
The link between green purchasing decisions and measures of environmental consciousness

Green
purchasing
decisions

35

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Introduction

The last decade has witnessed a dramatic increase in environmental consciousness worldwide. One recent survey found that 82 per cent of British citizens rated the environment as an immediate and urgent problem (Dembkowski and Hanmer-Lloyd, 1994), while another study established that 69 per cent of the general public believe that pollution and other environmental damage are impacting on their everyday life (Worcester, 1993). The increase in environmental consciousness has had a profound effect on consumer behaviour, with the green product market expanding at a remarkable rate. For example, a Mintel survey concluded that 27 per cent of British adults were prepared to pay up to 25 per cent more for green products (Prothero, 1990) and, in the USA, Green Market Alert estimated a market growth rate for green products of 10.4 per cent in 1993 to \$121.5 billion, and have projected that this will reach \$154 billion by 1997 (Lawrence, 1993).

In order to position their green product offerings, companies must first segment the market according to levels of pro-environmental purchase behaviour and then target the "greener" consumer segments. However, a review of the literature indicates that socio-demographic and personality indicators have had only limited success in profiling consumers according to their pro-environmental purchasing behaviour. The objective of this article is to ascertain whether variables specific to environmental consciousness are more suitable for characterizing consumers' green purchasing decisions. Specifically, measures of environmental knowledge, attitudes and behaviour are linked to two conceptualizations of the purchasing domain, namely green purchasing decisions in general and the specific purchasing habits of five green product categories. The analysis is conducted on two distinct data sets: marketing students and members of the general public throughout the UK. Although there have been numerous warnings regarding the use of student samples in applied

psychological and behavioural research (Bearden *et al.*, 1993; Permut *et al.*, 1978; Sears, 1986), US research found marketing students' responses to questions relating to environmental consciousness to be similar to those recorded by the general public as a whole (Synodinos, 1990). Thus, a secondary objective is to ascertain if the US findings can be replicated in a UK context and, thus, to shed some additional light on the student sample controversy.

Background and literature

Characterizing the market for environmental products

The demand for green products has been shown to be uneven across different market segments (Ottman, 1992; Peattie, 1992). Thus, "[f]or organizations to position green products, or communicate their environmental efforts, to members of the population who are likely to be concerned about environmental issues, green consumer segments need to be identified" (Bohlen *et al.*, 1993, p. 415). Over the last 20 years, there have been relatively few attempts to classify consumers specifically according to levels of green purchasing behaviour. However, there has been a whole wealth of research, using a variety of segmentation variables, attempting to profile the environmentally conscious members of the population in general. The measures that have been used fall into two distinct categories: socio-demographics, such as sex, age, education and social class (see Schlegelmilch *et al.*, 1994), and personality measures, such as locus of control, alienation, conservatism and dogmatism (e.g. Balderjahn, 1988; Crosby *et al.*, 1981; Henion and Wilson, 1976; Kinnear *et al.*, 1974).

Given the relative ease with which socio-demographics can be measured and applied, it is not surprising these have been the most widely used variables for profiling purposes. However, recent evidence illustrates that "there is very little value in the use of socio-demographic characteristics for profiling environmentally-conscious consumers in the UK" (Schlegelmilch *et al.* 1994, p. 348), with only very weak relationships uncovered on a bivariate basis. Indeed, focusing specifically on pro-environmental purchasing behaviour, Schlegelmilch *et al.* (1994) explained, less than 10 per cent of variation through multiple regression procedures; this is in line with US studies that have performed multivariate analyses to link such characteristics to measures of green behaviour (Van Liere and Dunlap, 1980). The limited utility of socio-demographics may be explained by the fact that the environment is no longer a marginal issue; indeed, "environmental concern is becoming the socially accepted norm" (Schwepker and Cornwell, 1991, p. 85). Thus, it perhaps should not be expected that high levels of green purchasing behaviour would only be reflected in certain socio-demographic sectors of the consumer base.

Personality variables have been found to have somewhat higher linkages to individuals' environmental consciousness (Kinnear *et al.*, 1974; Schwepker and Cornwell, 1991). However, while this is true for general environmental measures, the results are somewhat inconsistent for specific pro-environmental behaviours, such as green purchasing decisions (see Balderjahn, 1988). Furthermore, personality variables have been shown to "explain only a small

part of the total variability of the behavioural measures used" (Webster, 1975, p. 196). Indeed, Hooley and Saunders (1993; p. 145) suggest that caution should be taken in using personality variables for market segmentation according to behavioural criteria: "In most instances, personality measures are most likely to be of use for describing segments once they have been defined on some other basis. It is quite possible, indeed probable, that behaviour and reasons behind it will vary within segments defined on the basis of personality characteristics alone". Moreover, personality variables "do not easily lead to segmentation strategy" (Webster, 1975, p. 196) due to the inherently complex processes involved in their measurement and interpretation.

