz *et al*, 1995; Peattie, 1995, pp. 273 - 274; Morris *et al*, 1995; Fuller *et al*, 1996):

1. Environment protection: whether recycling contributes to environment protection in general
2. Benefits: whether recycling reduces litter going to landfill sites and helps in raw materials and energy conservation
3. Personal participation: how consumer perceives his personal contribution and responsibility in recycling
4. Convenience/inconvenience: consumer's willingness to spend time and effort to recycle
5. Financial factors: who get the benefits and consumer's motivation
6. Third parties: contribution and responsibility of the various third parties involved in recycling such as the national and local government, companies etc.
7. Recycling programs: what are consumer's opinion about the efficiency of existing recycling programs operations.

II. Initial items analysis and reduction

Drawing from literature review 71 items were initially collected which are representative of the above mentioned components. Next, in order to examine face validity, two discussion groups were used. The first one was consisted of experts in the environmental studies domain and the second of non-experts. The use of their opinions concluded in reducing the initial number of items to 28 (Appendix A).

The above 28 items comprised the major part of a questionnaire which was later used for data collection. The answers to these questions were in five-point Likert scale. 16 of the 28 items were positively worded, while the rest were reverse coded. Moreover item phrasing was another

concern in this stage in order to obtain simplicity and avoid double-barreled, misleading and ambiguous questions. However some of the statements had a slight difference in meaning. It is useful to have such statements in this stage of measure development as it is possible for relatively similar questions to produce fairly different answers. Statistical analysis following will show which sentences will stay in the final measure and which ones will be eliminated. Furthermore, Obermiller's scale measuring attitudes towards recycling was included in the questionnaire. This scale is important to evaluate the convergent validity of the under construction measure (Obermiller, 1995).

III. Data collection and measure purification

In order to collect data a two-stage area survey, with personal interviews, was conducted in 198 households of the municipality of Thessaloniki in Northern Greece. The demographic characteristics of the selected sample (sex, age, income, education and occupation) were not different from those of the last census of the National Statistical Service of Greece for the specific area.

The collected data were statistically analyzed following a procedure based, as we have mentioned, in the review of the relevant literature and especially in Churchill's research studies. The procedure is as follows:

First, Cronbach's alpha coefficient of the initial 28 items was calculated for evaluating reliability. Cronbach's alpha coefficient value was 0,8446, which is characterized as excellent (Bearden *et al*, 1993). Next a principal components analysis was attempted in an exploratory factor analysis. A necessary condition for the paradigm of factor analysis to be used is that raw variables should be related so that they can have common factors (Siardos, 1996, p.16). Bartlett's goodness of fit test

calculated resulted in 1915,7586 ($p=0,0000$) indicating that factor analysis is an appropriate technique in our case. Moreover Keiser-Meyer-Olkin index was in an acceptable level (0, 77208) showing the sufficiency of the used sample size.

Using the accepted criterion for eigenvalue greater than 1, nine factors with eigenvalue greater than 1 resulted. Table 1 shows the matrix of the first four factors explaining 43,4% of the total variance.

In order to obtain interpretability of the factor structure item analysis focused on the first two factors. Using the common criterion for factor loadings greater than 0,50, we observe that 13 sentences remain in the first factor. These 13 sentences are representative of all mentioned components except for the last one (recycling programs efficiency). The second factor captures 3 sentences with factor loading greater than 0,50. These three sentences can be interpreted as representing the meaning of the mentioned last component. The first two factors cumulatively explain 32,3% of the total variance.

TABLE 1: Factor analysis - matrix of the first four factors

	Factor 1	Factor 2	Factor 3	Factor 4
X1	0,35004	-0,28738	0,35904	-0,04936
X10	<u>0,57285</u>	-0,21444	0,22084	0,23310
X11	<u>0,53371</u>	0,25436	0,00805	0,12358
X12	0,46881	0,32598	0,11721	0,45686
X13	<u>0,52980</u>	0,02784	-0,06829	0,01147
X14	<u>0,60641</u>	0,04527	-0,18311	0,11962
X15	0,33002	-0,24015	-0,19871	0,15766
X16	<u>0,72863</u>	-0,13998	-0,05466	-0,06552
X17	<u>0,62993</u>	-0,12616	-0,07887	-0,36755
X18	0,16520	0,36899	0,33431	0,42498
X19	0,21793	-0,02278	-0,30774	0,21873
X2	0,49897	-0,36259	-0,10382	0,00272
X20	<u>0,63965</u>	0,12231	0,32121	-0,03141
X21	<u>0,62863</u>	0,07035	0,26913	-0,00973
X22	<u>0,66979</u>	0,06337	-0,20707	-0,37014
X23	<u>0,57866</u>	0,12923	-0,06084	-0,31640
X24	0,06074	<u>0,55353</u>	-0,06540	-0,04507
X25	0,48864	-0,07546	0,02248	0,31515
X26	<u>0,68797</u>	0,15648	-0,08807	-0,10661
X27	0,10700	0,39358	0,44473	-0,07219
X28	<u>0,66590</u>	0,04152	-0,02199	-0,11853
X3	<u>0,34106</u>	<u>-0,59690</u>	0,14755	0,15009
X4	0,40355	0,07567	-0,44542	0,25508
X5	<u>0,77108</u>	0,02270	-0,09909	0,00700
X6	0,37814	-0,21845	0,52959	0,06540
X7	0,39487	0,20042	-0,00782	-0,39995
X8	0,18528	-0,31277	-0,42437	0,26903
X9	0,13789	<u>0,59036</u>	-0,27777	0,16517

