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Original Paper

The Green Management of Paper of the Third Age in the Region of Attica. Case Study: The Municipalities of Egaleo and Chaidari

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Abstract

The purpose of this thesis is to examine the determinant factors of recycling and in particular of paper recycling. The research focuses on paper recycling behavior on the part of the elderly in the Region of Attica. Primary research was based on the use of layered data. The survey data was collected through the distribution of questionnaires to senior citizens in the municipalities of Egaleo and Chaidari. The questionnaire was distributed by hand in the region's O.C.C. (Open Care Centers) for the Elderly Staff Members during the period from November 2017 until February 2018 (11/2017-02/2018). The final sample of the survey amounted to 375 participants. Multiple logistic regressions generate useful conclusions, such as whether participants recycle paper or not appear to be linked to the educational level of the elderly. In addition, through the logistic regressions, it appears that intention to recycle affects significantly the behaviour towards, recycling, and the perceived behavioural control as well. Furthermore, including social and demographic data, it appears that the educational level, monthly family income and residential status are factors that affect whether the participants are recycling paper or not.

Keywords

recycling, paper, third age, pre-planned behaviour model, recycling determinants, logistic regression

1. Introduction

The present dissertation aims to study the waste management in the Urban Region of Attica. In particular, the dissertation focuses on the green management of printed paper. Paper production has a significant impact on the environment. Its use and process as a raw material has a variety of adverse effects on the environment. On the other hand, there are new technologies/methods that can mitigate the negative effects of paper production on the environment, while having positive economic results (Laurijssen et al., 2010). One of these methods is recycling, which does not involve the benefit of re-usage of waste only. The main benefit of recycling is the lower environmental burden with pollutants/wastes, which mitigates the negative environmental impact of paper production (Pati et al., 2008). These two categories of recycling benefits are related to the production process and, in particular, inputs/production factors and outputs/products. Recycling contributes to the conservation of natural resources by reintroducing inputs (in this case paper) back into the production process. Re-usage of waste is the reason why recycling has positive financial results (Virtanen et al., 2013). On the other hand, recycling reduces the harmful effects resulting in the increase of the volume of waste. Therefore, in terms of output, the production process creates fewer externalities for society as a whole, given the fact that paper production coming from recycled paper fibres consumes less energy, preserves natural resources (wood) and reduces environmental pollution. The conflict between financial optimization and environmental protection has drawn the attention of research programs concerning the design of waste management systems (Pati et al., 2006).

Recycling is not new technology. In fact, it is a commercial proposal, since Matthias Koops founded the Neckinger mill in 1826, which produced white paper from printed paper waste. However, there have been very few researches on the impact of recycling until the end of the 1960s. From the late 1960s to the late 1970s, significant researches were carried out to determine the impact of recycling on the properties of pulp (Nazhad & Paszner, 1994).

Consumption of recycled paper has been steadily growing over the past decades. According to the Confederation of European Paper Industries (CEPI), the use of recycled paper was carried out using virgin fibres until 2005. This development has been reinforced not only by the technological progress and the competitiveness prices of recycled fibre, but also by the environmental awareness at both producer and consumer level, which affected the demand for recycled paper. The European paper industry has suffered considerable consequences as a result of the debt crisis that occurred in 2009. Several businesses ended their operation due to the weakening of the global economy. Despite the fact that the consumption of recycled paper in Europe has decreased during this period, exports of recycled paper to Asian markets are constantly rising. However, the recycling rate, expressed as “paper recycling volume/paper consumption volume”, reached 72.2% of recycling in 2009, compared to 66.7% in 2008 (CEPI, 2015).

Therefore it is important, through this thesis, to identify the factors that seem to determine the attitudes and perceptions of the elderly, especially since they have not been studied as a separate category. Given the difficult situation that some are experiencing, it is important to look at the specific constraints they face, but also at how their paper recycling action is being formed in order to develop proposals for practical implementation.

