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AN EXAMINATION INTO RECYCLING AND WASTE MANAGEMENT ATTITUDES AND BEHAVIORS BY UK EMPLOYEES

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Abstract

This paper examines employees' work-related attitudes to recycling and waste management systems whilst retaining a link with personal domestic behavior. A questionnaire of 38 Likert-type items measured employee attitudes to environmental, waste management and recycling, environmental and sustainability concerns, perceived costs and benefits to the company. The hypotheses included demographic differences in attitudes, that attitudes and behavior are related and that behaviors transfer from home to work. The sample included 189 employees from 6 northern UK companies. A factor analysis reduced the attitudes items into four factors, being a positive approach to company recycling, that policies are needed, that recycling is costly to the company and that recycling can earn money. The factors were correlated with behavioral measures and compared by demographics and past recycling behavior using t-tests and ANOVAs.

The results show differences in attitudes and behaviors by job type and age, that recycling at work and home are unrelated but that use of eco-friendly products is related to attitudes and concern about depletion of natural resources. The findings are discussed in terms of attitude theories, workplace behavior, training and communications about environmental and waste management in companies plus the transferability of these findings to other types of management systems, other sectors or regions.

Keywords: industry, management system, policies, procedures, recycling, workforce

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1. Introduction

The importance of improving industrial environmental and waste management systems for economic and environmental reasons has been highlighted extensively (Ayres and Kneese, 1969, Peiró-Signes et al., 2011, Segarra-Oña et al., 2011, Heidrich and Tiwary, 2013). Indeed, industry and businesses have been described as being “on the leading edge of the interface between people and the environment” (World Commission on the Environment and Development, 1987). Waste management is part of the overall environmental performance and resource management of any business and the unnecessary creation and disposal of waste leads to financial losses and environmental

burdens (Hicks et al., 2004; Peiró-Signes et al., 2011). However, any system or tool that aims to improve environmental and waste management will be of little use if the workforce is reluctant to work with them. This paper focuses on attitudes to recycling and waste management, whether these vary demographically, and whether workplace and domestic recycling behaviors are related.

There have been many theories attempting to ascertain the role and importance of attitudes to behavior: these include norm activation theory (Harland et al., 2007; Schwartz, 1977), the theories of reasoned action [TRA] and planned behavior [TPB] (Ajzen, 1991), attribution (Hewstone, 1989), social identity and social categorization theories (Tajfel, 1982; Turner, 1991) and social construction

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(Dake, 1992). Many environmental, recycling or waste management behavior theories are based on TRA and TPB, all showing how attitudes, motives, behavioral norms and perceived behavioral control determine how people behave (Hines et al., 1986; Stern, 2000). However there is still debate on just how predictive of behavior these theories actually are and whilst significant correlations have been found between attitudes and intentions, self-reported or actual household recycling or environmental behaviors, there remain many questions as to why these relationships are not so strong (Cheung et al., 1999; Davies et al., 2002; Kilbourne and Pickett, 2008; Nigbur et al., 2010; Omran and Read, 2008). For example, Nigbur et al. (2010) add self-identity and social identity to improve the predictive ability of TPB, whilst using a different theoretical approach Harland et al. (2007) address the importance of situational activators such as efficacy and ability and personality trait activators such as awareness of consequences and denial of responsibility in norm activation theory. To complicate the position further, whilst attitudes have been found to be a reliable predictor for household recycling and environmental behaviors they are less so for work behavior (Cordente-Rodríguez et al., 2010; Omran and Read, 2008, Whitmarsh and O'Neill, 2010). Environmental and waste behaviors and attitudes are complex, indeed sufficiently so as to make sensible forecasts difficult and the first hypothesis is to test the extent to which attitudes to recycling and waste management are related to recycling behavior.

Several studies have addressed demographic differences, with mixed findings. Perhaps the most consistent demographic is gender, where differences are almost pervasive: for example, women have been shown to have different attitudes to risk and risk-taking (Mishra and Akman, 2014), exhibit different leadership skills as managers, hold stronger health-related and pro-environmental attitudes, and may be more actively involved in environmentally responsible behavior, although the reasons for these differences are not always so clear (Bord and O'Connor, 1997; Cordente-Rodríguez et al., 2010; Wehrmeyer and McNeil, 2000). Perhaps the next biggest demographic in relation to recycling would be worker/management attitude differences: for example, Lingard et al. (2000) found workers exhibiting stronger pro-environmental attitudes whereas managers were more concerned with cost, time and quality of work; however, Teo and Loosemore (2001) and to some extent Segarra-Oña et al. (2011) reported perceived level of knowledge and involvement among workers was rather low and operatives can see waste as an inevitable by-product and a low priority by senior management.