Given the failures of the above two classes of variables, this article proposes a new segmentation approach, through an analysis of the linkages between pro-environmental purchase behaviour and measures of environmental consciousness. The rationale for this approach rests on the fact that consumers have traditionally been shown to express their environmental consciousness through the products they purchase. In the first wave of post-war enthusiasm for environmental protection during the late 1960s and early 1970s, being environmentally-concerned and being consumerist were seen as mutually exclusive. During this period, it was thought that the only way to cut down on pollution and solve the world's environmental problems, particularly natural resource depletion, was to cut down on consumption. Throughout the 1970s and 1980s, energy efficiency and pollution control measures appeared to promise a "have your cake and eat it environmentalism" (Henley Centre, 1990, p. 24) and, as a consequence, green issues were not at the forefront of consumer concerns. However, in recent years when the environment surged in importance, rather than cut down their consumption of products, consumers began to seek out environmentally-friendly alternatives in preference to their usual product purchases. Hence the "green" consumer was born. Evidence for this change in purchase behaviour can be found in numerous surveys. For example, in July 1989, a MORI (Market and Opinion Research International) poll revealed that the proportion of consumers selecting products on the basis of "environmental performance" had increased from 19 per cent to 42 per cent in less than a year (Elkington, 1989) and, by late 1992, a Nielsen study revealed that four out of five consumers were expressing their opinions about the environment through their purchasing behaviour (*Marketing*, 1992). It is likely, therefore, that consumers who exhibit high levels of environmental consciousness make more green purchasing decisions than those exhibiting low levels. Thus, it is envisaged that measures of environmental consciousness will be more closely related to purchasing habits than either socio-demographics or personality variables.

The environmental consciousness construct

Over the last 25 years, there have been numerous attempts to conceptualize and operationalize the construct of "environmental consciousness". In addition to the marketing literature (Anderson *et al.*, 1974; Antil, 1984; Van Dam, 1991), studies have been conducted in a wide range of other disciplines, such as

psychology (e.g. Arbuthnot and Lingg, 1975; Lounsbury and Tornatsky, 1977; Maloney *et al.*, 1975), sociology (Buttel and Flinn, 1978; Mohai and Twight, 1987; Ray, 1975), political science (e.g. Jackson, 1983), environmental studies (e.g. Dunlap and Van Liere, 1978; Scott and Willits, 1994; Vining and Ebreo, 1990) and business research (Balderjahn, 1988).

A number of different instruments have been used in the above efforts to measure environmental consciousness. On the substantive front, these vary in the extent to which they incorporate different green issues, such as population control, natural resources and energy consumption. For example, some studies have focused on concern about acid rain (Arcury *et al.*, 1987), recycling issues (Vining and Ebreo, 1990) or pollution (Ramsay and Rickson, 1976), while more common practices have been to either aggregate items dealing with these various substantive issues into single environmental measures (e.g. Hackett, 1993; Jackson, 1985; Maloney *et al.*, 1975), or to develop a number of measures, each covering specific issues (Tognacci *et al.*, 1972; Witherspoon and Martin, 1992). The latter two approaches would seem to provide a more comprehensive profile of green consumers, however, such approaches have been criticized on the basis that:

it is unclear whether...these various substantive issues reflect equally the broader concept of concern with environmental quality (Van Liere and Dunlap, 1981: p. 653).

Measurement instruments also differ in terms of their implicit or explicit assumptions regarding the components of the environmental consciousness construct. For example, some have solely addressed environmental attitudes (Buttel, 1979), capturing individuals' levels of concern/interest about specific or general aspects of environmental, ecological, or energy-saving phenomena. Other studies have focused on environmentally-sensitive behaviour (Brooker, 1976), capturing individuals' past, current and intentional commitment to activities that aim to ameliorate society's negative impact on the natural environment. However, given the controversy of the attitude-behaviour link (see Foxall, 1984a,b), an analysis of attitudinal components alone may not accurately predict actual behaviour. Indeed, weak linkages between attitudes and behaviour have been noted in the environmental and social marketing literature (Gill *et al.*, 1986; Rothschild, 1979); moreover, "in order to be 'green', it may be argued that individuals require an understanding of the consequences of their behaviours" (Bohlen *et al.*, 1993, p. 417). In this context, positive attitudes towards the environment are not necessarily indicative of high levels of environmental knowledge (see Ramsay and Rickson, 1976). Thus, along with attitudinal and behavioural components, knowledge items that capture individuals' level of factual information about specific or general aspects of environmental, ecological or energy-saving phenomena should be contained within any operationalization of environmental consciousness. However, to date, measures of environmentalism "have included relatively few components of the entire 'green' semantic domain" (Hackett, 1992, p. 3).