2. Recycling in the Third Age

The present dissertation aims to discuss and examine the eco-management of printed paper by the elderly. Since the research aims to examine the elderly in particular, it is interesting to study the factors that determine the behaviour towards recycling as well as the interventions carried out at household level in order to enhance an environmentally friendly behaviour in general and specifically towards recycling. By examining the factors influencing household recycling, conclusions can be drawn regarding the behaviour that older people are expected to have.

With regard to the meta-needs, the time that people have met their basic needs and have reached a state of self-realization, they will seek satisfaction in relation to other needs, namely meta-needs such as knowledge, creativity, perfection, and peace. If a consumer has environmental consciousness, then they will seek to implement strategies to achieve an environmentally friendly environment, making them sensitive to such behaviours (Carmi et al., 2015).

Despite the above-mentioned theory, environmentally friendly behaviours needs are not necessarily always preferred by consumers because of contradictions or inhibitors (Bamberg, 2013). Carmi (2012) suggests that moral reasoning takes place when environmental impacts are recognized as significant and when there is no other possibility that affects a decision. Martinho et al. (2015) suggest that when two behaviours have the same value for the consumer, the characteristic of sustainability can determine the choice of behaviour.

Researches on environmental behaviour, part of which is recycling as well, have reported a significant relationship between consumer's attitude and consumer's environmental behaviour (Sidique et al., 2010). Research on environmental behaviour in general is based on two main theoretical models: the theory of reasoned action (Ajzen & Fishbein, 1980) and the Theory of Planned Behaviour (TPB) (Ajzen, 1991). These models have shown the relationship between attitude and behaviour. However this relationship is in some cases not as strong as expected for all environmental behaviours (Chen & Tung, 2010). Despite the fact that these models have expanded and their predictability has increased, they are not yet fully successful (Pakpour et al., 2014). The TPB assumes that consumers have a reasonable basis for their behaviour, taking into account the effects of their intentions and actions, which are influenced by the following factors (Bortoleto et al., 2012): (i) Attitude, the favourable (or unfavourable) assessment behaviour of the individual, (ii) subjective rule, the perception of the

individual of the social pressure to participate (or not to participate) in a particular behaviour, and (iii) perceived control, consisting of a person's perception of compliance with a behaviour.

On this basis, the goal of the research is to focus on a single aspect of environmental behaviour, that of recycling. Research focuses on paper recycling in households, targeting a specific age group, the third age (60+). In the next section, we examine the factors that determine behaviour towards household recycling by exploring possible researches that have provided information and data on paper recycling in particular as well as findings about the elderly.

3. Statistical Survey Methodology

In order to fulfil the purpose of the survey, quantitative research was selected, through the distribution of questionnaires to senior citizens in the Region of Attica. The sample of the survey consists of 375 elderly people from the O.C.C. (Open Care Centres) of the municipalities of Egaleo and Chaidari. The questionnaire includes factors identified in the pre-planned behaviour model (attitudes, subjective patterns, perceived behavioural control, intention and behaviour towards paper recycling), but also additional factors that have been included in the model in recent surveys (moral standards, situational factors and perceived consequences). Both descriptive as well as induction statistics were used to identify the factors that have significant impact on older people paper recycling behaviour.

3.1 Approach—Research Variables

Independent model variables are social-demographic elements, attitudes, subjective patterns, perceived behavioural control, moral standards, conditional factors, and the perceived consequences of paper recycling. Attitudes, subjective patterns, perceived behavioural control, moral standards, state factors and the perceived consequences of paper recycling are measured as the average of the answers to the relevant questions in the second section of the questionnaire.