Not every study has found demographic differences: Swami et al. (2011) found no relation between demographics and recycling attitudes or behaviors. Joyce et al. (2004) and Harvey et al. (2014), suggest that 20% of employees will be proactive, 60% complacent and 20% rather negative

in terms of their attitudes to recycling and waste management and they do imply that the proactive 20% can come from all levels and grades. Albeit for different reasons, one potentially being that norm-activation would differ by grade for situational or personality reasons (Harland et al., 2007) and another might be related to self-categorization (Turner, 1991). Thus, the shop floor may be at least as concerned as management, sometimes more so and the second hypothesis is therefore testing if individuals sharing demographic backgrounds such as company position, job function, age, gender etc. have similar beliefs, attitudes and behaviors.

It is often assumed that people care less about waste and recycling issues at work than they do at home- due perhaps to diffusion of responsibility, lack of personal control, lower motivation, etc. However, there is some evidence showing a "spillover" or halo effect, such that recycling at work can have a beneficial effect on recycling at home (Berger and Kanetkar, 1995) and that there is an overlap between environmental and recycling behaviors within the workplace. Thus, the third hypothesis is that people that recycle at home will recycle at the company i.e. that a spillover effect does exist. Internal pressures such as environmental views and commitments of the workforce have been ascertained as main drivers for the successful implementation of recycling practices and significant correlations have been found between concerns about natural resources, recycling activities, environmental attitudes and general environmental behaviors (Cordano et al., 2010; Hines et al., 1986; Kilbourne and Pickett, 2008; Thøgersen and Ölander, 2003). The final hypothesis is that concern for natural resources will be related to recycling attitudes and behaviors.

Aim and objectives of the study

The aim of this study is to examine attitudes and behaviors of the workforce in relation to recycling and waste management and to ascertain whether there is any transfer of attitude or behavior from home to work. An objective is to identify if demographic differences exist and another is to ascertain linkages between recycling attitudes and behaviors. This will help to understand better how the workforce might respond to more sustainable company practices. Four hypotheses have been derived from the literature and are tested here,

- H1- To test the extent of the relationship between attitudes and behavior with respect to recycling in the workplace,
- H2- There are demographic differences in recycling attitudes and behaviors,
- H3- Those recycling at home will also recycle at work,
- H4- Resource depletion concern is positively related to recycling behaviors.

2. Methodology

2.1. Questionnaire design and pilot study

A questionnaire method was chosen for this study in order to obtain as much information from as many people as possible in a comparative form whilst keeping respondents anonymous. Unstructured interviews with representatives from the companies whose employees would be surveyed and expert discussions were conducted to design the questionnaire and a set of 70 Likert scale items were developed. Two pilot studies on 15 and 12 non-expert volunteers of mixed demographic backgrounds reduced this to 38 Likert scale items, which included company recycling (4 items), beliefs about management (5), company resources (4), personal and company responsibility (6), perceived importance of recycling (4), guilt if not recycling (4), perceived costs and benefits (2) and own control of behavior (2). The items were presented as a 7-point Likert-type scale ranging from 'strongly agree' to 'strongly disagree'.

Behavior was measured using 3 questions: 'time since' is preferable to 'how often' since the latter is more likely to generate a socially desirable response (Oppenheim, 2008) so questions asked (1) how long since the respondent last recycled at home and (2) work. A final behavioral question asked respondents to circle as many eco-friendly products out of a list of 5 that they used, and these were aggregated to form 'N Eco-products'. Two 10-point semantic differentials were included to assess general environmental concern, from very concerned to unconcerned and recycling concern from as much as possible to not bothering (Dunlap et al., 2000, Hines et al., 1986). Finally, demographic items covered age groups, position (shop-floor, supervisor, administration, middle management, senior management), work type (technical support, operations, clerical, marketing, management) and gender of the respondent.

2.2. Sample and procedure

The workforces of six companies from different industrial sectors (engineering, production and industrial design) within the North of England were surveyed. The companies were chosen based on their business sectors and being at different stages of introducing environmental and waste management systems and of different sizes (based on turn-over and number of employees) from small, medium to large enterprises to cover as wide ranging circumstances as possible.

The companies are described briefly below.