In addition to the existing substantive issues and theoretical conceptualizations, many existing measurement instruments have not been subjected to rigorous psychometric assessments of dimensionality, reliability and validity. For example, some studies have merely used internal consistency measures to assess both the reliability and dimensionality of the employed items (Buttel, 1979; Jackson, 1985; Tognacci *et al.*, 1972); however, if items are combined that in reality measure two correlated yet distinct constructs, “a combination of all their items might well yield internal consistency, even though they reflect two different constructs” (Spector, 1992, p. 54). Worse still, some studies have aggregated items into composite measures without any reliability or validity checks (Corrado and Ross, 1990; Lowe *et al.*, 1980; Murphy *et al.*, 1979; Ramsay and Rickson, 1976).

Finally, the vast majority of relevant literature is American (65 US studies have been uncovered) and “European academic research in this area has been relatively sparse” (Schlegelmilch *et al.*, 1994, p. 348). In this context, there may be certain country-specific factors, such as levels and types of pollution, environmental legislation and the availability of green products that will affect the operationalization of the environmental-consciousness construct.

Given the obvious problems inherent in previous measurement instruments, to capture levels of environmental consciousness existent in the UK consumer base, it was decided to develop a new series of summated rating scales, capturing the entire environmental consciousness domain as it applies to the UK consumer, namely measures of environmental knowledge, attitudes and behaviour. The key phases in the scales’ developmental process are outlined in the following section.

Methodology

Sample selection

The data for the current investigation was obtained from two distinct samples. The survey instrument was first administered in a self-completion format to a sample of 160 undergraduates attending a second-year marketing course at a UK university. The vast majority of students were British, and were aged between 19 and 21 years, although approximately 15 per cent were European exchange students, who tended to be slightly older (21 to 25 years of age). Questionnaires were distributed at the beginning of a marketing principles lecture, with the subjects requested to return the questionnaire on their way out of the lecture theatre. All questionnaires were returned, resulting in a 100 per cent response rate.

In the social psychology arena, students are generally used as subjects due to convenience-related factors, and their representativeness of the population of interest is often overlooked (Bearden *et al.*, 1993; Burnett and Dunne, 1986). Thus, it has been argued that such samples “may be inappropriate surrogates for many marketing studies” (Permut *et al.*, 1978, p. 2). In explaining the disparity in results from student and public samples, Sears (1986, p. 527)

indicates that students tend to exhibit “incompletely formulated senses of self, rather uncrystallized sociopolitical attitudes” and “behave less emotionally and impulsively than the general population”.

However, Gordon *et al.* (1984) argue that the question of external validity can only be assessed through direct comparisons between students and the public in specific domains; indeed, Landy and Bates (1973) and Bernstein *et al.* (1975), contest that limited generalizability from student samples should not be assumed a priori for any particular social phenomenon. Indeed, previous research in the US, far from discouraging the use of student samples in the investigation of environmental consciousness, found marketing students' responses to be very similar to those recorded by the general public as a whole (Synodinos, 1990). Having said that, data for the latter sample was collected 15 years previously by Maloney *et al.* (1975) and, thus, Synodinos' (1990) comparison may be subject to history effects. Given that, to the authors' best knowledge, no UK study has yet directly contrasted students with ordinary consumers on environmental issues, the current research design will also shed some light on this contentious issue.

For the second sample, a database consisting of 600 addresses of members of the general public throughout the UK was obtained from a professional sampling agency (CACI), and a structured mail questionnaire was sent to each address. Two weeks after the questionnaires were mailed, 100 follow-up telephone calls were made and 100 letters sent out to non-respondents of the first wave. A total of 113 usable questionnaires were finally obtained, representing an effective response rate of 19 per cent. In order to investigate non-response bias, a comparison of responses to questionnaires received from the initial mailing to those received after the follow-up was conducted, as recommended by Armstrong and Overton (1977). This failed to uncover any significant differences in the variables of interest, thus providing no evidence of such sample bias (despite the rather low response rate). The sample composition was slightly over-represented by the higher social classes and the better educated when compared with the UK population as reported by Smyth and Browne (1992); this is often the case with mail surveys addressed to the general public (Moser and Kalton, 1971). The sample also contained a higher proportion of male respondents – possibly because males are more likely to see themselves as head of the household and, therefore, responsible for the provision of the required information.

Dependent variables

The dependent variables employed in the analysis all relate to individuals' purchasing habits of environmentally-friendly products (Table I). In operationalizing the pro-environmental purchasing domain, a conscious effort was made to exclude items purchased for reasons of energy conservation, where the latter may not be motivated by individuals' environmental consciousness. For example, while the purchasing of energy efficient light bulbs is undoubtedly an “environmentally-sensitive” behaviour, it is a

decision more often driven by personal economics (Hseueh and Gerner, 1993; Powers *et al.*, 1992). As noted previously, two conceptualizations of the purchasing domain are included as dependent variables.