As already mentioned above, the selection of socio-demographic data as interpretive variables of both behaviour and intention to recycle are based on previous researches, which conclude that social-demographic data are statistically significant interpretative factors (Seacat & Northup, 2010; Saphores et al., 2012; Fiorillo, 2013; Pakpour et al., 2014; Babaei et al., 2015; Crociata et al., 2015; Martinho et al., 2015; Triguero et al., 2016; Czajkowski et al., 2017; Echegaray & Hansstein, 2017; Lizin et al., 2017; Oztekin et al., 2017; Sidique et al., 2010; Saphores et al., 2012; Yau, 2012; Miafodzyeva & Brandt, 2013; Pakpour et al., 2014; Akil et al., 2015; Alpizar & Gsottbauer, 2015; Babaei et al., 2015; Martinho et al., 2015; Arbués & Villanúa, 2016; Choon et al., 2016; Noor, 2016; Zen et al., 2014; Babaei et al., 2015; Jafari et al., 2015; Martinho et al., 2015; Choon et al., 2016; Wang et al., 2016; Fielding et al., 2016).

Accordingly, the selection of attitudes as an interpretive variable is based on a previous references that finds that it has a statistically significant effect on behavior and intent to recycle (Chen & Tung, 2010; Sidique et al., 2010; Best & Kneip, 2011; Bezzina & Dimech, 2011; Pakpour et al., 2014; Park & Ha, 2014; Wan et al., 2014a; Wan et al., 2014b; Babaei et al., 2015; Botetzagias et al., 2015; Ylä-Mella et al., 2015; Martinho et al., 2015; Arbués & Villanúa, 2016; Arı & Yılmaz, 2016; Wang et al., 2016; Echegaray & Hansstein, 2017; Oztekin et al., 2017; Wan et al., 2017). Similarly, subjective models are a statistically significant factor in predicting behavior and the intention to recycle from a part of researches (Chen & Tung, 2010; Bezzina & Dimech, 2011; Fornara et al., 2011; Park & Ha, 2014; Wan et al., 2014a; Wan et al., 2014b; Ylä-Mella et al., 2015; Arı & Yılmaz, 2016; Wang et al., 2016; Echegaray & Hansstein, 2017; Oztekin et al., 2017; Wan et al., 2017), as well as the perceived behavioral control (Chen & Tung, 2010; Fornara et al., 2011; Pakpour et al., 2014; Park & Ha, 2014; Wan et al., 2014a; Wan et al., 2014b; Ylä-Mella et al., 2015; Wan et al., 2017). From these surveys, some examine the above factors as interpretive of the intention to recycle (Chen & Tung, 2010; Pakpour et al., 2014; Park & Ha, 2014; Ylä-Mella et al., 2015; Bezzina & Dimech, 2011; Fornara et al., 2011; Arı & Yılmaz, 2016; Wan et al., 2014a; Wan et al., 2014b; Oztekin et al., 2017; Wan et al., 2017), while others of both intention and behavior towards recycling (Chen & Tung, 2010; Pakpour et al., 2014; Ylä-Mella et al., 2015; Bezzina & Dimech, 2011; Fornara et al., 2011; Arı & Yılmaz, 2016; Wan et al., 2014a; Wan et al., 2014b; Oztekin et al., 2017; Wan et al., 2017).

Moral standards have been found in a series of researches as important interpretive factors of intention and behavior towards recycling (Chen & Tung, 2010; Saphores et al., 2012; Miafodzyeva & Brandt, 2013; Culiberg, 2014; Pakpour et al., 2014; Park & Ha, 2014; Wan et al., 2014b; Botetzagias et al., 2015; Lizin et al., 2015; Gould et al., 2016; Miliute-Plepiene et al., 2016; Czajkowski et al., 2017; Wan et al., 2017). Situational factors have been used in recent studies that have been presented as potential interpreters of behavior and intention to recycle and have a statistically significant effect as well (Chen & Tung, 2010; Seacat & Northup, 2010; Sidique et al., 2010; Best & Kneip, 2011; Bezzina & Dimech, 2011; Tabernero & Hernandez, 2011; Ittiravongs, 2012; Saphores et al., 2012; Yau, 2012; Fiorillo, 2013; Guerrero et al., 2013; Latif et al., 2013; Miafodzyeva & Brandt, 2013; Thomas & Sharp, 2013; Chi et al., 2014; Zen et al., 2014; Babaei et al., 2015; Sun et al., 2015; Ylä-Mella et al., 2015; Lakhan, 2016; Noor, 2016; Welfens et al., 2016; Wan et al., 2017). Finally, the visible consequences of recycling, which essentially measure the inherent motivation of individuals for recycling based on the results they consider to be also in previous surveys statistically significant factors explaining the behavior and intention to recycle (Bezzina & Dimech, 2011; Park & Ha, 2014; Wan et al., 2014a; Wan et al., 2014b; Wan et al., 2017).