- Company A Medium sized wallpaper manufacturer, supplying mainly the UK and Europe
- Company B Small cheese-making company supplying regional businesses and shops
- Company C Medium sized company making metal cladding, supplying the UK market
- Company D Small recycling company supplying the UK and Europe with recycled products

- Company E Large chemical company supplying polymer and cellulose products worldwide
- Company F Large manufacturer supplying of electronic goods worldwide.

Of these companies A had an environmental waste policy, F had an environment policy and E had a system operating in lieu of a policy; the other three had no policy relating to the environment. A covering letter addressed to the employees of each company stated the purpose of the study and assured respondents of complete anonymity and confidentiality. The respondents were selected by random from the staff list; the survey was presented in paper form and returned anonymously to boxes provided at central locations at the companies. 366 questionnaires were distributed and 189 were returned giving a response rate of 52%, which can be considered reasonable for a non-compulsory anonymous survey in industry (Oppenheim, 2008); the different company N and response rates are given in Table 1.

Table 1. Company numbers of employees and questionnaires distributed plus respondents by gender

Company	A	B	C	D	E	F	Totals
N employees	82	4	1		23	23	379
N questionnaires	0	4	1		45		66
Total responses	8	3	3		11		89
Male	8		3		4		40
Female	0				6		6

Note: 3 respondents did not identify their gender

2.3. Data processing and reduction

Occasional items that were missing were replaced by the item mean; for any long strings of missing items, the respondent was removed (Little, 1988) ; this yielded 186 respondents for analysis. The 38-item attitude data were analyzed using a principal component analysis with Varimax rotation and the scree plot indicated that four factors be rotated. The loadings on each factor are presented in Table 2 along with the eigenvalues, their proportions of variance and Cronbach's alphas; all loadings numerically >0.3 are included. The four factors can be described as F1 positive attitudes to waste and recycling, typified by the perception that senior management hold positive attitudes and that the company is doing well in this respect. F2 stresses the importance of recycling waste and the need for policies, typified in waste being the concern of everybody and that the company should have policies for waste and the environment. Both F1 and F2 have alphas >0.8. F3 relates to recycling being perceived as a cost and F4 concerns how recycling can generate

income; both of these factors have lower alphas than F1 and F2 but are still acceptable for further analysis. It should be noted that 2 items are not included in the factor structure: item 9 'recycling as much as possible is good for the environment' was excluded since it did not load >0.3 on any factor; item 10 'our company is creating too much waste' loaded onto F3 but depressed the alpha to 0.580, so is excluded.

3. Results and analysis of the survey

H1 proposed that attitudes and behavior are related. F1, F2, F3 and F4 can be considered

attitudinal, along with two semantic differential measures of perceived concern for the depletion of natural resources and one's own recycling efforts at home. In order to test H1, these six measures were correlated with the three behavioral measures of time since recycled at home or work and N eco products, with the findings shown in Table 3. In addition, the two measures of perceived concern are correlated with each other, at $r=0.493$, $p<0.0001$, implying that the more one is concerned about depletion of resources, the more one is also concerned about one's own efforts, so presumably these precede some action to improve one's own efforts.

Table 2. Factors and factor loadings [all >.300 included]

	<i>Factor</i>			
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>Factor 1: Positive approaches to waste and R 14 items</i>				
3 Our company has a good WMS in place	0.799			
24 Senior management sincere attempts recycle much as possible	0.754			
7 Company is doing as much R as possible	0.740			
1 Company is dealing well with the environment	0.726			
17 Company provides useful guidance to do with waste	0.692			0.309
20 I know about how recycling activities done at our company	0.673			0.385
36 Company responds well to suggestions to improve R and WM	0.671			
2 At our company I recycle as much as possible	0.656			
21 Our company recycles more than it did 2 years ago	0.591			
28 Waste is not an important issue in our company	-0.590			
23 I use the facilities available at the company to recycle waste	0.535	0.345		
19 At company people will only recycle if they are instructed	-0.484			
30 Waste in our company can actually mean lost production	0.391			
34 Our company generates more waste than it did 2 years ago	-0.382		0.301	
<i>Factor 2: Policies and actions are needed 12 items</i>				
35 Our company should have an environmental policy		0.736		
33 Waste management should be everybody's concern		0.735		
27 Our company should have a waste management policy		0.685		
38 Like to be involved in recycling initiative at our company		0.651		
11 I feel guilty if I do not recycle as much as I could		0.576		
26 I recycle more waste at home than most people		0.544		
25 We do too little about waste in the UK		0.513		
12 Our company should tell us of the benefits if we recycle more		0.510		
14 Waste management and recycling is proper house keeping		0.476		0.355
15 WM and R should not be the responsibility of my department		-0.446		
31 Contribution to R waste too small to make difference	0.391	-0.396		
6 Need clear working procedures		0.355		0.309
<i>Factor 3: Recycling is costly 4 items</i>				
18 Improving waste management will cost money			0.736	
8 Recycling uses up valuable company resources (e.g. money)			0.693	
4 Process efficiency most important; not bother with waste		-0.354	0.545	
37 I believe reducing waste is better than recycling			0.456	
<i>Factor 4: Recycling can earn income 6 items</i>				
13 Our company could make money by recycling more				0.770
5 Our company makes money from recycling				0.651
32 Recycling can make our company more competitive				0.635
22 I have made suggestions to boss how to recycle more here				0.417
29 Companies should pay more tax if not recycle their waste		0.333	-0.325	0.366
16 The less waste our company creates the more efficient it gets				0.344
Eigenvalues	7.34	4.73	2.30	2.01
% of variance	19.3	12.4	6.1	5.3
Mean scores standardized to score/7	4.62	5.49	3.86	4.82
Cronbach's Alpha	0.885	0.802	0.617	0.655

