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THE DETERMINANTS OF INDIVIDUAL'S RECYCLING BEHAVIOR WITH AN INVESTIGATION INTO THE POSSIBILITY OF EXPANDING THE DEPOSIT REFUND SYSTEM IN GLASS WASTE MANAGEMENT IN CROATIA*

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ABSTRACT

This study investigates the recycling behavior of Croatian citizens and identifies the determinants of individual recycling intention. It also addresses whether the existing deposit refund system for glass bottles in Croatia can be replaced by an expanded system that includes the return and reuse of almost all types of glass containers. A total of 427 Croatian citizens participated in the survey. Quantitative data analysis was performed using Structural Equation Modeling. In addition to the survey, a focus group was conducted with the relevant experts. The results confirmed the assumption about the pro-environmental orientation in Croatia. Citizens have a positive attitude towards the expanded deposit refund system in waste glass disposal and intend to implement it. The most significant predictor of their intention is their attitude towards the expanded deposit refund system, followed by familiarity with recycling. A person's recycling intention is mainly determined by familiarity with recycling and perceived behavioral control. In the qualitative study, Croatian experts were generally positive about an expanded deposit refund system for glass containers but warned that implementation would not be without certain obstacles. The added value of the study is the creation of new knowledge for the design of local and national policies that can promote individuals' environmentally friendly behavior and improve the glass waste disposal system in Croatia.

KEYWORDS: *sustainable development; glass waste management; deposit refund system; pro-environmental behavior; recycling behavior; Croatia*

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1. INTRODUCTION

As society shifts its priorities to sustainability issues, recycling becomes one of the critical aspects of environmentally friendly behavior. In parallel with these processes, recycling behavior is receiving significant scientific attention. Scholars from different disciplines are intensively searching for an answer related to factors that most (de)motivate individuals' recycling behavior (Phulwani et al., 2020). Demographic and socio-economic characteristics of individuals, various psychological variables, and financial incentives for recycling are most commonly studied as potential determinants of recycling behavior (Li et al., 2019). Understanding these factors in different national and cultural contexts leads to a more effective combination of waste management systems that promote environmentally friendly activities by individuals (Cristóbal et al., 2022).

Statistical data from the municipal waste sector supports the need to create an appropriate mix of national and local policies to promote recycling behavior in Croatia. Information and education activities to raise citizens' awareness of their role in waste separation, together with investments in infrastructure, have led to positive developments in recent years. However, the rate of separately collected municipal waste of 43% in 2021 (Puntarić et al., 2022) is far from the maximum possible rate of 80% for separate collection of municipal waste in the European Union set in the amended Waste Framework Directive of 2018 (European Environment Agency, 2023).

When it comes to separating different types of waste, there is still a lot of room for progress in the glass packaging segment, which accounted for 24% of packaging placed on the Croatian market in 2021 (Gumhalter Malić, 2023). Certain types of glass waste in Croatia are collected separately in green containers in public places and recycling centers available in more developed cities (Čistoća.hr, n.d.). In addition, some of the glass containers are included in the deposit refund system (DRS) (Gumhalter Malić, 2023). Modern DRSs are currently in use in forty countries around the world. They are recognized as an effective waste collection instrument that results in high packaging return rates (even above 95%), supplying the system with high-quality feedstock for recyclers (Schneider et al., 2021) and enabling the collection of containers for reuse (Agnusdei et al., 2022). Despite its advantages, Croatia's primary deposit refund system is limited to only some types of glass containers. The return fee is included in the product price and is paid to the user when the empty containers are returned. Collection rates for covered containers are pretty high, and the waste impurities percentage is low. Specifically, collection rates for glass from 2015 to 2021 ranged from 76% to 93% (Gumhalter Malić, 2023). The Environmental Protection and Energy Efficiency Fund is central to the Croatian DRS. The Fund is an intermediary for producers/importers, organizing the entire system and ensuring its smooth operation (Gumhalter Malić, 2023; Petrović, 2018).

In parallel with the primary deposit refund system, which mainly provides for the collection of bottles for recycling, there is a deposit refund system for reusable bottles. In general, reusable packaging systems have more advantages, as they substantially reduce material consumption and significantly reduce the negative impact on the environment (Coelho et al., 2020). Reusable glass containers have lower lifetime costs than single-use glass containers. Their use holds the most significant potential for reducing carbon dioxide emissions among the various cost-effective conservation measures (Hekkert et al., 2000). Depending on market characteristics, refillable glass can be reused up to fifty times (Agnusdei et al., 2022). The potential success of such a system is evidenced by the overall deposit system for reusable beer bottles, which is the norm in many European countries such as the Netherlands and Germany. Despite the strengths of reusable systems, the trend toward simplifying logistics in distribution and retailing has led to the increasing dominance of single-use containers in recent decades (Coelho et al., 2020). In Croatia, the deposit system for reusable containers applies only to certain types of beer and water bottles. Manufacturers are responsible for return and reuse (Republic of Croatia, 2020).

This paper focuses on two basic research directions: (1) examining the recycling behavior of Croatian citizens and identifying the determinants of individual recycling intent; (2) studying the possibility of introducing and adopting a deposit refund system in Croatia that expands the existing deposit system for reusable glass bottles. The proposed expanded system would provide for returning almost all types of glass containers in pristine condition for reuse, with financial compensation or a discount on purchasing a new product. In the remainder of the article, we look at existing work on the pro-environmental behavior of individuals and its determinants and provide an overview of the results to date in Croatia.

2. LITERATURE REVIEW

2.1. Determinants of pro-environmental behavior

The study of the determinants of pro-environmental behavior is mainly based on psychology and sociol-

ogy, often applying the behavioral theories of Ajzen, Schwartz, and Stern. According to these models, individuals' pro-environmental and recycling behaviors are usually associated with several factors, such as demographic characteristics, institutional conditions, economic factors, social and cultural elements, attitudes, etc. Apart from the fact that there are many of them, some of the factors are contradictory, and it isn't easy to combine and include them in a single model (Li et al., 2019). However, the factors that have attracted the most research interest can be divided into three categories: (1) demographic and socio-economic factors, (2) psychological factors, and (3) external factors of pro-environmental behavior. Each of these groups of factors is considered separately in the following review.

2.1.1. Demographic and socio-economic factors

The pro-environmental profile factors that first attracted research interest relate to people's demographic characteristics (Li et al., 2019). Whether it is gender, age, education level, place of residence (urban/rural), or another variable, the results have been quite heterogeneous (Saphores et al., 2012). For example, Johnson et al. (2004) found that women care more about the environment than men. Although they are generally less likely to engage in environmental activism, they recycle more often. Age, education level, residence, family size, and political orientation were also found to be significant determinants of recycling behavior (the authors note that older respondents, individuals with high education levels, larger families, urban residents, and individuals who describe themselves as liberals are more likely to recycle). Different results were reached by Do Valle et al. (2004), who found that gender, education, and age were not significant predictors of recycling participation. The predictive power of an individual's demographic characteristics was also tested by Saphores et al. (2012), who found that only age and family size were statistically significant (willingness to recycle was higher among older respondents and more prominent families).

When examining recycling behavior as a function of household characteristics, some studies show that larger households and households with higher incomes (or individuals from such households) participate in recycling to a greater extent than smaller households and those with lower incomes (Gamba & Oskamp, 1994; Sidique et al., 2010). Sidique et al. (2010) relate the results to the amount of waste generated in the household and assume that members of households that consume more are more likely to recycle.

2.1.2. Psychological factors

In addition to demographic and socio-economic variables, psychological factors such as attitudes, values, and subjective norms play an essential role in studying an individual's pro-environmental profile. This group of variables proved to be a good predictor of pro-environmental behavior, suggesting that attitudes toward recycling and circular economy are essential determinants of recycling intentions, sustainable waste management, and technological innovation (Li et al., 2019). In addressing this issue, authors often rely on the Theory of Planned Behavior (TPB) proposed by Ajzen (1985, 1991). According to the TPB, a person's beliefs shape attitudes toward a particular behavior and influence subjective norms and perceived behavioral control (PBC). Attitude toward a behavior "refers to the degree to which a person has a favorable or unfavorable evaluation or appraisal of the behavior in question" (Ajzen, 1991, p. 188), while subjective norms concern social pressure (Ajzen, 1991) and represent individual perceptions of other people's expectations (Park & Ha, 2014). PBC indicates individual perceptions of the ease or difficulty of performing a particular behavior and reflects expected obstacles, hindrances, and previous experiences (Ajzen, 1991, p. 188). These three factors (attitude, subjective norms, and PBC) constitute behavioral intention, which strongly predicts actual behavior (Ajzen, 1991).