General pro-environmental purchasing behaviour was captured with the general purchasing behaviour scale, a summated measure of responses to three purchasing statements, namely:

- (1) "Choose the environmentally-friendly alternative if one of a similar price is available";
- (2) "Choose the environmentally-friendly alternative regardless of price"; and
- (3) "Try to discover the environmental effects of products prior to purchase".

Dependent variables	No. Items	Mean		Standard deviation		Range	
		S	GP	S	GP	S	GP
General purchasing scale	3	9.87	9.64	2.38	2.95	3-15	3-15
Recycled paper products	1	3.37	3.55	1.02	0.77	1-5	1-5
Not tested on animals	1	3.53	3.67	1.08	1.06	1-5	1-5
Environmentally-friendly detergent	1	3.50	3.58	1.14	1.03	1-5	1-5
Organically-grown fruit and vegetables	1	2.37	2.67	1.05	1.02	1-5	1-5
Ozone-friendly aerosols	1	4.60	4.26	0.80	0.97	1-5	1-5

Table I.
Summary statistics for
purchasing measures

Note: In Tables I-III, S = student sample; GP = general public sample

Each item was measured on a 5-point frequency of purchase scale (1 = "Never", 5 = "Always"). Following principal components analysis, unidimensionality was established, with the single factor accounting for approximately 75 per cent of the variation in the individual items. A high level of internal consistency for both the student and general public samples was found, with alpha values of 0.709 and 0.817 for student and general public samples respectively, well above the acceptable thresholds suggested by Nunnally (1967). In contrast, specific pro-environmental purchasing behaviour was captured with five variables, all single-item measures recording purchase frequencies of a number of green product categories, measured on 5-point scales (1 = "Would never buy", 5 = "Would always buy").

Independent variables

As mentioned earlier the domain of "environmental consciousness" is defined as a multi-dimensional construct, consisting of cognitive, attitudinal and behavioural components. Therefore, measures encapsulating all three dimensions are included as independent variables, using four composite scales (Bohlen *et al.*, 1993); these include:

- (1) A knowledge scale measuring the respondent's self-perception of knowledge on a total of 11 key environmental problems, scored on a five-point itemized category format (1 = "Know nothing about", 5 = "Know a great deal about").
- (2) An attitudes scale consisting of 19 five-point Likert statements aimed at capturing the respondent's concern about environmental quality (1 = "Strongly disagree", 5 = "Strongly agree").
- (3) A recycling behaviour scale comprising four items regarding levels and types of recycling activities, scored on a five-point itemized category format (1 = "Would never do", 5 = "Do often").
- (4) A political action scale consisting of four politically-motivated activities in order to combat environmental degradation (e.g. writing to newspapers or supporting pressure groups), scored on a five-point itemized category format (1 = "Would never do", 5 = "Do often").

In developing the scales, established procedures from the measure development literature were followed (Churchill, 1979; DeVellis, 1991; Gerbing and Anderson, 1988; Spector, 1992). First, in order to specify the domain of environmental consciousness, an extensive literature review was undertaken to explore both green issues in general and previous measurement instruments in particular. This was coupled with a number of semi-structured interviews with the general public, in order to capture the types and levels of environmental consciousness within the mindset of the UK consumer. The second phase of the developmental process consisted of focus group discussions with both experts on green issues and business undergraduates. With regards to the former, participants included university lecturers who have extensive knowledge on green issues and postgraduate researchers working on environment-related theses. Both sets of group discussions assisted the generation of items which pertained to each of the dimensions of the constructs at issue. Finally, once a sample of items had been generated, a questionnaire was formulated and pilot tested on a sample of 60 business undergraduates. Subsequently, the items pertaining to each construct were refined and administered to both student and general public samples.

For both sample types, the developed scales were assessed in terms of dimensionality, reliability and construct validity. Specifically, principal components analysis ensured that each of the scales was unidimensional in nature, with each factor extracting a high proportion of variation in the individual items. Subsequently, the reliability of the various dimensions was addressed, with all scales exhibiting high levels of internal consistency. Finally, assessments of within-measure and between-measure construct validation were undertaken and, again, all scales proved to be adequate in terms of this psychometric property (see Tables II-IV).