Note: WMS refers to waste management system and R to recycling

Table 3. Correlations of factors, N eco products and concerns for own home recycling and resource depletion

	<i>F1</i>	<i>F2</i>	<i>F3</i>	<i>F4</i>	<i>SinceHR</i>	<i>SinceWR</i>	<i>NEco</i>	<i>Concdep</i>
F1 positive approach								
F2 Policies needed	0.216**							
F3 R costly	0.025	-0.217*						
F4 R makes money	0.299***	0.499***	-0.152*					
Since R home	0.083	-0.117	0.048	0.088				
Since R wk	-0.085	0.017	0.038	-0.052	0.099			
N eco products	0.168*	-0.279**	-0.030	0.296***	-0.043	0.157		
Concern for depletion	0.179*	0.561***	-0.201**	0.335***	0.007	0.026	0.256***	
Concern R at home	0.100	0.471***	-0.037	0.246**	-0.312**	0.018	0.260**	0.449***

Notes: * is $p < .05$, ** $p < .01$, *** $p < .001$

Table 4. Recycling at home and at work frequencies cross-tabulated

<i>Recycle at home?</i>	<i>Recycle at work?</i>		Total
	Yes	Never	
Yes	96	49	145
Never	4	5	9
Total	100	54	154

Table 5. Time since last recycled at home vs. at work: t tests for factors, behaviors and perceived concerns

<i>Recycled in past?</i>	<i>Yes</i>		<i>Never</i>		<i>t</i>	<i>prob</i>
	<i>Mean</i>	<i>s.d.</i>	<i>Mean</i>	<i>s.d.</i>		
<i>At home</i>						
F1 positive approaches	4.56	1.01	4.81	1.00	-0.69	n.s.
F2 Policies needed	5.58	0.68	4.67	1.10	3.53	0.0005
F3 R costly	3.82	1.00	4.20	0.89	-1.07	n.s.
F4 R makes money	4.62	0.94	4.86	1.11	-0.70	n.s.
N eco products	2.42	1.15	2.00	2.25	1.05	n.s.
Concern for depletion	7.68	1.64	5.89	1.05	3.25	0.0014
Concern for own recycle	7.13	1.20	4.00	2.29	4.56	<0.0001
N	174		9			
<i>At work</i>						
F1 positive approaches	4.68	0.96	4.22	1.09	2.68	0.0081
F2 Policies needed	5.62	0.78	5.39	0.71	1.80	0.0746
F3 R costly	3.85	0.99	3.88	0.99	-0.17	n.s.
F4 R makes money	4.68	0.98	4.50	0.95	1.08	n.s.
N eco products	2.34	1.19	2.35	1.21	-0.04	n.s.
Concern for depletion	7.66	1.71	7.46	1.73	0.73	n.s.
Concern for own recycle	6.92	2.15	7.00	2.22	-0.22	n.s.
N	101		55			

In relation to recycling behavior at home and at work, time since recycling at home and work and N eco products were correlated, yielding no significant relationships between any of these three measures, thus providing no support for H1 or H3 in that respect. Further, to test H3 the frequencies of people recycling or not show that recycling at home is far more common than at work, as shown in Table 4, so whilst the mean times since recycling at work are relatively low than those at home, nevertheless far fewer people recycle at work than at home.