In operationalizing Ajzen's theory, Ramayah et al. (2012) showed that environmental awareness is significantly related to attitude toward recycling, while attitude significantly influences students' recycling behavior. Botetzagias et al. (2015) studied citizens of Greece and found that perceived behavioral control was the most significant predictor of recycling intention. Sidique et al. (2010) sought to identify the profile of individuals who use drop-off recycling sites and concluded that recycling frequency and pro-environmental beliefs are positively influenced by knowledge of recycling infrastructure. Similarly, Keramitsoglou and Tsagarakis (2013) found that citizens' knowledge of the recycling process and the availability of recycling infrastructure were significant predictors of recycling attitudes and behaviors.

2.1.3. External factors

Among the external variables that potentially influence pro-environmental behavior, several factors are mentioned (e.g., the convenience of recycling, prompt voice intervention, community recycling programs, etc.). However, the impact of financial incentives for recycling, such as recycling refunds and rebates, is the most commonly studied (Li et al., 2019; Phulwani et al.,

2020). Miliute-Plepiene et al. (2016) show that financial incentives encourage household recycling. However, according to older findings by Vining and Ebreo (1990), monetary and similar incentives and rewards appear to significantly affect individuals who do not typically participate in recycling (so-called non-recyclers).

2.2. Previous research on pro-environmental behavior in Croatia

Although the existing knowledge is valuable, research on individual pro-environmental behavior and participation in recycling in Croatia is relatively unsaturated and cries out for further development. Somewhat older research in this area shows that improper waste disposal in Croatia is among the priority problems of most significant concern to citizens (Cifrić, 2005, 2008). It is also concluded that, in general, there is a pro-environmental orientation (Ristić, 1999), which is accompanied by a trend of growing environmental awareness in the area of waste issues (Šućur, 1992), and that recycling is the most common pro-environmental behavior practiced (Cifrić, 1997; Stanić et al., 2009). Recent studies, primarily based on descriptive statistics, show different representations of recycling behavior in Croatia, depending on the type of waste studied, the sample, and other study specifics. However, in general, the representation of those who recycle is higher than that of non-recyclers (Ćalušić & Holy, 2017; Kalambura et al., 2016; Pavlinović Mršić & Stojan, 2020).

Ristić (1999) makes an essential contribution regarding psychological determinants of recycling behavior. Based on a sample from the city of Zagreb, the author concludes that self-reported recyclers and non-recyclers differ significantly in their attitudes toward recycling, their perceptions of the ease of recycling, their recycling habits, and their sense of responsibility for recycling. Examining demographic and socio-economic variables related to recycling participation is somewhat more popular but with mixed results. When examining the student population, Cifrić (1997) found that only the father's education was statistically significant. On the other hand, Stanić et al. (2009) declared gender and income per household member to be significant variables, while age, education level, and income were found to be related to the practice of returning packaging to stores.

Regarding broader research on pro-environmental behaviors in Croatia, Pfeifer et al. recently conducted an interesting study (2021). Using TPB, they examine the predictors of students' low-carbon behavior intentions. They find that awareness of carbon footprint, incentives for low-carbon behavior, and perceived behavioral control are the strongest stimulators of young people's pro-environmental intentions.

Citizens' perceptions of the quality of the waste management system in Croatia that were studied are predominantly negative. Great room for progress is seen in local infrastructure development and the provision of information on different waste collection options (Ćalušić & Holy, 2017; Kalambura et al., 2016). The deposit refund system is also seen as deficient, being immature and insufficiently developed compared to the systems in place in other countries (Stanić et al., 2009). From the perspective of industry experts, the deposit refund system in Croatia is partially successful. In the qualitative study by Drašković et al. (2011), the experts emphasize the problem of limiting the system to certain types of packaging and the high cost of the system for the industry. Another shortcoming is revealed in the motivation of citizens to participate in the deposit refund system, which is mainly associated with financial benefits for the poorer segments of the population.

Consequently, packaging waste collection is sometimes not perceived as a pro-environmental activity and may evoke negative associations. Drašković et al. (2007) relate this to Croatian institutions' lack of communication efforts. After introducing the deposit refund system in 2006, the Croatian government left all communication about the new system to the mass media. The information in the media was often incorrect and incomplete, portrayed the system as a social category, and did not contain any pro-environmental messages.

2.3. Conceptual model, research objectives, and hypotheses

According to the TPB (Ajzen, 1985, 1991), recycling behavior is a direct consequence of recycling intention, which is formed under the influence of the individual's attitude toward recycling, subjective norms, and perceived behavioral control (PBC). Apart from these variables, recycling intention is potentially influenced by other psychological and external factors and the demographic and socio-economic characteristics of individuals and households. In addition, the determinants of recycling intention, along with attitudes toward the expanded deposit refund system in the GWM, are potential predictors of intention to adopt the expanded deposit refund system in the GWM. Accordingly, the conceptual model shown in Figure 1 was developed.

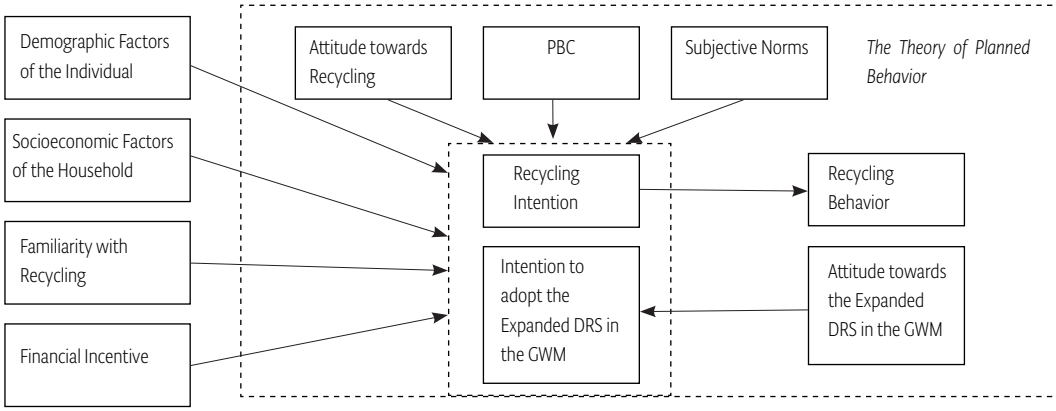

FIGURE 1. Conceptual model

Following the conceptual model, the following research objectives were set:

SO1: To determine the recycling behavior of citizens and identify determinants of the recycling intention of citizens.
SO2: To determine citizens' attitudes towards the expanded deposit refund system in the GWM.
SO3: To identify the determinants of citizens' intention to adopt the expanded deposit refund system in the GWM.
SO4: To present an outlook of the opinions of experts from the Croatian professional and scientific community on the possibilities of implementing the expanded deposit refund system in the GWM.

Based on specific objectives 1-3 and the existing theory, the following hypotheses were tested in the quantitative research:

H1: Recycling intention is a direct predictor of recycling behavior.
H2: Psychological variables of the individual (attitude toward recycling, subjective norms, perceived behavioral control, familiarity with recycling) have a significant impact on recycling intention.
H3: Financial incentive for recycling as an external variable significantly impacts recycling intention.
H4: Demographic variables of the individual (gender, age, area of residence, level of education) and socio-economic variables of the household (household size, household income) have a significant impact on recycling intention.
H5: Attitude towards the expanded deposit refund system in the GWM and determinants of recycling intention significantly impact intention to adopt the expanded deposit refund system in the GWM.

Further in the paper, the quantitative and qualitative research methodology is presented, followed by the elaboration of the research results.