Findings

To assess the strength of the relationships between the measures of environmental consciousness and pro-environmental purchasing behaviour,

Variables	Sample type	No. items	Mean	SD	Range	Alpha	Min.
Environmental knowledge scale	S	11	34.77	6.19	20-52	0.872	0.184
	GP	11	33.78	8.50	11-51	0.940	0.399
Environmental attitudes scale	S	19	74.37	9.17	40-95	0.887	0.037
	GP	19	77.33	9.45	49-95	0.896	0.086
Recycling behaviour scale	S	4	13.34	2.84	4-18	0.743	0.358
	GP	4	14.13	3.44	4-20	0.807	0.423
Political action scale	S	4	9.03	3.02	6-20	0.787	0.399
	GP	4	9.24	3.24	4-17	0.798	0.419

Table II.
Mean, range and alpha statistics for environmental consciousness measures (independent variables)

Variables	Sample type	No. items	Inter-item correlations			Item-total correlation		
			Min.	Max.	Mean	SD	Min.	Max.
Environmental knowledge scale	S	11	0.184	0.631	0.386	0.109	0.427	0.654
	GP	11	0.399	0.836	0.595	0.092	0.621	0.824
Environmental attitudes scale	S	19	0.037	0.693	0.305	0.126	0.272	0.650
	GP	19	0.086	0.625	0.336	0.114	0.358	0.697
Recycling behaviour scale	S	4	0.358	0.508	0.422	0.065	0.521	0.547
	GP	4	0.423	0.639	0.511	0.089	0.612	0.638
Political action scale	S	4	0.399	0.653	0.503	0.112	0.472	0.704
	GP	4	0.419	0.628	0.509	0.085	0.525	0.681

Table III.
Inter-item and item-total correlations for environmental consciousness measures (independent variables)

Scales	Knowledge	Attitudes	Recycling	Politics
Environmental knowledge scale	1.000 (1.000)			
Environmental attitudes scale	0.401 (0.483)	1.000 (1.000)		
Recycling behaviour scale	0.277 (0.328)	0.450 (0.250)	1.000 (1.000)	
Political action scale	0.447 (0.502)	0.625 (0.552)	0.386 (0.327)	1.000 (1.000)

Note:

Figures without parentheses are from the student sample; figures within parentheses are from the general public sample

Table IV.
Between-measure correlations for environmental consciousness scales

individual regression analyses were conducted for both student and general public samples. Prior to analysis, a number of the dependent variables for the general public sample (recycle paper products, products not tested on animals, and organically-grown fruit and vegetables) were found to exhibit very skewed distributions which were dealt with through natural logarithmic transformations. Forward selection of the predictors was considered to be the preferred option for equation construction, given the primary concern with explanatory power and obtaining a parsimonious equation; this also helps reduce problems of multicollinearity (see Hair *et al.*, 1992). In the forward selection procedure, "the first variable considered for entry into the equation is the one with the largest positive or negative correlation with the dependent variable" (Norušis, 1988, p. 171).

All regression equations were found to be significant beyond the 0.5 per cent level for both samples, reflecting the explanatory power of the environmental consciousness measures. In addition, as anticipated, all the partial regression coefficients were in the positive direction, demonstrating that the higher the environmental consciousness scores, the higher the frequency of green purchasing decisions. To check the stability of the regression results, the analyses were subsequently re-run using both backward elimination and stepwise selection; essentially identical results were obtained for both samples, indicating a high degree of stability of the regression equations.

With regards to the student sample, not all of the general environmental measures are related to the purchasing measures, as different combinations of independent variables enter into the equation for each dependent variable (Table V). Specifically, the environmental attitudes scale has the highest explanatory power for four of the purchasing measures (the general purchasing behaviour scale, recycled paper products, products not tested on animals and ozone-friendly aerosols), the political action scale has the highest explanatory power for two of the purchasing measures (environmentally-friendly detergents and organically-grown fruit and vegetables), while for the environmental knowledge scale, and the recycling behaviour scale, the beta weights in all equations are much smaller, resulting in only marginal increases in the adjusted R^2 s. The greatest proportion of variation explained is observed for the general purchasing behaviour scale and recycled paper products (approximately 26 per cent of variation for both variables), whereas only 13-17 per cent of variation is explained in the remaining purchasing items.

For the general public sample (Table VI), the environmental attitudes scale is the most important predictor overall and, consistent with the findings for the former sample, this variable explains the highest proportion of variance in the general purchasing behaviour scale, recycled paper products, products not tested on animals and ozone-friendly aerosols. The political action scale again explains the highest proportion of variance in environmentally-friendly detergents and organically-grown fruit and vegetables, and it is also entered in the equation for the general purchasing behaviour scale. In contrast, the environmental knowledge and recycling behaviour scales contribute towards