Table 4 shows clearly that there are a third of respondents (54) who said they never recycled at work; thus the never recycled were compared to those who had recycled at some point, for home and work, with the results in Table 5. For recycling at home, there are differences for F2 and concern for depletion or own recycling, although based on a relatively small number of never recyclers. However for recycling at work only F1 and F2 show a significant difference. Also in the table can be seen

differences in perceived concerns and actual behavior in terms of number of eco products used: whilst there were large differences in the concerns in relation to recycling at home, none were apparently differentiating respondents in relation to recycling at work, implying no support for H1.

H4 also involves relating attitudes to behavior and proposed that concern for depletion of natural resources is related to recycling behavior and attitudes; the findings in Table 5 shows that these are significantly different in relation to recycling at home and further in Table 3 that such concern is correlated with all four factors and with the number of eco products used, but not with time since recycled either at home or at work. Thus, there is support for H4.

H2 concerned demographic differences in attitudes and accordingly the four factors and the behavioral measures of time since recycling and number of item types recycled were tested for differences by gender, age group, length of service, job grade and job type and company. Using

ANOVAs, there were no differences found for job grade except for the number of different eco-products used, which was significant with $F=2.58$, $p=0.0426$; however this showed no clear pattern other than that the mean score for the administration group being less than that of the other four groups. Thus it can be concluded that H2 is not proved for job grade. The four factors and behavioral measures were also compared across the five main job types using 1-way ANOVAs, with the results given in Table 6, where it can be seen that operational and technical support workers are longest since recycling at home and at work but use more eco-products.

Four of the six companies (A, B, C and E) had sufficient respondents to make meaningful ANOVAs to compare companies on the four factors and the behavioral measures; these are presented in Table 7 where it can be seen that three of the measures are significant, with Company B being longest since last recycling at work, least likely to believe that recycling can earn money, and Company C highest in believing that recycling is costly to do.

Given that the numbers never recycling are different for the four companies in Table 7, never recycled and recycled at work were compared across

the four companies using a χ^2 test, yielding $\chi^2=9.44$, 3 d.f. $p<0.05$, with companies A and C contributing the high cell values, thus company C has significantly fewer people recycling and company A more than the expected values. This is difficult to 'unpick' further due to the size of N in the companies.

The individual demographics of gender and age were also compared. For gender, there were no differences in behavior, but significant differences in the direction of women being more likely to believe that policies were needed, less likely to believe that recycling is costly or that it makes money and having more concern for their own recycling, all using 1-tailed tests in the direction of women being more concerned for environmental rather than cost reasons; these results are shown in Table 8. In relation to age group differences, 1-way ANOVAs (conducted in case age shows curvilinear relationships) were conducted on the four factors and the three behavioral measures, with results shown in Table 9. In the table, a trend toward using more eco-products with increasing age is clear, with only a dip in relation to the 26-35 age group; this group also dips on F1 with the least positive attitudes. F2 and F4 both show general trends of increasing with age.

Table 6. Job types differences for factor scores: means and 1-way ANOVAs

	<i>Job Type</i>					<i>F</i>	<i>Prob 2-tailed</i>
	<i>Technical support</i>	<i>Operational</i>	<i>Clerical</i>	<i>Marketing</i>	<i>Management</i>		
F1 Positive approaches	4.59	4.56	4.26	4.19	5.08	3.04	0.0187
F2 Policies needed	5.65	5.39	5.47	5.46	5.85	2.19	0.0723
F3 R costly	4.05	3.95	3.72	3.51	3.75	1.33	n.s.
F4 R makes money	4.58	4.81	4.24	4.22	4.64	2.89	0.0237
Time since R home	2.29	2.62	1.76	1.66	1.35	0.18	n.s.
Time since R wk	1.85	1.40	1.19	1.07	0.88	0.93	n.s.
N Eco products used	2.44	2.80	1.71	1.77	2.27	3.69	0.0079
N	28	84	23	23	24		

Table 7. Company differences for factor scores and behaviors: means and 1-way ANOVAs

	<i>Company</i>				<i>F-ratio</i>	<i>Prob 2-tailed</i>
	<i>A</i>	<i>B</i>	<i>C</i>	<i>E</i>		
F1 Positive approaches	4.85	4.47	4.53	4.45	1.74	n.s.
F2 Policies needed	5.51	5.76	5.37	5.53	0.63	n.s.
F3 R costly	3.64	3.71	4.69	3.90	3.84	0.0108
F4 R makes money	4.71	3.84	4.30	4.61	3.53	0.0162
Time since R home	2.77	1.11	1.78	2.54	0.28	n.s.
Time since R wk*	.87	3.17	1.00	1.37	3.98	0.0102
N Eco products used	2.29	2.92	2.15	2.35	1.06	n.s.
N all (N recycle wk*)	38 (27)	12 (6)	13 (3)	110 (61)		