3.2 Multiple Logistic Regressions for Factors of the Pre-planned Behavior Model and Demographic Characteristics Affecting Paper Recycling

In order to study the influence of the factors of the pre-designed behavior model on paper recycling, the following multiply (binomial) logistic regression equation was created:

$$\textbf{Paper Recycling} = a + \beta 1 \cdot \textit{Recycling intention} + \beta 2 \cdot \textit{Attitudes towards Recycling} + \beta 3 \cdot \textit{Subjective Standards} + \beta 4 \cdot \textit{Visible Behavioral Control} + \varepsilon$$

In addition, the remaining scales of the pre-planned behavior model were added, resulting in the multiple regressions logistic equation:

$$\textbf{Paper Recycling} = a + \beta 1 \cdot \textit{Recycling Intention} + \beta 2 \cdot \textit{Recycling attitudes towards recycling} + \beta 3 \cdot \textit{Subjective Standards} + \beta 4 \cdot \textit{Visible Behavioral Control} + + \beta 5 \cdot \textit{Moral Standards} + \beta 6 \cdot \textit{Situational Factors} + b7 \cdot \textit{Visible Recycling consequences} + e$$

Demographic features have been added to produce the following multiple regression logistic equation:

$$\textbf{Paper Recycling} = a + \beta 1 \cdot \textit{Recycling Intention} + \beta 2 \cdot \textit{Attitudes towards recycling} + \beta 3 \cdot \textit{Subjective Standards} + \beta 4 \cdot \textit{Visible Behavioral Control} + \beta 5 \cdot \textit{Moral Standards} + \beta 6 \cdot \textit{Situational factors} + \beta 7 \cdot \textit{Visible Recycling consequences} + \beta 8 \cdot \textit{Gender} + \beta 9 \cdot \textit{Age} + b10 \cdot \textit{Educational level} + \beta 11 \cdot \textit{Monthly family income} + \beta 12 \cdot \textit{Monthly pension} + \beta 13 \cdot \textit{Individual status} + \beta 14 \cdot \textit{Number of children} + \beta 15 \cdot \textit{residence} + \beta 16 \cdot \textit{residence status} + e$$

More specifically, variables such as recycling intent, gender, educational level, monthly family income, personal status, residence and residence status were coded using pseudo variables. Thus, the resulting multiple regression logistic model is:

$$\textbf{Paper Recycling} = a + b_1 \cdot DRI_1 + b_2 \cdot DRI_2 + b_3 \cdot DRI_3 + b_4 \cdot DRI_4 + b_5 \cdot RS + b_6 \cdot SM + b_7 \cdot CBC + b_8 \cdot EM + b_9 \cdot SF + b_{10} \cdot CC + b_{11} \cdot SEX + b_{12} \cdot AGE + b_{13} \cdot DEDU_1 + b_{14} \cdot DEDU_2 + b_{15} \cdot DEDU_3 + b_{16} \cdot DEDU_4 + b_{15} \cdot DEDU_5 + b_{16} \cdot DEDU_6 + b_{17} \cdot DINC_1 + b_{18} \cdot DINC_2 + b_{19} \cdot DINC_3 + b_{20} \cdot DINC_4 + b_{21} \cdot PEN + b_{22} \cdot DPER_1 + b_{23} \cdot DPER_2 + b_{24} \cdot DPER_3 + b_{25} \cdot CHD + b_{26} \cdot DLIV_{21} + b_{27} \cdot DLIV_2 + b_{28} \cdot DLIV_3 + b_{29} \cdot DLIV_4 + b_{30} \cdot DHST_1 + b_{31} \cdot DHST_2 + \varepsilon$$