3. METHODS

3.1. Quantitative research methodology

3.1.1. Sample characteristics and data collection

To test the hypotheses, a survey was conducted. The population of the survey consisted of adult citizens of Croatia. Completion of the questionnaire was offered to all potentially interested participants (available members of the population). Data was collected through a self-administered questionnaire distributed to potential respondents through online channels. Following the ethical aspects of the research, respondents were informed in advance about the purpose of the survey, and their anonymity was guaranteed. The latter also helped to mitigate the problem of social desirability (Podsakoff et al., 2003). When the online questionnaire was available (from August 19, 2022, to September 19, 2022), 403 responses were received. An additional 24 responses were received through the distribution of the printed questionnaire. The response rate for respondents who were contacted in person was 55.2%. The high response rate results from convenience sampling combined with the snowball technique. The overall response rate cannot be determined. Some potential respondents were not contacted personally but by sharing the questionnaire in social networking groups. However, only 16.2% of the observations were collected through indirect contact.

Characteristic	Characteristic modality	Frequency	Percentage
Gender	Female	269	63.59%
	Male	153	36.17%
	No gender declaration	1	0.24%
Age	25 or younger	118	27.90%
	26-35	113	26.71%
	36-45	96	22.70%
	46-55	47	11.11%
	56-65	34	8.04%
	Older than 65	15	3.55%
Level of completed education	Primary school	7	1.65%
	Secondary school	171	40.43%
	Bachelor's degree	108	25.53%
	Master's degree	113	26.72%
	Doctorate and other postgraduate degrees	24	5.67%
Area of residence	Rural	252	59.57%
	Urban	171	40.43%
Working status	Student	88	20.80%
	Employee, self-employed, or entrepreneur	288	68.09%
	Unemployed	17	4.02%
	Retired person	26	6.15%
	Other	4	0.94%

TABLE 1. Demographic characteristics of survey participants

After unifying the database, four questionnaires were eliminated from the 427 questionnaires collected, where respondents ticked identical answers to all statements on a Likert scale. Since this is a "yes-answer" problem, such respondents should be excluded from consideration (Collier, 2020). Accordingly, 423 responses/observations were included in the statistical data analysis phase. This sample size is well above the minimum 200 observations Boomsma (1982) recommended for Structural Equation Modeling. Table 1 shows the demographic data of the research participants.

3.1.2. Measures

The questionnaire was divided into three sections: (1) demographic and socio-economic data, (2) recycling behavior, recycling intention, and their determinants, and (3) attitude and intention toward the expanded deposit refund system in GWM. Sections 2 and 3 consisted of 32 statements tested on a 7-point Likert scale (Ajzen, 1991). Items measuring behavioral intention and its psychological determinants have been used in previous research as follows: attitude (Botetzagias et al., 2015; Do Valle et al., 2005; Sidique et al., 2010), subjective norms (Davies et al., 2002; Do Valle et al., 2005; Knussen & Yule, 2008; Sidique et al., 2010; Tonglet et al., 2004), perceived behavioral control (Knussen & Yule, 2008; Sidique et al., 2010), familiarity with recycling (Do Valle et al., 2005; Sidique et al., 2010; Tonglet et al., 2004), recycling intention (Botetzagias et al., 2015; Tonglet et al., 2004). Recycling behavior was measured by self-reported regularity of recycling, which reflects the degree of involvement in recycling activities (modified from Do Valle et al., 2005). Items measuring financial incentives as an external determinant of recycling intention were created in the study.

3.2. Qualitative research methodology

Survey research was preceded by a qualitative study designed to investigate the fourth specific objective of the research. Among the various data collection techniques, a focus group was selected. In addition to the focus group, an in-depth interview was also conducted. Thus, the research was based on a mixed-method data collection strategy.

The focus group was held on May 23, 2022, in a virtual environment using Zoom software. The focus group participants were experts from the Croatian scientific or professional community who professionally deal with waste management, circular economy, and sustainable development. Specifically, the following experts participated in the focus group: (1) an associate professor in the field of economics at one of the faculties in Croatia, (2) a member of the State Council for Sustainable Development and Environmental Protection, (3) an expert in consulting and forensic expertise in the field of waste management and circular economy, (4) a representative of the Ministry of Economy and Sustainable Development, (5) a full professor at one of the faculties in Croatia whose scientific interests are related to biomass and biofuels, waste management and post-harvest technology. The focus group lasted 51 minutes, during which all interviewees participated in the discussion.

An interview was also conducted with a full professor at one of the universities in Croatia who has many years of professional experience in environmental protection and waste management. Since it was impossible for her to participate in the focus group at the agreed time, a one-on-one interview with her was conducted. The interview was conducted via Zoom on May 25, 2022, and lasted 37 minutes.

The qualitative research was conducted with consideration of relevant ethical issues. All interviewees gave consent to the recording of the group discussion and the disclosure of their identity.

4. RESULTS

4.1. Data analysis and results of quantitative research

Research hypotheses were tested using Structural Equation Modeling (SEM). Data analysis was performed in the IBM SPSS Amos 26 software tool, using Maximum Likelihood Estimation (MLE). MLE is the most common estimation method in applying SEM, based on the assumption of multivariate normal data (Hayashi et al., 2010). Accordingly, data-screening procedures were performed to identify outliers.

4.1.1. Data fit and cleaning

The presence of univariate outliers that need to be removed from the data was examined based on the value of the asymmetry coefficients of skewness and kurtosis. Using SEM, Brown (2006) and Kline (1998) suggest acceptable values for skewness in the range of -3 to +3 and kurtosis in the range of -10 to +10. According to these criteria, no univariate outliers were identified in the data (verification was performed after multivariate outliers were removed). The identification of multivariate outliers was based on the analysis of Mahalanobis squared distance values (d2) and was based on the application of the "rule of thumb" proposed by Collier (2020). Following this criterion, 37 observations were removed, and the remaining 386 observations were further analyzed.

4.1.2. Measurement reliability and validity

The analysis began with confirmatory factor analysis and testing the reliability and validity of the measurement scale. To ensure the convergent validity of the constructs, items with factor loadings of less than 0.5 were excluded from the model. The factor loadings of all items retained in the model are statistically significant, with values ranging from 0.564 to 0.978 (Table 2), which exceeds the minimum factor loading criterion proposed by Hair et al. (2006) for sample sizes 350 and above. In addition, Cronbach's alpha was used to calculate the internal consistency of the data collection instrument. As shown in Table 2, the values of Cronbach's alpha coefficient for each construct are above 0.7, indicating that the internal consistency of the scales is relatively high. The exception is the value of Cronbach's alpha coefficient for financial incentives, which is 0.638, indicating that the measurement scale for this construct needs to be improved in future studies. Because Cronbach's alpha values above 0.6 are acceptable (Hair et al., 2006; Kline, 1998), the construct was retained in the model. The composite reliability values (CR) for eight latent variables range from 0.755 to 0.952, indicating the high internal consistency of the scale items. The CR for financial incentives is 0.648, above the acceptable threshold of 0.6 (Bagozzi & Yi, 1988). The convergent validity test involved calculating the average variance extracted (AVE). AVE for eight of nine latent variables is between 0.508 and 0.907, indicating good validity (Hair et al., 2006). AVE for financial incentives is 0.480, with a CR coefficient of 0.648 still makes the latent variable adequate (Fornell & Larcker, 1981).