Note: means for time since recycled at work do not include 'never'

Table 8. Gender differences in factor scores and behavioral measures: means and t-tests

	<i>Men N=136</i>		<i>Women N= 46</i>		<i>t</i>	<i>Prob 1-tailed</i>
	<i>Mean</i>	<i>s.d.</i>	<i>Mean</i>	<i>s.d.</i>		
F1 Positive approaches	4.62	1.03	4.38	0.93	1.37	n.s.
F2 Policies needed	5.45	0.77	5.69	0.64	-1.93	0.0278
F3 R costly	3.93	1.02	3.65	0.97	1.68	0.0475
F4 R makes money	4.68	1.01	4.37	0.72	1.94	0.0268
Time since R home	2.78	6.92	2.35	6.41	0.37	n.s.
Time since R wk	1.20	1.18	1.60	2.20	-1.21	n.s.

N eco products used	2.41	1.21	2.24	1.14	0.83	n.s.
Concern for depletion	7.49	1.75	7.65	1.62	-0.55	n.s.
Recycling concern	6.74	2.28	7.30	1.90	-1.66	0.0500

Table 9. Age group differences in factor scores and behavioral measures: means and t-tests

	Age group					F	Prob 2-tailed
	Under 25	26-35	36-45	46-55	56+		
F1 Positive approaches	4.87	4.22	4.57	4.61	4.88	2.09	0.0841
F2 Policies needed	5.19	5.34	5.60	5.53	5.78	2.03	0.0920
F3 R costly	3.57	3.66	3.99	3.92	3.91	0.96	n.s.
F4 R makes money	4.15	4.38	4.81	4.63	4.75	2.09	0.0084
Time since R home	2.44	1.43	1.09	4.20	1.50	1.27	n.s.
Time since R wk	1.81	1.10	1.53	1.20	1.06	0.58	n.s.
N Eco products used	2.11	1.78	2.29	2.74	3.20	4.05	0.0046
N	28	84	23	23	24		

The final demographic variable tested, length of service, was correlated with all the factors and behavioral measures, with no significant findings generated on its own, and 2- or 3-way ANOVAs for demographics would be difficult with the N of the sample. However a Chi-squared test (χ^2) of the 7 length-of-service groups by recycled/never recycled was significant with $\chi^2=17.22$, 6 d.f. $p=0.0085$; the percentages of respondents in the longest and mid-length of service who recycled at work were higher and those with the least length of service was lower than for those who did not recycle, supporting a limited relationship of length of service with recycling at work. Length of service was correlated with time since recycled for both work and at home, yielding $r=-0.141$ $N=101$ and $r=0.117$ $N=174$ respectively; whilst neither of these reaches significance, they are in different directions and the two correlations are significantly different to each other at $z=2.05$ $p=.0404$ 2-tailed. So greater length of service is associated more recent recycling at work but in effect the opposite in relation to recycling at home, again implying that the two types of recycling are not nearly the same behavior and that H3 has no support. Thus, for H2, it can be said that there are differences in all the demographics but these are not pervasive for all the seven dependent variables. Time since last recycled at home did not significantly differ for any demographic variables, whilst the measure most likely to exhibit significant demographic variation was F4 which was different on four of the five demographic tests, followed by number of eco-products used which was significant on three.

In order to try to establish the relative importance of these findings in relation to recycling behavior at work, the demographic items (with gender as a dummy variable) along with the four factors, concern for natural resources, and the behavioral measures of N Eco products and time since last recycled at home, were entered into a multiple regression with time since recycled at work. Whilst this must therefore exclude those who never recycled at work and therefore does not present a full picture, the results are perhaps indicative of how the variables are affecting the propensity to recycle in

work environments where it is hardly encouraged. The findings for 140 respondents were $R^2 = 0.177$ and adjusted $R^2 = 0.107$, with $F_{11,129} = 2.52$ $p=0.0065$. The independent variables with the significant coefficients (in brackets) were length of service (-2.88), age (2.03), F1 (-2.76), rating of recycling at home (2.03) and time since recycled at home (2.42); in addition, gender yielded a coefficient of -1.66, suggesting the possibility that women are more likely to recycle than men. All the other variables yielded low coefficients. These results lend support the various findings concerning demographics except for length of service, which now appears to be positively associated with the propensity to recycle at work, albeit only based on data for those who stated that they did recycle at work.