Where:

- Paper recycling: this is the dependent qualitative variable that expresses whether households are recycling paper (at least one kind of paper, based on question 46). It takes the value 1 if the citizens recycle paper and the value 0 if the citizens do not recycle paper.
- DR1: this is a pseudo variable used to encode the Recycling Intention variable (question 47). It takes the value 1 if it is very unlikely for the citizen to recycle paper within the next month and 0 if differently.
- DR2: this is a pseudo variable used to encode the Recycling Intention variable (question 47). It takes the value 1 if it is neither possible nor unlikely for the citizen to recycle paper within the next month and 0 if differently.

- DR3: this is a pseudo variable used to encode the Recycling Intention variable (question 47). It takes the value 1 if it is possible for the citizen to recycle paper within the next month and 0 if differently.
- DR4: this is a pseudo variable used to encode the Recycling Intention variable (question 47). It takes the value 1 if it is very likely that the citizen recycles paper in the next month and 0 if differently.
- RS: it is an independent quantitative variable that is the average of the answers to questions 10-15 (scale Attitudes towards recycling). It takes values between 1 and 5.
- SM: this is an independent quantitative variable which is the average of answers to questions 16-18 (Subjective Standards scale). It takes values between 1 and 5.
- CBC: it is an independent quantitative variable that is the average of answers to questions 19-25 (Scale Perceptual Behavioral Control). It takes values between 1 and 5.
- EM: this is an independent quantitative variable that is the average of the answers to questions 26-31 (Moral Standards scale). It takes values between 1 and 5.
- SF: this is an independent quantitative variable that is the average of the answers to questions 32-35 (Stage situational factors). It takes values between 1 and 5.
- CC: this is an independent quantitative variable which is the average of the answers to questions 36-42 (Scale Visible Recycling Consequences). It takes values between 1 and 5.
- SEX: it is an independent qualitative variable expressing the gender of the citizens. It takes the value 0 if the citizen is a woman and the value is 1 if the citizen is a man.
- AGE: it is an independent quantitative variable that expresses the age of the citizens.
- DEDU1: this is a pseudo variable used to encode the Educational Level variable. It takes the value 1 if the citizen is a junior high school graduate and 0 if different.
- DEDU2: this is a pseudo variable used to encode the Educational Level variable. It takes the value 1 if the citizen is a high school graduate and 0 if different.
- DEDU3: this is a pseudo variable used to encode the Educational Level Variable. It takes the value 1 if the citizen is a postgraduate graduate and 0 if different.
- DEDU4: this is a pseudo variable used to encode the Educational Level variable. It takes the value 1 if the citizen is a graduate of University Institution (U. I)—Technological Institution (T. I) and 0 if different.
- DEDU5: this is a pseudo variable used to encode the Educational Level variable. It takes the value 1 if the citizen holds a postgraduate degree and 0 if different.
- DEDU6: this is a pseudo variable used to encode the Educational Level variable. It takes 1 if the resident holds a PhD and 0 if different.
- DINC1: this is a pseudo variable used to encode the Monthly Family Income variable. It takes 1 if the citizen has a monthly family income of between € 801 and € 1500 and 0 if different.