TABLE 2. Measuring items and measurement reliability and validity

Construct	Measuring item	Factor loading**
Attitude towards Recycling (A)	Recycling is a positive. (A1)	0.799
	I feel I am doing a good job when I recycle the waste my household generates. (A2)	0.765
	Recycling is generally important in the context of reducing environmental pollution. (A3)	0.904
	Recycling is generally important for conserving natural resources. (A4)	0.873
	Recycling can improve the quality of the environment. (A5)	0.796
	Recycling is a desirable activity from my perspective. (A6)	0.858
	Cronbach's alpha = 0.908 and CR = 0.932 (excellent)*; AVE = 0.695	
Subjective Norms (SN)	People who are important to me expect me to recycle household waste. (SN1)	0.706
	My friends will support me in my waste recycling activities. (SN2)	0.786
	People who are important to me think that recycling waste is positive. (SN3)	0.870
	Cronbach's alpha = 0.808 and CR = 0.832 (very good)*; AVE = 0.624	
Perceived Behavioral Control (PBC)	Recycling is something I can do easily. (PBC1)	0.564
	Household recycling is a strenuous activity for me. – neg. (PBC3)	0.878
	I don't have enough time or space to sort and separate the waste generated in my household. – neg. (PBC4)	0.842
	Recycling is an activity that reduces my comfort. – neg. (PBC5)	0.796
	Cronbach's alpha = 0.845 and CR = 0.858 (very good)*; AVE = 0.608	
Familiarity with Recycling (FAM)	I am familiar with the recycling infrastructure where I live (location of containers, types of containers, etc.). (FAM1)	0.653
	I am familiar with the colors of the containers in which basic types of waste are disposed of (plastic, glass, paper, mixed municipal waste). (FAM2)	0.734
	I am familiar with what types of plastic, paper, and glass are disposed of in separate containers and in what form. (FAM4)	0.747
	Cronbach's alpha = 0.702 and CR = 0.755 (adequate to good)*; AVE = 0.508	
Financial Incentive (FI)	I am encouraged to recycle by the financial compensation for some types of returnable packaging (HRK 0.50 per piece). (FI1)	0.645
	Without financial compensation for returnable packaging, I would recycle waste less often. (FI2)	0.738
	Cronbach's alpha = 0.638 and CR = 0.648 (acceptable to adequate)*; AVE = 0.480	
Recycling Intention (IN)	In the forthcoming month, I intend to recycle the waste generated in my household. (IN1)	0.903
	Mark how likely you are to recycle the waste generated in your household in the forthcoming month. (IN2)	0.940
	Cronbach's alpha = 0.918 and CR = 0.919 (excellent)*; AVE = 0.850	
Recycling Behavior (BI)	I have regularly recycled the waste generated in my household. (BI1)	0.882
	I have developed the habit of regularly recycling waste generated in my household. (BI2)	0.972
	Recycling the waste generated in my household is something I do continuously. (BI3)	0.941
	Cronbach's alpha = 0.950 and CR = 0.952 (excellent)*; AVE = 0.869	

EDS Attitude (EDSA)	I like the idea (of the expanded deposit refund system in the GWM). (EDSA1)	0.978
	I consider the idea (of the expanded deposit refund system in the GWM) positive. (EDSA2)	0.926
	Cronbach's alpha = 0.940 and CR = 0.951 (excellent)*; AVE = 0.907	
EDS Intention (EDSI)	If the idea comes to fruition, I intend to return the glass packaging to stores. (EDSI1)	0.904
	I would practice such a method of returning glass packaging. (EDSI2)	0.934
	Cronbach's alpha = 0.913 and CR = 0.916 (excellent)*; AVE = 0.845	

NOTE: *evaluation of the reliability according to kline (1998).
**standardized factor loadings from the measurement model.

TABLE 3. Discriminant validity using Fornell and Larcker criterion

	A	SN	PBC	FAM	FI	IN	BI	EDSA	EDSI
A	***0.834***								
SN	0.472	***0.790***							
PBC	0.364	0.313	0.780						
FAM	0.451	0.505	0.502	***0.713***					
FI	-0.211	-0.020	-0.380	-0.182	***0.693***				
IN	0.438	0.482	0.522	0.689	-0.246	***0.922***			
BI	0.387	0.510	0.567	0.649	-0.206	0.845	***0.932***		
EDSA	0.286	0.242	0.219	0.330	0.153	0.281	0.241	0.952	
EDSI	0.340	0.303	0.228	0.416	0.179	0.338	0.324	0.712	***0.919***

NOTE: The values shown on the table's diagonal are the square root of the AVE, and the values below the diagonal are the correlations between constructs.

The discriminant validity of the constructs was tested using the criterion of Fornell and Larcker. According to this criterion, the square root of the AVE of each construct must be greater than the correlations of that construct with other constructs (Fornell & Larcker, 1981). The data in Table 3 indicate that the mentioned condition is met, which means that the research meets the requirements of discriminant validity.

The evaluation of the goodness of fit of the measurement model was performed using standard indicators available in the IBM SPSS Amos software tool. The calculated fit indices for CFI, TLI, SRMR, RMSEA, $\chi 2/df$, GFI, and AGFI were 0.946, 0.931, 0.074, 0.063, 2.512, 0.885, and 0.842, respectively. Following the criteria shown in Table 4, all indicators are within the recommended values and point to a good measurement model fit.

4.1.3. Structural models: Goodness of fit statistics and model comparisons

The path analysis began with constructing an initial structural model without demographic and socio-economic variables (Model 1). In the second step, an alternative model was constructed based on previous research (e.g., Matthies et al., 2012) and following the modification indices generated by Amos (Model 2). Compared to the first model, Model 2 included two additional causal relationships: the direct effect of subjective norms on recycling behavior and the direct effect of PBC on recycling behavior. In the third step, Model 2 (superior to Model 1) was extended to include three demographic/socio-economic variables: age, education level, and household income (Model 3). These three variables were measured on an ordinal scale with several categories equal to or greater than five. As shown by Rhemtulla et al. (2012) in the ML estimation test, treating ordinal variables with five or more categories as continuous is correct. The re-

TABLE 4. Fit statistics for structural models and R-squared values

The goodness of fit indicator	The boundary for an acceptable value	Model 1	Model 2	Model 3
Chi-square (χ^2)	Significant p values expected*	(p<0.001)	(p<0.001)	(p<0.001)
Confirmatory Fit Index (CFI)	Above 0.90*	0.942	0.946	0.937
Tucker-Lewis Index (TLI)	Above 0.90*	0.929	0.933	0.922
Standardized Root Mean Square Residual (SRMR)	0.08 or less*	0.077	0.075	0.076
Root Mean Square Error of Approximation (RMSEA)	Below 0.07*	0.063	0.062	0.061
χ^2/df	Equal or below 3	2.549	2.475	2.413
Goodness-of-fit Index (GFI)	Equal or above 0.85	0.878	0.883	0.872
Adjusted Goodness of Fit Index (AGFI)	Equal or above 0.80	0.838	0.843	0.832
Akaike Information Criterion (AIC)	The lowest value in comparative models	912.571	890.497	1,075.735
Browne-Cudeck Criterion (BIC)	The lowest value in comparative models	927.159	905.399	1,095.351
Variance explained - R^2 for recycling intention	0.75 – substantial; 0.50 – moderate; 0.25 – weak	0.585	0.551	0.543
Variance explained - R^2 for recycling behavior		0.741	0.747	0.742
Variance explained - R^2 for EDS intention		0.571	0.571	0.585

NOTE: *Valid for a sample size larger than 250 and the number of observed variables equal to or greater than 30. See: Aho et al. (2014); Botetzagias et al. (2015); Hair et al. (2006, 2013); Kline (1998).

maining three categorical variables (gender, place of residence, and household size) were not included directly in the model but served as the basis for multigroup analyzes. The first multigroup analysis included a comparison by gender (women/men), the second analysis included a comparison by residence (rural/urban), and the third multigroup analysis was conducted for household size (1-4 members/5 or more members).

Table 4 shows the goodness-of-fit statistics for Models 1, 2, and 3, along with the criteria for each indicator. As can be seen, the level of model fit to the data can be described as reasonable for all three models. Although the differences between the models are slight, Model 2 stands out as having the most favorable goodness of fit indicators, which is also confirmed by the model comparison indicators (AIC, BIC). Following Hair et al. (2013), it can be concluded that all three models explain a substantial part of the variance in recycling behavior and a middle part of the variance in recycling intention and EDS intention, which is an excellent result.

4.1.4. Hypothesis testing results

Hypothesis testing was preceded by examining citizens' regularity of recycling and their attitudes toward and intentions to adopt the expanded deposit refund system in the GWM. For this purpose, the one-sample T-test and the Wilcoxon rank test were used. The descriptive statistics and the results of the tests for the observed variables BI1, BI2, BI3, and EDSA1, EDSA2, EDSI1, and EDSI2 are presented below.