• Explained variance percentage	24,8	7,5	6,1	5,0
• Explained cumulative variance percentage	24,8	32,3	38,4	43,4
• Eigenvalue	6,95	2,09	1,70	1,41

Factor analysis results support results of other research studies measuring attitudes. In cases of attitudes measurement it is very difficult or impossible to obtain *one* factor indicating unidimensionality of the measure by explaining a high percentage of the total variance in the raw variables (Spector, 1992; Bohlen *et al*, 1993). In order to examine reliability of the 16 sentences Cronbach's alpha coefficient was calculated resulting in a value of $\alpha=0,8358$.

Further trying to improve measure reliability and particularly internal consistency we checked for cross loadings in the two factors. No cross loaded items appeared to exist. Furthermore, item-to-total correlation analysis of the 16 sentences was performed. All the 16 sentences were kept, because they were found having item-to-total correlation coefficients greater than 0,30 (Spector, 1992, p.33; Bearden *et al*, 1993, pp. 7-8; Siardos, 1996, p. 16).

In order to improve the factor structure the elimination of the 3 sentences of the second factor was attempted. This procedure resulted in raising Cronbach's alpha to 0,8770. The increase of Cronbach's value may suggest that the second factor actually represents the seventh component of the under study domain. This seventh component is recycling programs efficiency, which is conceptually more related to behavior than to attitudes. More specifically it expresses consumers' real experiences from local recycling programs. Therefore we decided that only the 13 sentences of the first factor should be better included in the final measure. The mean of these sentences is 53,066, with theoretical values of the measure ranging from 13 to 65, and the standard deviation 6,780. As far the 3 sentences of the second factor they should be better researched within the context of recycling behavior. The 13 sentences consisting the final measure of recycling attitudes are represented circled

in Appendix A. For further evaluation of measure reliability split-half reliability method was performed, according to relevant literature (Peter, 1979; Bearden *et al*, 1993, pp. 7-8). The results of this analysis indicated high reliability (0,8670). Finally, measure convergent validity, using Obermiller's scale, was calculated. Correlation analysis performed gave an acceptable, for such cases, correlation coefficient (0,5138).

CONCLUSIONS

In this paper we presented a procedure of constructing a reliable and valid scale for measuring specific attitudes towards recycling. Specification of the domain was the first stage of the procedure, done by relevant literature review. Next an initial pool of 71 items was developed. Face validity, through expert and non-expert discussion groups, was checked, leading to 28 remaining items. For further measure purification exploratory factor analysis, item-to-total correlation and Cronbach's alpha were used. This stage concluded to a 13 items final measure. The measure was also checked for reliability and validity, both of them proved to be well within acceptable limits. Further research might test the appropriateness of the final measure, using it as the main independent variable, to predict recycling behavior. This, i.e. prediction of recycling behavior through attitude variables, measured by a reliable and valid scale, is the main contribution of this paper. On a practical basis, a reliable prediction of recycling behavior may assist local and national governments as well as companies to make right policy decisions.

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APPENDIX A: Items produced by expert and non-expert discussion groups contribution.

1. Recycling never crossed my mind
2. Recycling is important
3. Recycling is not a solution to the litter problem
4. Each consumer can contribute to the solution of the litter problem in his/her district
5. Recycling benefits are worthwhile my time and effort
6. The litter problem is exaggerated
7. Recycling helps to natural resources conservation
8. Non recyclable packages should be banned by law
9. Local authorities in my district do a very good job on recycling
10. I am not willing to take part into any recycling program, if there are no financial motives for me
11. Mainly businesses and not the environment take most of the recycling benefits
12. It is rather inconvenient to sort out and transport the recycling materials
13. Government should issue regulations about the use of recycled and recyclable materials in products packaging
14. Consumers should force the producers to use recyclable materials in their products packages
15. It is frightening to think about the consequences of the litter increase
16. It is my personal responsibility to help recycling efforts
17. Recycling is a great help to environmental protection
18. There are no particular benefits for the whole community coming from recycling programs

19. I feel guilty for not taking part into a recycling program
20. It is useless to recycle as long as not many other people do the same
21. Recycling is more fuss than benefit
22. Recycling reduces litter going to the landfill sites
23. Recycling contributes to energy conservation
24. I do not trust authorities, responsible for the recycling problems
25. The litter problem does not affect my personal life
26. I get satisfaction by taking part into recycling
27. I always think that I should start participating into recycling programs and I keep postponing it
28. Recycling benefits return back to the society