- DINC2: this is a dummy variable used to encode the Monthly Family Income variable. It takes 1 if the citizen has a monthly family income between 1501 € and 2500 € and 0 if different.
- DINC3: this is a pseudo variable used to encode the Monthly Family Income variable. It takes 1 if the citizen has a monthly family income between 2501 € and 3500 € and 0 if different.
- DINC4: this is a pseudo variable used to encode the Monthly Family Income variable. It takes 1 if the citizen has a monthly family income of more than 3500 € and 0 if different.
- PEN: it is an independent quantitative variable expressing the monthly pension of the citizens.
- DPER1: this is a pseudo variable used to encode the Marital Status variable. It takes the value 1 if the citizen is married and 0 if different.
- DPER2: this is a pseudo variable used to encode the Marital Status variable. It takes the value 1 if the citizen is divorced and 0 if different.
- DPER3: this is a pseudo variable used to encode the Marital Status variable. It takes the value1 if the citizen is widowed and 0 if different.
- CHD: it is an independent quantitative variable that expresses the number of children that the citizens have.
- DLIV1: this is a pseudo variable used to encode the Accommodation variable. It takes the value 1 if the citizen lives with the spouse/partner and 0 if different.
- DLIV2: this is a pseudo variable used to encode the Accommodation variable. It takes the value1 if the citizen lives with the spouse/partner and the children and 0 if different.
- DLIV3: this is a pseudo variable used to encode the Accommodation variable. It takes the value 1 if the resident lives with the children and 0 if different.
- DLIV4: this is a pseudo variable used to encode the Accommodation variable. It takes the value 1 if the citizen lives with siblings or other relatives, housekeeper, institution etc., and 0 if different.
- DHST1: this is a pseudo variable used to encode the Accommodation status variable. It takes the value 1 if the citizen lives in a house that he owns and 0 if different.
- DHST2: this is a pseudo variable used to encode the Accommodation status variable. It takes the value 1 if the citizen is hosted and 0 if different.

Table 1 illustrates the results of the multiple regressions logistic for the multiple logistic regression models. Variable Attitude vs. Recycling, Subjective Standards, Moral Standards, Situational Factors, Visible Recycling Consequences, Gender, Age, Monthly Pension, Personal Condition, Number of Children and Accommodation did not show statistically significant predictors for paper recycling. By removing these variables, the Accommodation status variable was not statistically significant in the regression model. After this variable was also removed, the final regression logistic model is shown in Table 1.

The final multi-logistic regression model interprets about 34.1% of the variability of paper recycling. In particular, citizens who claim they are unlikely to recycle paper within the next month are almost 8 times more likely to recycle paper than those who claim it is very unlikely in the same question (p <0.001), keeping all other variables constant.

Citizens who claim they are neither likely nor unlikely to recycle paper within the next month are 33 times more likely to recycle paper than those who claim it is very unlikely to recycle paper within the next month (p <0.001) keeping the other model variables constant.

In addition, citizens claiming that it is likely to recycle paper within the next month are nearly 129 times more likely to recycle paper than those who claim it is unlikely to recycle paper within the next month (p <0.001) keeping all other variables constant.

Table 1. Results for the Multiple Regression Logistic Model

Variables		First Model		Final model	
		Exp(B)	p	Exp(B)	p
Constant	α	< 0,001	**0,009**	0,029	**< 0,001**
Intention to recycle	DRI1	9,566	**0,003**	7,803	**0,001**
	DRI2	53,519	**< 0,001**	33,563	**< 0,001**
	DRI3	211,478	**< 0,001**	128,756	**< 0,001**
	DRI4	151,004	**< 0,001**	137,686	**< 0,001**
Attitude towards recycling	RS	1,034	0,943	–	–
Subjective standards	SM	1,437	0,234	–	–
Perceived Behavioral Control	CBC	2,721	**0,013**	1,988	**0,014**
Moral standards	EM	1,265	0,615	–	–
Situational factors	SF	1,607	0,163	–	–
Visible recycling consequences	CC	0,850	0,755	–	–
Gender	SEX	0,986	0,975	–	–
Age	AGE	1,005	0,891	–	–
Educational level	DEDU1	1,563	0,573	1,327	0,689
	DEDU2	2,303	0,128	2,136	0,129
	DEDU3	0,039	**0,001**	0,063	**0,001**
	DEDU4	2,358	0,207	2,449	0,144
	DEDU5	> 100,0	0,999	> 100,0	0,999
	DEDU6	> 100,0	0,999	> 100,0	0,999
Monthly family income	DINC1	0,164	**0,006**	0,312	**0,018**
	DINC2	0,650	0,639	0,863	0,827