Since the statements were measured on a Likert scale from 1 to 7, with 1 indicating complete disagreement and 7 indicating complete agreement with the statement, respondents' answers 5, 6, and 7 indicate somewhat regular, regular, and completely regular recycling (BI1, BI2, BI3). Similarly, responses 5, 6, and 7 indicate somewhat positive, positive, and entirely positive attitudes toward the expanded deposit refund system in the GWM (EDSA1, EDSA2) and some intention, intention, and full intention to adopt the expanded deposit refund system (EDSI1, EDSI2). Accordingly, the t-test alternatively assumes that the mean

TABLE 5. Results of one-sample T-test and the Wilcoxon signed rank test

Variable	Mean	Median	St. dev.	Min	Max	Test*	Statistic	Df	p
BI1	6.10	6	1.18	1	7	Student-t	34.8	385	< .001
						Wilcoxon W	66,975	385	< .001
BI2	6.21	7	1.13	1	7	Student-t	38.5	385	< .001
						Wilcoxon W	66,493	385	< .001
BI3	6.26	7	1.08	1	7	Student-t	41.2	385	< .001
						Wilcoxon W	68,796	385	< .001
EDSA1	6.57	7	0.895	2	7	Student-t	56.4	385	< .001
						Wilcoxon W	69,581	385	< .001
EDSA2	6.66	7	0.726	3	7	Student-t	71.8	385	< .001
						Wilcoxon W	71,606	385	< .001
EDSI1	6.54	7	0.945	2	7	Student-t	52.8	385	< .001
						Wilcoxon W	70,584	385	< .001
EDSI2	6.58	7	0.862	2	7	Student-t	58.7	385	< .001
						Wilcoxon W	70,736	385	< .001

NOTE: H_a: $\mu > 4$

values of the variables in the population are larger than four (middle positions on the Likert scale). Similarly, the Wilcoxon signed-rank test alternatively tests whether the median of a variable in the population is larger than four.

As the results in Table 5 show, the p-values are smaller than α=0.01, indicating that citizens regularly recycle household waste. At a significance level of 1%, it can also be concluded that citizens are positive about the expanded deposit refund system in the GWM and intend to adopt it. These results are very optimistic and are in line with recent research on recycling behavior in Croatia, which finds a more significant number of recyclers compared to non-recyclers (Ćalušić & Holy, 2017; Kalambura et al., 2016; Pavlinović Mršić & Stojan, 2020).

Hypothesis testing was conducted based on path analysis as an integral part of Structural Equation Modeling. The results of testing the causal relationship between the variables in Model 1, Model 2, and Model 3 are presented in Table 6 and Figures 2, 3, and 4. Because Model 2 explained the largest percentage of variance in recycling behavior and Model 3 explained the largest percentage of variance in EDS intent, only the standardized path coefficients (β) and p-values of these two models are commented on in the discussion.

TABLE 6. Results of path analysis with standardized path coefficients for models 1, 2 and 3

Model	Model 1		Model 2		Model 3	
Tested path	**Coefficients (β)**	**t value**	**Coefficients (β)**	**t value**	**Coefficients (β)**	**t value**
Attitude → Recycling Intention	0.054	1.159	0.061	1.274	0.048	0.971
Subjective norms → Recycling Intention	0.169	3.034***	0.146	2.526**	0.153	2.572**
PBC → Recycling Intention	0.223	3.984***	0.189	3.280***	0.207	3.499***
Familiarity → Recycling Intention	0.480	6.311***	0.491	6.249***	0.478	6.061***
Financial incentive → Recycling Intention	-0.050	-0.937	-0.055	-1.002	-0.027	-0.458
Recycling Intention → Recycling Behavior	0.861	19.909***	0.705	14.661***	0.702	14.556***
Attitude → EDS Intention	0.105	2.181**	0.104	2.181**	0.125	2.562**
Subjective norms → EDS Intention	0.013	0.250	0.015	0.275	-0.021	-0.379
PBC → EDS Intention	0.021	0.384	0.022	0.412	0.009	0.169
Familiarity → EDS Intention	0.190	3.022***	0.189	2.983***	0.185	2.969***
Financial incentive → EDS Intention	0.154	2.688***	0.154	2.693***	0.125	2.075**
EDS Attitude → EDS Intention	0.587	11.862***	0.587	11.866***	0.594	12.007***
Subjective norms → Recycling Behavior	-	-	0.118	3.053***	0.125	3.233***
PBC → Recycling Behavior	-	-	0.160	4.151***	0.161	4.179***
Age → Recycling Intention	-	-	-	-	0.050	1.157
Education → Recycling Intention	-	-	-	-	0.051	1.137
Household Income → Recycling Intention	-	-	-	-	0.029	0.702
Age → EDS Intention	-	-	-	-	0.041	1.022
Education → EDS Intention	-	-	-	-	-0.070	-1.648*
Household Income → EDS Intention	-	-	-	-	-0.076	-1.927*

NOTE: *P<0.1; **P<0.05; ***P<0.01.

According to the results, recycling intention is a strong predictor of recycling behavior (model 2: β=0.705, p< 0.01; model 3: β=0.702, p< 0.01), confirming the basic assumption of the TPB (Ajzen, 1985, 1991). Hypothesis H1 is therefore accepted at the significance level α=0.01.

When it comes to psychological factors (Hypothesis H2), recycling intention is most strongly influenced by an individual's familiarity with recycling (Model 2: β=0.491, p< 0.01; Model 3: β=0.478, p< 0.01) and perceived behavioral control (Model 2: β=0.189, p< 0.01; Model 3: β=0.207, p< 0.01). The results are

TABLE 7. Direct, indirect, and total effects of subjective norms, PBC, and familiarity with recycling on recycling behavior (results from model 2)

Path	Direct effect (β)	Indirect effect (β)	Total effect (β)
Subjective norms → Recycling Behavior	0.118**	0.103**	0.221***
PBC → Recycling Behavior	0.160***	0.133**	0.293***
Familiarity → Recycling Behavior	-	0.346***	0.346***

NOTE: **p<0.05; ***p<0.01 (a bootstrap approximation obtained by constructing two-sided bias-corrected confidence intervals).

consistent with Gamba and Oskamp's (1994) conclusions, who found that relevant knowledge about recycling is the most critical determinant of recycling behavior. More recently, Sidique et al. (2010) reached a similar conclusion, showing that drop-off sites are more frequently visited by individuals who are familiar with drop-off sites and for whom recycling is a convenient activity. Andersson and Borgstede (2010), Keramitsoglou and Tsagarakis (2013), and Vining and Ebreo (1990) also found a significant positive influence of recycling familiarity on recycling intention (or behavior), while the stimulatory influence of PBC has been demonstrated in a variety of studies (e.g., Botetzagias et al., 2015; Heidari et al., 2018; Park & Ha, 2014). In addition, social pressure and expectations of the immediate environment, such as family and friends, also play an essential role in shaping recycling behavior in Croatia. The effect of subjective norms on recycling intention is slightly weaker than the first two factors but significant (Model 2: β=0.146, p 0.05; Model 3: β=0.153, p 0.05). In addition to the direct effect on recycling intention, subjective norms and PBC also directly affect recycling behavior. Accordingly, the total effect of these predictors on recycling behavior is equal to the sum of the indirect effect (via recycling intention) and the direct effect (Table 7).

The direct effect of familiarity with recycling on recycling behavior was not assumed in Model 2 because it was found to be insignificant. As Hayes (2013) demonstrated, the mediation effect can be significant even in cases where the direct effect is not. Bootstrapping tests proposed by Preacher and Hayes (2008) were used to investigate this. The analysis, conducted with 2,000 bootstrap samples at the 95% confidence interval, found that the mediation effect was significant for all three paths shown in Table 7. The overall effects for all three paths with the same bootstrap test properties are statistically significant.