Independent variables	Dependent variables													
	General purchasing behaviour scale	Recycled paper products	Products not tested on animals	Environmentally-friendly detergents	Organically-grown fruit and vegetables	Ozone-friendly aerosols	Step	Beta	Cum R ²	Step	Beta	Cum R ²		
Environmental knowledge scale	[-]	[-]	[-]	[-]	[-]	[-]	0.153	0.174	2	0.163	0.159	[-]	[-]	[-]
Environmental attitudes scale	1	0.433 (0.256)	1	0.401 (0.232)	1	0.416 (0.165)	[-]	0.173	[-]	[-]	[-]	[-]	1	0.371 (0.129)
Recycling behaviour scale	[-]	[-]	[-]	[-]	[-]	[-]	0.269	0.257	2	0.197	0.257	[-]	[-]	[-]
Political action scale	[-]	[-]	[-]	[-]	[-]	[-]	0.120	0.111	1	0.258	0.145	[-]	[-]	[-]

Notes: Cum R²: = cumulative R² (adjusted R² in brackets)
All standardized betas significant beyond p = 0.05
All regression equations significant beyond p = 0.005

Table V.
Summary stepwise forward estimation regression results for student sample

Table VI.
Summary stepwise forward estimation regression results for general public sample

Independent variables	Dependent variables																	
	General purchasing behaviour scale			Recycled paper products			Products not tested on animals			Environmentally-friendly detergents			Organically-grown fruit & vegetables			Ozone-friendly aerosols		
	Step	Beta	Cum R ²	Step	Beta	Cum R ²	Step	Beta	Cum R ²	Step	Beta	Cum R ²	Step	Beta	Cum R ²	Step	Beta	Cum R ²
Environmental knowledge scale	2	0.278	(0.519)	2	0.231	(0.207)												
						0.224												
Environmental attitudes scale	1	0.373	(0.430)	1	0.265	(0.159)	1	0.324	(0.142)									0.296
						0.167												0.544 (0.288)
Recycling behaviour scale	[-]	[-]	[-]	[-]	[-]	[-]	2	0.226	(0.180)									
									0.199									
										2	0.294	(0.225)						0.242
																		0.166 (0.157)
Political action scale	3	0.277	(0.566)	[-]	[-]	[-]	[-]	[-]	[-]	1	0.306	(0.157)	1	0.299				0.088

Notes: Cum R² = cumulative R² (adjusted R² in brackets)
All standardized betas significant beyond p = 0.05
All regression equations significant beyond p = 0.005

the variation in different purchasing items than for the student sample; specifically, the former contributes to the general purchasing behaviour scale and recycled paper products, and the latter contributes to products not tested on animals and organically-grown fruit and vegetables. The explanatory power of the independent variables for the general public sample also reveals differences to the findings of the student sample. Regarding the general purchasing behaviour scale, 57 per cent of variation is explained for the general public sample by the environmental measures; in fact, for all but one of the specific purchasing items, the predictive power of the environmental measures is higher than that for the student sample, with 18.9 per cent of the variation explained. In contrast, the adjusted R^2 for organically-grown fruit and vegetables is just 0.079, suggesting that the environmental measures are rather ineffective for explaining variation in general public purchases for this particular product category.

Given the differences in the regression results between the two samples, multivariate analysis of variance was conducted to test whether, as Synodinos (1990) suggests, marketing students exhibit similar levels of environmental consciousness to the general public. With regards to the purchasing behaviour measures, the summary statistics reveal that both the variances and means are, as a whole, significantly different between the two samples (Tables VII and VIII). The univariate variance tests illustrate that two of the purchasing items have different dispersion characteristics for the two samples, with students exhibiting a smaller dispersion from the mean for recycled paper products, and a higher dispersion for ozone-friendly aerosols (see Table I). On the other hand, the univariate means tests illustrate that the two samples have different average response levels for three of the purchasing items; the general public purchase more products not tested on animals and organically-grown fruit and

Dependent variables	Univariate variance test		Univariate means test	
	<i>F</i> -value (1.102868)	Significance	<i>F</i> -value (1.198)	Significance
General purchasing behaviour scale	3.042	0.081	0.010	0.920
Recycled paper products	11.837	0.001	2.485	0.117
Products not tested on animals	1.780	0.182	4.947	0.027
Environmentally-friendly detergents	0.623	0.430	0.153	0.696
Organically-grown fruit and vegetables	0.136	0.712	6.382	0.012
Ozone-friendly aerosols	7.776	0.005	6.821	0.010
Notes:				
Multivariate variance (Box's <i>M</i>) <i>F</i> -value = 21.99517			2.080	0.003
Multivariate means (Hotellings <i>T</i> ²) <i>F</i> -value = 4.209			3.949	0.001

Table VII.
Comparisons between
student and general
public samples
(dependent variable)

Table VIII.
Comparisons between
student and general
public samples
(independent variables)

Independent variables	Univariate variance test		Univariate means test	
	<i>F</i> -value (1.133271)	Significance	<i>F</i> -value (1.212)	Significance
Environmental knowledge scale	7.834	0.005	0.818	0.367
Environmental attitudes scale	0.229	0.633	4.061	0.045
Political action scale	0.127	0.722	0.237	0.627
Recycling behaviour scale	4.584	0.032	2.887	0.091
Notes:				
Multivariate variance (Box's <i>M</i>) <i>F</i> -value = 10.206663			2.008	0.028
Multivariate means (Hotellings <i>T</i> ²) <i>F</i> -value = 4.209			2.587	0.038

vegetables, while students purchase higher levels of ozone-friendly aerosols (see Table I).