	DINC3	0,244	0,284	0,791	0,776
	DINC4	0,068	0,082	0,416	0,449
Monthly Pension	PEN	1,001	0,218	–	–
	DPER1	4,618	0,134	–	–
Personal Status	DPER2	3,691	0,115	–	–
	DPER3	2,953	0,253	–	–
Number of children	CHD	0,965	0,843	–	–
	DLIV1	0,658	0,683	–	–
	DLIV2	0,354	0,328	–	–
Living with	DLIV3	1,134	0,878	–	–
	DLIV4	0,491	0,330	–	–
	DHST1	2,942	**0,035**	2,076	0,092
Accommodation Status	DHST2	1,037	0,961	0,973	0,968
$\chi 2$	170,064	< **0,001**	156,234	< **0,001**	
Cox & Snell R2	0,365	0,341			
2 Log likelihood	175,786	198,615			

Citizens who claim that it is likely to recycle paper within the next month are 137 times more likely to recycle paper compared to those who claim that it is very unlikely to recycle paper within the next month ($p < 0.001$), keeping the other variables constant. In addition, an increase in the scale of perceived behavioral control by one unit results in an increase of almost 2 times the probability of paper recycling ($p = 0.014$), keeping the other variables constant. At the same time, as shown by the regression logistic model, graduates of post-secondary education are 0.6 times more likely to recycle paper than Primary school graduates, keeping all other variables constant ($p = 0.001$). Finally, citizens with a monthly family income of between € 801 and € 1500 were found to be 0.31 times more likely to recycle paper than citizens with a monthly family income of up to € 800 ($p = 0.018$), keeping all other variables constant.

4. Results

Continuing with the regressions made with regard to whether the participants are recycling or not, an important predictive factor is the intention to recycle. The more the paper recycling probability increases over the next month, the more likely is for the participant to recycle paper. Perceived behavioral control also enhances the likelihood of the participant to recycle. With the addition of regression and moral standards, situational factors and perceived consequences, there is a marginal increase in the determinant factor of Cox and Snell, which means that extra addition of variables does

not contribute to the interpretive power of the model. Indeed, the additional variables do not appear to affect significantly the likelihood to recycle or not on the part of the participants. However, with the addition of demographic variables, an estimation factor of 0.37 is observed, which means that demographics reinforce the model's interpret capability. Indeed, in addition to intent and perceived behavioral control, in this model a statistically significant influence of the educational level arises, the monthly family income and the accommodational status. Post high school graduates are 0.6 times more likely to recycle paper than Primary school graduates, keeping all other variables constant. Citizens with a monthly family income of between € 801 and € 1500 were found to be 0.31 times more likely to recycle paper than citizens with a monthly family income of up to $ 800. Participants that own their own house are nearly 3 times more likely to recycle than others.

At this point, a link is made to the studies that use as dependent variable measures to indicate whether the participant is recycling or not. The fact that home ownership and educational level increases the likelihood of recycling arises from Martinho et al. (2015). In addition, Babaei et al. (2015) found out that there is an increased likelihood of recycling for people with higher educational level, which also arises in the present study. The educational level as a booster for the likelihood of recycling arises from the research of Choon et al. (2016). However, they still do not find how the status of residency affects the participants in recycling or not, as found in the current study. Crociata et al. (2015) also found that a higher educational level generally leads to a higher probability of recycling, but the statistically significant difference they observe is between those who have completed high school and those with university education.

Higher educational level leads to increased recycling potential and based on the study of Triguero et al. (2016). Income as a booster for the likelihood of recycling arises from the study of Czajkowski et al. (2017), while Fiorillo (2013) and Jafari et al. (2015) found that both higher income and educational levels tend to positively influence the likelihood of recycling. Income as the only predictor factor of demographic data arises from the study of Park (2018). The findings are also consistent with the study of Zen et al. (2014), who found that educational level, income, residential status, play an important role in predicting the likelihood of recycling.