3.1. Summary of hypotheses testing

H1 proposed that attitudes and behavior are related. This hypothesis has some support, such that those attitudes identified with F1 (positive approaches), F2 (policies needed) and F4 (generates income) are related to the number of eco products used, but not to time since recycling at home or at work.

For H2, there are differences in all the demographics shown in Tables 6, 7, 8 and 9 but these are not pervasive for all the seven dependent variables. The least demographic differentiators were length of service and job grade. Time since last recycled at home was not significantly different for any demographic variables at all, whilst the measure most likely to exhibit significant demographic variation was F4 which was different on four of the five demographic tests, followed by number of eco-products used which was significant on three. These lend partial support to H2.

H3 proposed that recycling at home and at work are related, and the evidence here can provide no support at all for that hypothesis. Indeed there are many people who recycle at home but not at work rather than the other way round.

Finally, H4 proposed that the perceived concern for depletion of natural resources is related to recycling behavior and attitudes. The findings here

lend strong support for the hypothesis in terms of attitudes, and for behavior in terms of number of eco-products used but not in relation to recycling.

4. Discussion

There is already a body of knowledge concerning attitudes and behavior, especially in relation to domestic recycling although less so for industrial recycling focused on waste management. Themes emerging from this paper include the lack of a relationship between work place and home recycling behaviors, demographic differences and their implications, the nature of the factors found and the extent to which attitudes and behavior are related causally. These are discussed below, but first it is important to address the factor structure and factor means and what these say about attitudes to waste management and recycling.

The mean of 4.62 for F1 (positive attitudes to waste and recycling) suggests that whilst the majority are feeling more strongly than neutral about their senior management and how well their company is doing, it is not that high; there are clearly plenty of employees that feel the reverse. This is reinforced by the much higher mean for F2 (policies needed) emphasizes the importance of recycling waste and the need for policies at 5.49, indeed there is an implication in this that the companies are lacking to some extent. The cost-benefit issues that constitute F3 (cost) and F4 (generates income), with means of 3.86 and 4.82 respectively imply that employees see waste management much more as having earning potential than as a cost. Indeed, it is seen Table 6 that managements are more likely than operational staff to agree that policies are needed but operational staff agree more that recycling can earn money. These findings are consistent with Lingard et al (2000) and Joyce et al (2004) but less so with Teo and Loosemore (2001) or Segarra-Oña et al. (2011).

Whilst recycling at work in this study was fairly frequent, it differed for different organizations and actually one third of respondents said they never recycled at work yet recycled at home. This is of concern, especially since recyclers differed from non-recyclers on only two factors, suggesting that whilst their attitudes and perceptions are similar their behaviors differ. This lack of correspondence between expressed attitudes and behavior has been of concern in the various attitudes models attempting to explain why there is such an inconsistency. TPB (Ajzen, 1991) would perhaps explain this partly because intention moderates the attitude-behavior relationship or there is a lack of perceived behavioral control such that the ability to recycle is not present; alternatively norm activation theory emphasizes situational and personality trait activators and these may well be important here (e.g. Harland et al., 2007). It is proposed that behavior needs to be changed directly to remove the habituated and complacent lack of responsiveness from quite a large proportion of employees; this can be done by

creating new subjective norms centered on proactive behaviors and awareness of consequences, but it must also take into account that some employees behaviors reflect their socially constructed beliefs about their role in recycling (Dake, 1992). It is proposed that norm-activation theory may offer something more than TPB alone would do.

If there is a spillover effect, it is certainly not happening in the direction of home to work, although changing workplace behavior might potentially achieve more recycling at home (Berger and Kanetkar, 1995). It can be also argued that there is a fundamental difference between home recycling and company recycling, since the former is under volitional control, whereas the latter may not be. So it can be proposed that initiatives that begin to focus on recycling and waste management could change the perceived behavioral control baseline.

The demographic findings in this study are interesting, even if they are not pervasive. For example, for job types, one might expect management to be most interested in recycling and the possibility of it making money rather than be a liability (Aragón-Correa et al., 2004). Yet here operational staff has actually generated better scores than management, albeit not significantly so in this sample. This is consistent with the findings of Lingard et al. (2000) that site-based employees are more concerned about the disposal costs than office employees, presumably because the effects are more obvious. In terms of gender, women seem to care more about recycling as an issue in this study, which is consistent with findings elsewhere, where we know they are more likely to feel guilt, are more health and environmental conscious (Bord and O'Connor, 1997; Buenrostro et al., 2014; Stern et al., 1993; Whitmarsh and O'Neill, 2010).