Regarding the general environmental measures (independent variables), the summary statistics again reveal that, taken as a whole, the variances and means are significantly different between the student and general public samples (Tables VII and VIII). Focusing on the specific disparities between the two data sets, differences are observed in the variances for the environmental knowledge scale and recycling behaviour scale, while the general public sample has a higher variation in response on both measures. Differences are also identified on the environmental attitudes scale, with students appearing to exhibit, on average, lower concerns about environmental quality than the general public.

The results suggest that the differences observed in the regression equations could be due to discrepancies in the means and variances of both the general environmental measures and the measures of pro-environmental purchasing habits between the student and general public samples. Therefore, the US findings of Synodinos (1990) are not replicated in the UK; i.e. marketing students exhibit different levels of environmental consciousness to the public as a whole, and using the former as a proxy for the latter does not seem to be justified.

Discussion

The main purpose of this study was to assess the link between variables specific to environmental consciousness and pro-environmental purchasing behaviour. The regression results suggest that such measures may indeed be more useful than either socio-demographic or personality variables, given that the latter variable types explain very little variation in responses to environmental phenomena. Indeed, the environmental consciousness variables often explain more than 20 per cent of the variation in the purchasing measures. In addition, all the partial regression coefficients are in the positive direction,

indicating that consumers' overall environmental consciousness has a positive impact on pro-environmental purchasing behaviour. However, the findings suggest that the strength of the relationships is dependent on three factors.

First, the results vary between sample type; more variation in pro-environmental purchasing behaviour is explained for the general public sample. Moreover, different environmental measures are observed to be important explanatory variables for each sample, providing support for Sears' (1986, p. 520) argument that "some relationships might hold with ordinary adults in everyday life but not to any visible degree among college students". This suggests that the generalization of relationships from student data could lead to a distorted portrait of the UK green consumer.

Second, the strength of the relationships varies according to the dimension of purchasing behaviour at issue. Specifically, much more variation is explained for the general purchasing behaviour scale than for the specific purchasing items, particularly for the general public sample. This is not a surprising finding, given the argument that scores on general measures should not be expected to predict isolated acts (e.g. Fishbein, 1973; Heberlein, 1981). The items on the composite general purchasing behaviour scale do not relate to specific products, but to "hypothetical" buying decisions, i.e. responses to the items may be based on an artificial purchasing situation, in which all other decision criteria are held constant. Thus, one would not expect the environmental measures to explain very high levels of variation in purchasing levels of the specific items due to the absence of intervening factors (such as price, convenience, performance, etc.) in the regression model. Finally, results are inconsistent across the specific purchasing items, particularly for the general public sample. For instance, approximately four times the variation is explained in purchasing levels of ozone-friendly aerosols in relation to organically-grown fruit and vegetables. A possible explanation is that the performance of the former is similar to aerosols containing CFCs, availability is widespread, and they are equally as convenient to use; in contrast, Grunert (1991, p. 11) contests that organic produce is perceived to be of bad appearance and that there is "dissatisfaction with supply and distribution density". Hence, it is possible that the discrepancies in the strength of the relationships are a consequence of moderating factors in respondents' purchasing decision criteria.

With regards to the independent variables themselves, the findings indicate that different environmental measures serve as explanatory variables for each of the purchasing measures. While the environmental attitudes scale is observed to be the most consistent explanatory variable for both samples, the remaining environmental variables vary considerably in terms of their explanatory power. The strong relationships uncovered for the attitudinal measure is in fact a positive surprise, given the weak linkages uncovered in the literature between attitudes and behaviour. The environmental knowledge scale did not manifest strong relationships for either sample. Although this finding is in line with previous research in the area (see Hines *et al.*, 1987), due to the inherently subjective nature of the scale's operationalization, measuring self-

perception of knowledge may not provide an accurate indication of consumer knowledge and, hence, the explanatory power of "true" knowledge may be higher than that observed in the present study. However, "true" environmental knowledge is difficult to capture (Bohlen *et al.*, 1993); additionally, Cope and Winward (1991) contest that this problem is exacerbated by the fact that consumers know little about environmental problems and their solutions.