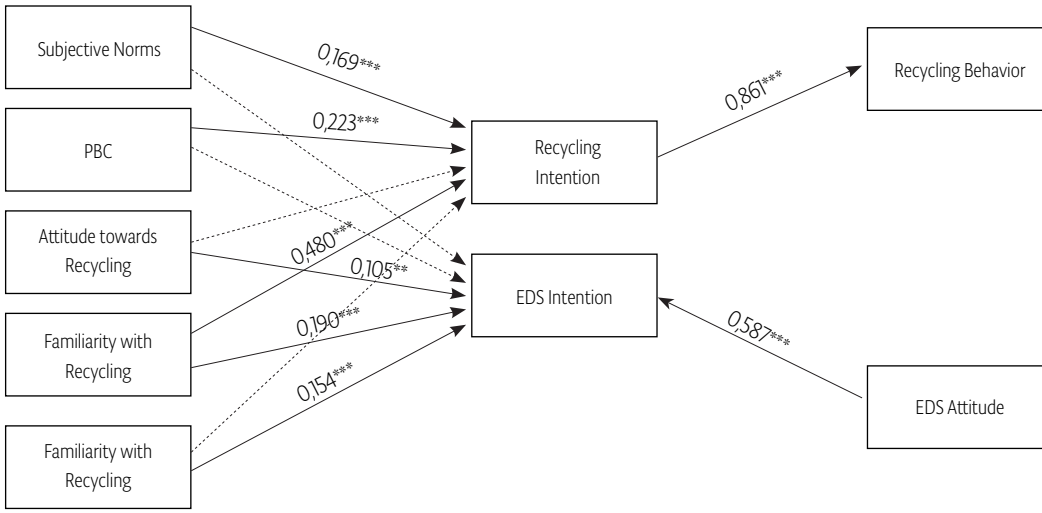

FIGURE 2. Results of path analysis for model 1

NOTE. Non-significant paths are shown with a dashed arrow, and standardized coefficients are reported for significant paths. *p<0.1, **p<0.05, ***p<0.01.

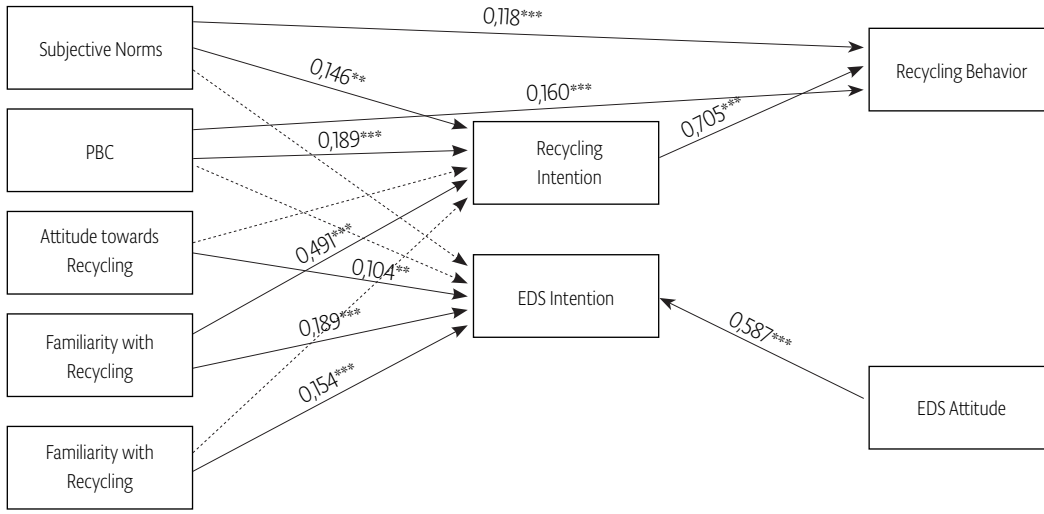

FIGURE 3. Results of path analysis for model 2

NOTE. Non-significant paths are shown with a dashed arrow, and standardized coefficients are reported for significant paths; *p<0.1, **p<0.05, ***p<0.01.

In contrast to the psychological variables discussed previously, the influence of attitude toward recycling on intention to recycle proved statistically insignificant. Although it refutes one aspect of the TPB, the result is not surprising since the empirical work already presents a similar conclusion. These results suggest that respondents with positive attitudes toward recycling do not necessarily engage in recycling, which could be due to a lack of opportunities, skills, or resources for recycling activities (Diyana & Osman, 2010). The lack of perceived social pressure to recycle (Arli et al., 2020) and the perceived inconvenience of recycling by people with positive attitudes toward recycling may also impact the above factors. Since recycling familiarity, PBC, and subjective norms were significant predictors of recycling intention, while the influence of recycling attitude on recycling intention cannot be detected, Hypothesis H2 is partially accepted.

The financial incentive for recycling in the form of a fee of HRK 0.50/EUR 0.07 for the return of certain types of packaging has no significant influence on recycling intention, indicating the rejection of Hypothesis H3. This result is expected, considering that the sample consists mainly of individuals who recycle regularly.

Compared to the psychological factors, the demographic variables proved to be weaker indicators of Croatian citizens' intention to recycle. All three variables included in Model 3 (age, education level, household income) have a non-significant impact on recycling intention. In addition, multigroup analyzes were conducted to examine the differences and significance of differences in the causal relationship between the predictor variables and the dependent variables in the model concerning the defined groups by gender, place of residence, and household size. The analyzes were performed in Model 2 due to the best model fit indicators. As the results show, almost all group differences are insignificant, with a few exceptions, as seen in Table 8. Accordingly, Hypothesis H4 is partially accepted, and it can be concluded that the results indicate a weaker power of demographic factors in predicting recycling behavior. The latter was found in a recent summary of many previous empirical findings on predicting an individual's pro-environmental behavior (Li et al., 2019).

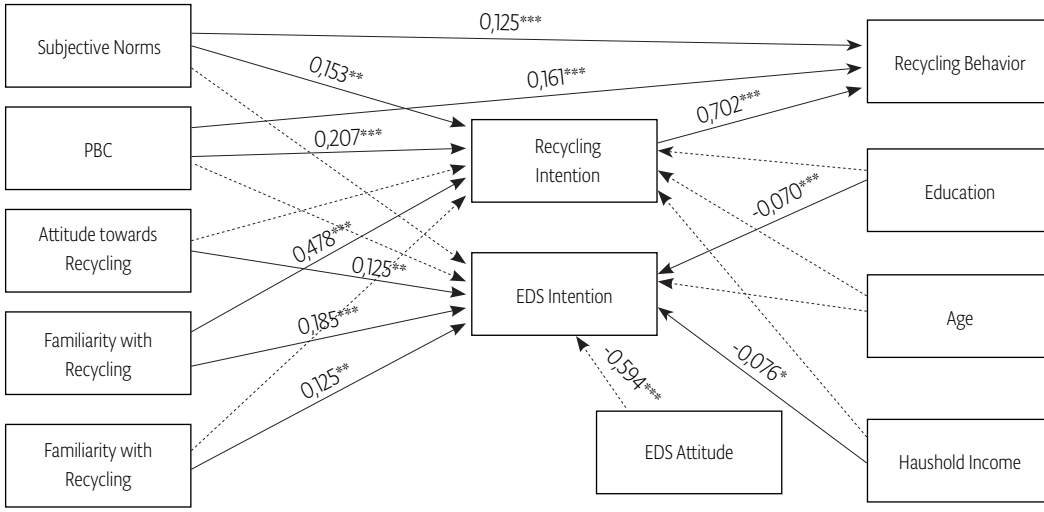

FIGURE 4. Results of path analysis for model 3

NOTE. **Non-significant paths are shown with a dashed arrow, and standardized coefficients are reported for significant paths. *p<0.1, **p<0.05, ***p<0.01.**

When it comes to the determinants of intention to adopt the expanded deposit refund system in the GWM (testing Hypothesis H5), the strongest predictor is the attitude toward the expanded deposit refund system in the GWM (Model 2: β=0.587, p< 0.01; Model 3: β=0.594, p< 0.01). In addition, the variables that significantly determine the intention to adopt the expanded deposit refund system in GWM are familiarity with recycling (Model 2: β=0.189, p< 0.01; Model 3: β=0.185, p< 0.01), financial incentives (Model 2: β=0.154, p< 0.01; Model 3: β=0.125, p< 0.05), and attitude toward recycling (Model 2: β=0.104, p< 0.05; Model 3: β=0.125, p< 0.05). Subjective norms and PBC, on the other hand, are not significant. In interpreting these results, it is essential to remember that these variables were measured regarding recycling behavior, not specific behavior related to GWM's expanded deposit refund system. In this segment, future research requires expanding the model to include an additional aspect of measuring subjective norms and PBC.