In terms of recognizing that policies are needed (Kilbourne and Pickett, 2008), or that recycling can earn money, there is a U-shaped age group distribution, such that older and youngest employees agree the most. The conclusion that can be drawn from the various demographic differences found here is that certain groups of employees might be targeted differently- to capitalize on the experience of older workers, to encourage the 'greener' attitudes coming through in younger workers, and to use what we know about how female employees are more likely to care about these issues. Therefore there are a number of management issues emerging from these findings.

As mentioned earlier, F2 (policies are needed) had a high mean, in fact the highest of the four factors. This is consistent with suggestions elsewhere that government strategies and policies are required to improve attitudes in relation to the introduction and maintenance of recycling activities at home (Cordente-Rodríguez et al., 2010; Omran and Read, 2008; Whitmarsh and O'Neill, 2010).

Further, it appears that without policies or working procedures there might not be much incentive for the employees to participate in company

recycling, and that these can incorporate suggestions to good effect (Cordano et al., 2010, Joyce et al., 2004, Peiró-Signes et al., 2011). Policies, especially ones that are seen to be enforced, coupled with asking the workforce directly for ideas and contributions might form a way forward.

The findings here about the number of eco-products confirm findings elsewhere that other behaviors at home may relate to environmental or recycling behavior at home (Cordente-Rodríguez et al., 2010; Hines et al., 1986). This also points to research considering as many ways of measuring recycling behavior as possible in order to understand it better.

5. Recommendations and implications of the research findings

This study was conducted in one region of the UK and thus it is important to ascertain whether the findings may generalize elsewhere. DEFRA (2011), showed that, whilst regional differences do exist, for example in 2009/10 regional household rates were highest in the east of England (46%) and lowest in London (32%) whereas the North-West sent 59% to landfill and the West Midlands 28%, the North East region was considered as a good representation of waste recycling and disposal practices with 35% recycling and 45% to landfill. On that basis, we can conclude that generalizing from the findings in this study is possible.

Communication with employees clearly underpins any action to improve waste management behaviors (Heidrich et al., 2009). Not only should the importance of these be given emphasis as has been intimated earlier, but also the financial aspects need to be considered. In this study, the agreement with recycling being costly was significantly less than that about it generating income, which is a positive view and surely can influence how employees would respond to new initiatives. So it is proposed here and in line with recent findings that any company introducing a new management system should not only have strong new policies and emphasize the moral and ethical gains (in relation to depletion of resources) but also demonstrate clearly the potential financial gains from more sustainable management (Moldovan, 2017; Sposato et al., 2017; Vemury et al., 2018). This may develop more positive attitudes and behaviors in the employees as well as in management commitment. However, some issues need to be addressed if more positive attitudes and behaviors are to ensue.

Changing attitudes and behavior is not a quick or easy thing to do, especially when the existing behaviors are well embedded. In addition, attitude change may not always translate into behavior change, so barriers such as convenience that may prevent this translation need to be considered. Policies and opportunities to recycle are the baselines from which environmental attitude and behavior change programs may start, but as baselines they will

not generate these changes in themselves. To have a good policy for recycling and to provide the 'bins' is necessary but not sufficient to induce behavior or attitude change; these simply become something to which people pay lip service.

Communicating commitment, leading and behaving by example, encouraging and motivating, information about costs and benefits, all in relation to improved environmental and waste management, are crucial (Harvey et al., 2014; Heidrich and Tiwary, 2013; Sposato et al., 2017). On a more fundamental note, employees often know more about what can and should be recycled than do many managers and this is often not communicated upwards. This knowledge needs to be captured, synthesized and acted upon and managers may need to be more consultative if they are to do this. The findings here suggest that different demographics can be targeted effectively and a strategy to maximize the development of ideas for implementing better environmental and waste management systems should be considered as an important step, which also has the advantage of empowering employees and increasing their commitment as well as improving waste management and recycling.

6. Conclusions

This study shows that recycling is not a universal construct that can be applied to both work and domestic environments similarly and that there remains a gap between attitudes and behavior that may be attributable to situational and personality trait activators. Attitudes and behavior can be changed, but complacency and habituation need to be taken into account, along with strong policy and better management systems that involve communicating to the workforce on the benefits of changing behaviors.

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