Neither of the two behavioural measures were observed to explain substantial variation in the purchasing measures. One may have anticipated the recycling behaviour scale to have entered the regression equation for recycled paper products in the general public sample too, given that, conceptually, both behaviours aim to reduce solid waste in landfill sites and conserve natural resources. However, Vining and Ebreo (1990, p. 70) argue that "Recycling is an activity that demands time, space and resources of the family member who undertakes it". The latter is not really applicable to the purchasing of paper products, since such goods are usually clearly labelled to indicate whether or not they are manufactured from recycled paper or fibres. Thus, it could be argued that recycling activities would yield more positive relationships with purchasing decisions that require additional time and effort. Partial support for this is indicated by the fact that the recycling behaviour scale is entered into the equation for products not tested on animals for the general public sample; the purchasing of true cruelty-free products requires considerable effort on the part of the consumer (Prothero and McDonagh, 1992).

The political action scale is only observed to be an important explanatory variable for environmentally-friendly detergents and organically-grown fruit and vegetables. While the latter products are not widely purchased due to their price, poor appearance and availability constraints (Grunert, 1991), products in the former category have generally not been accepted by consumers, since they "do not clean as well or as effortlessly as their more toxic counterparts" (Coddington, 1993) and the more well known detergents have "not won acceptance with mainstream consumers because [their] packaging is unattractive" (Wongtada *et al.*, 1992: p. 14). Activities encapsulated in the political action scale are more likely to be undertaken by consumers who are highly environmentally-conscious. Therefore, a possible explanation of the high explanatory power of this scale for the above items is that the latter are purchased by the "extreme" consumers who forsake other product benefits to support the green cause. However, given this argument, one would expect, on average, that low purchase frequencies be reported for both products and, while organic produce are bought infrequently, green detergents are bought quite often (see Table I).

Implications and conclusions

The limitations in the sample size suggest that only tentative conclusions should be made from the present study. A larger sample of the general public would seem prudent in order to assess the stability of the current results.

In spite of the above caveat, this study has illustrated that consumers' environmental consciousness may impact on their purchasing decisions, although the latter are also likely to be influenced by other moderating factors. The findings suggest that attitudes are the most consistent predictor of pro-environmental purchasing behaviour. Thus, organizations aiming to increase market penetration for existing green product offerings would be recommended to develop campaigns directed at increasing concern about environmental quality in the consumer base (e.g. advertising campaigns, point-of-sale material). However, given that 63 per cent of consumers are suspicious of manufacturers' green product claims (Toor, 1992), extreme care must be taken to ensure that claims about products' green credentials are based on solid foundations to prevent the inevitable consumer backlash. Second, organizations in the process of developing new green product offerings should ensure that their products perform competitively in other dimensions. If this is achieved, environmental considerations will no longer take a back seat in purchasing decisions, since all other evaluative criteria will be relatively stable. For example, if a new brand of environmentally-friendly detergent was developed that had attractive packaging and "matched" other detergents on all other dimensions, it is likely that the variance explained in the purchasing frequency of this specific product would be similar to the prediction level of the "hypothetical" situation of general pro-environmental purchasing behaviour. The present study has illustrated that prediction levels, as well as the predictors themselves, are dependent upon which specific green product group one is focusing on. However, only five product categories were explored and, given that some authors now believe that the environment will become the most important business issue of the decade (e.g. Carson and Moulden, 1991), a wider variety of environmentally-responsible products and services are likely to filter through into the marketplace, and will require individual investigation. Furthermore, the purchasing measures employed in the study are self-reported and, given that there is a certain amount of social desirability associated with environmental issues (Amyx *et al.*, 1994), some respondents may have artificially inflated their actual levels of purchases. Thus, through the use of techniques such as panel experimentation, future studies should investigate the consistency between self-reported and actual pro-environmental purchasing behaviour.

As outlined above, the attitudinal component of the environmental domain was observed to be the most important predictor of green purchasing decisions. However, in order to increase consumers' attitudes towards environmental quality, investigations are necessary to ascertain how environmental attitudes are formed. In this context, a comparison of personal sources (e.g. family and friends) and impersonal sources (e.g. media channels) of information could form the basis of preliminary investigations. Secondly, research should investigate attitudes towards specific products and the "believability" of green claims across product categories. Such research is essential for manufacturers'/retailers aiming to incorporate green concerns into their marketing mix. Finally,

replications of this research would be beneficial in order to ascertain if pro-environmental purchasing behaviour can be explained using the same environmental criteria in other countries. This holds particularly for the EU, where the existence of the Single Market necessitates organizations to have a clear understanding of the idiosyncrasies that exist within each country's green product base (Du Preez *et al.*, 1994).

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