The results suggest that the intention to adopt the expanded deposit refund system in the GWM is formed under the influence of a different set of factors than the factors that determine recycling intention. Namely, the only factor that significantly determines both dependent variables is familiarity with recycling. The significance of the influence of the financial incentive on the intention to adopt the expanded deposit refund system in the GWM indicates that part of the motivation for this type of pro-environmental behavior is extrinsic, which is consistent with the previous results of Drašković et al. (2011) and Miliute-Plepiene et al. (2016).

The findings on the influence of demographic variables on the intention to adopt the expanded deposit refund system in the GWM show a significant negative influence of two factors: educational level (Model 3: β=-0.070, p< 0.1) and household income (Model 3: β= -0.076, p< 0.1). Since these variables are negatively correlated with the financial incentive, it can be concluded that part of the adopters of the expanded deposit refund system in the GWM will be individuals of lower socio-economic status who are potentially motivated by monetary compensation for returning glass containers.

Results of the multigroup analysis show several significant differences in the groups by gender, area of residence, and household size. For example, attitude toward recycling is a significant predictor of intention to adopt the expanded deposit refund system in the GWM among men but not among women (the group difference is significant at α=0.05). On the other hand, familiarity with recycling significantly determines the intention to adopt the expanded deposit refund system in the GWM among women. At the same time, this relationship is not significant among men (the group difference is significant at α=0.01). Further results are available in Table 8.

TABLE 8. Results of multiple-group analyses

Variable	GENDER			AREA OF RESIDENCE			HOUSEHOLD SIZE		
Group	Female	Male	Sig. diff. across groups	Rural	Urban	Sig. diff across groups	1-4	5+	Sig. diff. across groups
Tested path	Coeff. (β)	Coeff. (β)		Coef. (β)	Coeff. (β)		Coeff. (β)	Coeff. (β)	
Attitude → Recycling Intention	0.075	0.062	n.sig.	0.119*	-0.089	p<0.1	0.060	0.103	n.sig.
*Subjective norms → Recycling Intention	0.177**	0.067	n.sig.	0.144*	-0.086	n.sig.	0.211***	-0.058	p<0.1
PBC → Recycling Intention	0.145**	0.273***	n.sig.	0.160**	-0.018	n.sig.	0.208***	0.313**	n.sig.
Familiarity → Recycling Intention	0.511***	0.478***	n.sig.	0.460***	0.915***	p<0.01	0.497***	0.416***	n.sig.
Financial incentive → Recycling Intention	-0.060	-0.027	n.sig.	-0.124*	-0.017	n.sig.	0.018	-0.138	n.sig.
Recycling Intention → Recycling Behavior	0.727***		n.sig.	0.704***	0.719***	n.sig.	0.710***	0.706***	n.sig.
Attitude → EDS Intention	0.072	0.239***	p<0.05	0.113*	0.037	n.sig.	0.051	0.191**	p<0.1
Subjective norms → EDS Intention	-0.025	0.049	n.sig.	0.081	-0.238*	p<0.05	0.024	-0.030	n.sig.
PBC → EDS Intention	-0.033	0.115	n.sig.	0.094	-0.173	p<0.1	-0.001	0.128	n.sig.
Familiarity → EDS Intention	0.303***	0.002	p<0.01	0.106	0.513**	p<0.05	0.236***	0.079	n.sig.
Financial incentive → EDS Intention	0.167**	0.104	n.sig.	0.182***	0.186*	n.sig.	0.134*	0.194**	n.sig.
EDS Attitude → EDS Intention	0.601***	0.515***	n.sig.	0.601***	0.547***	n.sig.	0.590***	0.666***	p<0.01
Subjective norms → Recycling Behavior	0.091*	0.151**	n.sig.	0.096*	0.127**	n.sig.	0.118**	0.105	n.sig.
PBC → Recycling Behavior	0.153***	0.142**	n.sig.	0.180***	0.140**	n.sig.	0.141***	0.212**	n.sig.

NOTE. *p<0.1; **p<0.05; ***p<0.01; Data from the unconstrained model; Model fit statistics: gender (CFI=0.932, TLI=0.915, SRMR= 0.075, RMSEA=0.050, c2/df=1.952, GFI=0.833, AGFI=0.777); area of residence (CFI=0.941, TLI=0.927, SRMR= 0.077, RMSEA=0.046, c2/df=1.815, GFI=0.841, AGFI=0.788); household size (CFI=0.925, TLI=0.908, SRMR=0.082, RMSEA=0.052, c2/df=2.043, GFI=0.827, AGFI=0.770)

In conclusion, attitude toward the expanded deposit refund system in the GWM is the strongest predictor of intention to adopt the expanded deposit refund system in the GWM, followed by familiarity with recycling and attitude toward recycling. In addition to the psychological variables, adopting the expanded deposit refund system in the GWM is influenced by an external factor related to financial support for packaging returns. The latter factor is negatively correlated with two demographic variables that significantly negatively impact the intention to adopt the expanded deposit refund system in the GWM (education level and household income level). Accordingly, Hypothesis H5 is partially accepted.

The last part of the questionnaire contained several descriptive questions. Their purpose was to investigate the study participants' perceptions about the shortcomings of the expanded deposit refund system in the GWM and the barriers to its implementation. They were also asked about the preferred form of financial compensation for returning glass packaging (cash compensation, discount for purchasing a new product, other). According to the results, respondents consider the most significant disadvantage

of the expanded deposit refund system in the GWM to be the creation of larger crowds in stores (225 responses) and increased prices of final products (199 responses). A large proportion of respondents also mention the problem of personal inconvenience related to the investment of time and effort that participation in such a system requires (141 responses). In addition, the most frequent response regarding the obstacle to implementing the expanded deposit refund system in the GWM is the lack of public initiative for change (291 responses), followed by the problem of possible protests from retail chains (142 responses). Regarding the form of the return fee, most respondents prefer money that can be obtained at the store's cash register (292 responses).

4.2. Results of qualitative research

Focus group participants identified strengths, specific challenges, and issues related to the expanded deposit refund system in the GWM. Generally, returning packaging with monetary compensation system has advantages because consumers in Croatia are used to it. Using a monetary incentive in the plastic return system has proven effective, as it has led to an increase in separately collected plastic waste. However, experts warn that the monetary incentive is often the only motive for participating in such a system and that under conditions of a better socio-economic status of Croatian citizens, waste separation rates would be significantly lower. In this context, it would be essential to achieve a situation where the expanded deposit refund system in the GWM is not an exclusively social category, as is the case with the existing plastic bottle return system. Experts see tools for such changes in educating citizens and raising public awareness.

When comparing different types of compensation for consumers, participants rated direct cash compensation, available at the store, as the best. This type of compensation is the easiest to implement and is already used in the plastic packaging return system. According to some experts, the cost of reimbursing consumers is not a barrier to implementing the expanded deposit refund system in the GWM. They point out that money constantly circulates in the system and is not an ongoing producer cost. Another segment of participants disagrees, emphasizing that the refund system should start with significant "frozen" funds circulating and represent a vast "dead capital" for producers.

Another challenge to implementing the expanded deposit refund system in the GWM is the potential resistance from retail chains. Implementation of the proposed system would intensify the problem of store congestion and vendor overload. It has also been observed that waiting in stores to return packaging leads to frustration among customers, who find it easier to sort packaging into appropriate containers. Tomari et al. (2017) see a solution in introducing reverse vending machines that accept empty beverage bottles and return money to the user. Such a system would reduce the burden on retailers and make returning glass containers much faster and easier.

Participants support initiatives to reuse all types of glass packaging and point out that the current system is inefficient because it is dual (only a small portion of glass packaging is covered by the return option). However, there were also contrary opinions. One expert (a representative of the relevant ministry) considered that the existing system in Croatia is satisfactory and cannot be considered a dual system.