Regarding the variables of the pre-planned behavioral model, the intention to recycle actually appears to be a major predictor of behavior towards recycling in previous studies as well (Ari & Yilmaz, 2016; Best & Kneip, 2011; Bezzina & Dimech, 2011; Chen & Tung, 2010; Echegaray & Hansstein, 2017; Fornara et al., 2011; Martinho et al., 2015; Pakpour et al., 2014; Wan et al., 2014a; Wan et al., 2014b; Ylä-Mella et al., 2015; Oztekin et al., 2017; Tong et al., 2018). However, it is worth noting that the attitude in these models play the most important role in predicting the likelihood of recycling, which is not the case in the present study. In particular, from the initial factors of the Ajzen model (1991) in this model, perceived behavioral control only significantly influences the likelihood of recycling. Perceived

behavioral control has been found to be a significant predictor in the previous researches (Pakpour et al., 2014; Park & Ha, 2014; Wan et al., 2014b; Ylä-Mella et al., 2015; Wang et al., 2018; Tong et al., 2018; Passafaro & Livi, 2017). It is noteworthy, however, that particularly Passafaro and Livi (2017) found that attitudes do not have a statistically significant effect on recycling behavior, whereas only the perceptual behavioral control seemed to affect the likelihood of recycling from the original factors of the Ajzen model (1991).

It is noted that in this model the addition of extra variables such as moral standards, situational factors and perceived consequences do not contribute to assessing the likelihood of the participants to recycle. Czajkowski et al. (2017), Miafodzyeva and Brandt (2013) and Huber et al. (2017), however, found that moral standards reinforce the likelihood of households to recycle. The perceived consequences of recycling similarly whenever they have been used to estimate the likelihood of recycling households have had a statistically significant effect (Czajkowski et al., 2017; Gould et al., 2016). Situational factors have also been found to be statistically significant in determining the likelihood of recycling (Chi et al., 2014; Fiorillo, 2013; Guerrero et al., 2013; Ittiravongs, 2012; Lakhan, 2016; Latif et al., 2013; Miafodzyeva & Brandt, 2013; Noor, 2016; Seacat & Northup, 2010; Sun et al., 2015; Tabernero & Hernandez, 2011; Thomas & Sharp, 2013; Welfens et al., 2016; Ylä-Mella et al., 2015; Zen et al., 2014; DiGiacomo et al., 2018; du Toit & Wagner, 2018). However, a minority of these studies leads to the conclusion that the further addition of the situational factors do not contribute to the model's interpretative ability (Tong et al., 2018; Yau, 2012; Saphores et al., 2012). Overall, whether an elderly person recycles paper or not is influenced by perceived behavioral control, paper recycling intention, educational level, monthly family income, and residential status.

5. Conclusions

Whether participants recycle paper appears to be linked to the educational level of the elderly, since the percentage of post-high school graduates who do not recycle paper was found to be particularly high in relation to the other levels of education. In addition, through the logistic regressions made, it appears that intention influences significantly the behavior towards recycling, and perceived behavioral control as well. In particular, as the possibility of recycling paper among the elderly increases, so do the intention and the perceived behavioral control as well. Including social and demographic data, it appears that the educational level, monthly family income and residential status are factors that affect whether the participants are recycling paper or not. Post high school graduates are 0.6 times more likely to recycle paper in comparison to Primary school graduates, keeping all other variables constant. Citizens with a monthly family income of between € 801 and € 1500 were found to be 0.31 times more likely to recycle paper than citizens with a monthly family income of up to $ 800. Participants who own their own houses are nearly 3 times more likely to recycle than others.

The present study provides knowledge regarding the behavior towards a particular category of material, the paper and a specific age group of the population, the elderly. Although there are few recent studies concerning paper recycling behavior as a dependent variable as it has been studied here, there is no research focusing specifically on the elderly. Consequently, this thesis contributes to the existing references on recycling behavior and provides the basis for further practical implementation proposals to encourage paper recycling on the part of the elderly, given the constraints they may face.

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