In addition, the experts were asked whether it would be possible to standardize glass packaging, as with beer bottles. The proposal was considered unrealistic, as packaging is part of product differentiation and branding. In addition, the experts pointed out the problem of the specificity of the food technologies used by the companies. In this context, harmonizing packaging would require additional efforts and entail using significant financial resources. The participant in the individual interview supported the proposal and emphasized that the implementation would be possible through negotiations with manufacturers and the adoption of appropriate regulations.

Regarding the general problems of the waste management system in Croatia, inappropriate practices of utility companies are highlighted. Namely, landfills in Croatia are very cheap, discouraging utility companies from disposing of their waste separately. According to the participants, the system should be changed by establishing more expensive centers for waste disposal. Higher fees will increase the motivation to reduce mixed municipal waste at the waste management center, increasing the rate of (correct) waste separation and reducing sorting costs. The lack of motivation of utility companies also contributes to the Environmental Protection and Energy Efficiency Fund taking glass packaging in the best condition. In contrast, utility companies are left with low-quality raw materials that they cannot sell at a profit. It has also been noted that utility companies are generally dissatisfied because they do not receive compensation from the Fund despite increased operating costs.

In addition, experts warn about the problem of lack of infrastructure on Croatian islands and in less developed places. In these areas, there is a lack of containers for separate waste collection; in some places, there are no stations for returning packaging. In addition, some consumers are dissatisfied because they pay the same disposal fee regardless of the differences

in waste separation. Experts believe that the solution is to increase prices for waste collection and introduce volume-based fees that encourage waste separation in general. The positive example of Međimurje County was given as an example of the latter because they have high recycling rates precisely because municipal waste is charged by volume. The same conclusion is reached by Mak et al. (2019), who see the possibility of increasing recycling participation by increasing waste fees.

The focus group ended with the message that the most effective waste management systems are those based on the principle of voluntarism, where the system subtly rewards intrinsic recyclers. In this sense, the importance of environmental education was emphasized. In addition, the system could be improved by greater proactivity on the part of utility companies, working "on the ground," conducting environmental cleanups, and similar initiatives. Such needs have also been identified in previous research on waste management in Croatia (Ristić, 1999). In the educational process, the Internet has an underutilized potential as a critical medium for spreading environmental protection awareness and improving recycling habits (Padilla & Trujillo, 2018).

5. CONCLUSIONS AND RECOMMENDATIONS

The study relied on a mixed-method strategy based on quantitative and qualitative methods to investigate four specific research objectives. The investigation of the first objective confirmed the assumption about the pro-environmental orientation in Croatia. According to the self-reported data, Croatian citizens recycle waste generated in their households. The strongest determinants of individual recycling behavior are familiarity with recycling, perceived behavioral control, and subjective norms, while the predictive power of demographic factors is weaker. Therefore, the authorities should focus on creating a perception of recycling as a convenient activity. In this context, it could be essential to improve the availability of waste separation infrastructure for all citizens and to raise awareness of the benefits of recycling. Rewarding intrinsic recyclers and strengthening the image of recycling as a socially desirable activity could also be essential actions that can be achieved through various aspects of education. Finally, according to the experts, an effective tool for promoting recycling could be the volume-based waste disposal fee, which should be extended to all parts of Croatia.

The investigation of the study's second objective revealed that citizens are optimistic about the expanded deposit refund system in the GWM and intend to adopt it. The most significant predictor of this intention is the attitude toward the expanded deposit system in the GWM, followed by familiarity with recycling, which was identified in the study of the third research objective. Another critical motivator for adopting the expanded deposit refund system in the GWM is the financial incentive, negatively correlated with education level and household income. As confirmed by focus group participants during the investigation of the fourth research objective, a large proportion of users of the existing plastic packaging return system in Croatia are individuals with lower socio-economic status who are primarily motivated by financial compensation for recycling. In line with the findings, authorities should develop various methods to increase environmental awareness among all categories of citizens. In addition to greater promotional efforts by utility companies, pro-environmental campaigns must also find a place in the media. Emphasis should also be placed on increasing familiarity with recycling, which is the strongest predictor of pro-environmental behavior among Croatian citizens. Promoting pro-environmental goals should go hand in hand with increasing citizens' confidence in the waste management system. The first step in this process is to improve (correct) waste disposal by utilities and to build appropriate relationships between utilities and the Fund for Environmental Protection and Energy Efficiency. As experts have noted, additional investments in utility infrastructure are needed, especially on islands and in less developed parts of the country.

This work has made several scientific contributions. Firstly, the empirical research refers to the study of the possibility of implementing and adopting the expanded deposit refund system in the GWM, which is the original idea of one of the authors of the paper. Accordingly, the research design is new, and no study with an identical or similar design has been conducted before (in Croatia and beyond). Moreover, the study contributes to insufficient work on the determinants of pro-environmental behavior in Croatia. Although this is a popular and rapidly growing field at the level of the international scientific community, recent research on this topic in Croatia is primarily descriptive. To the authors' knowledge, this study is the first of its kind in Croatia and contributes significantly to developing new knowledge on recycling behavior in this geographical area. An additional value of the study is the addition of a qualitative study to the survey-based research, which contributes to the understanding of the main problems and identifies areas for possible improvement of the waste management system in Croatia.

One of the study's limitations relates to the shortcomings of the convenience sample used in the

survey-based research. Since, in such a sample, not all population members have the same chance to participate in the survey, the results should not be generalized (Etikan et al., 2016). In addition, the survey measured recycling based on self-reported behaviors. Future research should be based on examining observed recycling behavior (see, e.g., Sidique et al. (2010)), as measuring behavior based on individual statements risks capturing socially desirable responses. New research directions include adding additional, potentially essential predictors of recycling behavior to the quantitative research model, such as moral norms (Botetzagias et al., 2015) and institutional factors (Li et al., 2019). Regarding the latter, it would be helpful to examine local differences in recycling behavior in Croatia, considering the municipal recycling program as an external variable to individuals' recycling intentions.

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ISTRAŽIVANJE MOGUĆNOSTI ZA PROŠIRENJE REFUNDIRANJA DEPOZITA U UPRAVLJANJU STAKLENIM OTPADOM U HRVATSKOJ

SAŽETAK

U ovom se radu istražuju ponašanje hrvatskih građana u području reciklaže otpada te se utvrđuju odrednice individualne namjere recikliranja. Također se razmatra je li postojeći sustav refundiranja depozita za staklene boce moguće zamijeniti proširenim sustavom, koji bi uključivao povrat i ponovno korištenje gotovo svih oblika staklene ambalaže. U anketnom je istraživanju sudjelovalo 427 hrvatskih građana, a kvantitativna analiza podataka izvršena je uz pomoć modeliranja strukturnih jednadžbi (Structural Equation Modeling). Uz anketno istraživanje, provedena je i fokusna skupina s ekspertima. Rezultati potvrđuju pretpostavku o pro-okolišnoj orijentaciji u Hrvatskoj. Građani imaju pozitivan stav prema proširenom sustavu povrata depozita u odlaganju staklene ambalaže te namjeravaju istog i implementirati. Najznačajniji prediktor njihove namjere je stav prema proširenom sustavu povrata depozita, a slijedi ga upoznatost s recikliranjem. Namjera pojedinca za reciklažu uglavnom je određena upoznatošću s recikliranjem i percepcijom kontroliranja ponašanja. U kvalitativnom istraživanju hrvatski su eksperti općenito prihvatili ideju proširenog sustava povrata depozita za staklene spremnike, ali su upozorili da će postojati i prepreke za provedbu. Dodana vrijednost istraživanja je stvaranje novih spoznaja za oblikovanje lokalnih i nacionalnih politika koje mogu promicati ekološki prihvatljivo ponašanje pojedinaca i poboljšati sustav odlaganja staklenog otpada u Hrvatskoj.

KLJUČNE RIJEČI: *održivi razvoj; upravljanje staklenim otpadom; sustav refundiranje depozita; pro-okolišno ponašanje; recikliranje; Hrvatska*