Elżbieta SZCZYGIEŁ • Paulina SZYJA • Katarzyna KOWALSKA • Renata ŚLIWA

THE WASTE MANAGEMENT OF POLISH HOUSEHOLDS AS AN ELEMENT OF CIRCULAR BEHAVIOURS – AN ANALYSIS OF RESEARCH RESULTS

Elżbieta **Szczygieł** (ORCID: 0000-0002-8804-1071) – *University of the National Education Commission*
Paulina **Szyja** (ORCID: 0000-0002-9672-1341) – *University of the National Education Commission*
Katarzyna **Kowalska** (ORCID: 0000-0003-2816-1802) – *University of the National Education Commission*
Renata **Śliwa** (ORCID: 0000-0001-5029-8798) – *University of the National Education Commission*

Correspondence address:
Podchorążych Street 2, 30-084 Cracow, Poland
e-mail: elzbieta.szczygiel@up.krakow.pl

ABSTRACT: The increasing amount of waste generated by households requires specific action because of the need for change dictated by the circular economy. To this end, it is necessary to diagnose the key characteristics of households that can influence the way their members manage their waste and then develop circular behaviours. This paper is an attempt to identify the key characteristics of households that can influence the way their members manage their waste. In the article, the authors present a literature review on circular economy in the field of household members' behaviour. The main objective is a statistical analysis of the differences in the way of managing waste due to the socio-economic characteristics of the households, which was carried out using data from one of the authors' own research. Within the analysis, the authors presented the socio-economic profile of the person who manages the waste carefully. Seven hypotheses were tested in the article. Only three were confirmed.

KEYWORDS: circular economy, households, sustainable development, waste management

Introduction

The mass of municipal waste generated per capita in Poland is steadily increasing. In 2015, it was 283 kg, while in 2022 (the latest data available), it will be 70 kg more (355 kg/per capita) (GUS, 2023). Although the amount of mixed waste collected per capita per year decreases from 216.5 kg in 2015 to 213.1 kg in 2022, this value unfortunately increases when household mixed waste is taken into account (from 173.1 kg in 2015 to 174.9 kg in 2022). At the same time, the rate of separate collection of household waste will increase from 25.1% in 2015 to 42.9% in 2022. This figure is encouraging, but there is still a lot to be done in terms of waste separation. This can be supported by promoting the idea of circular behaviour, which is part of the implementation of a circular economy in households. This article is the ninth in a series of publications on circular economy and sustainable development issues. It provides a review of the literature on the circular economy and the role of individual consumers and their behaviour in the transition to a circular economy. It also includes a statistical analysis of the differences in the way waste is managed according to the socio-economic characteristics of households, based on data from the author's own research.

Waste management in the circular behaviours concept

The 1960s and the publications of Kenneth E. Boulding mark the beginning of the circular economy (Michalak et al., 2020). However, the increased interest in this issue is linked to the second decade of the 2000s and the need to introduce structural changes in the economy in order to meet certain challenges, such as rising fuel prices, limited non-renewable resources, while at the same time producing huge amounts of waste due, among other things, to unsustainable resource management. According to Geissdoerfer et al. (2017) a circular economy is "a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling" (Geissdoerfer et al., 2017). The European Environment Agency's report strongly emphasises that "a circular economy is a fundamental alternative to the linear take-make-consume-dispose economic model that currently predominates" (EEA, 2016). In the literature, the topic of circular economy is, inter alia, associated with CE characteristics and perspectives (Ghisellini et al., 2016); measurement and monitoring of circular economy (UNECE, 2021); implementation of CE in industry (Lieder & Rashid, 2016); the process of transformation of cities (Sobol, 2019), including revitalisation processes (Nowakowska & Grodzicka-Kowalczyk, 2019); CE as an element of competitiveness for Europe (Ellen MacArthur Foundation, 2015); the impact of CE on developing and emerging countries (Langsdorf & Laurens, 2022) and the influence of consumers on the implementation of circular economy principles (Skawińska, 2019). The benefits of the transition to a circular economy (EEA, 2016) are environmental, resource, and social. For this to happen, changes are needed, especially on the part of individual consumers. However, due to the far-reaching processes of consumption and consumerism, they now require state support (Cramer, 2022), in the form of appropriate legislation, programmes and policies, as well as financial instruments to encourage consumers to adopt certain practices and entrepreneurs to change their business models (Whalen, 2020). The latter's actions in "the design of products and services can also have an influence on user behaviour (…)" (Wastling et al., 2018). It is important to change existing practices related to the purchase of goods and waste management in order to reduce the amount of waste and, when this is difficult, to manage it properly. According to Vidal-Ayuso et al. (2023), the main areas of research in CE related to consumer behaviour are elements that influence consumer behaviour and sustainable consumption, life extension and reparability, packaging and recycled plastic, e-waste and up cycling.

Circular behaviours were described by one of the authors in previous articles (Szczygieł, 2021; Szczygieł & Kowalska, 2021). The issue of circular behaviour concerns two areas of action. On the one hand, buying less and, on the other hand, managing appropriately. In the first, the issue may relate to the types of products, including circular products, and the degree of circularity of the products (Shevchenko et al., 2023). The second is related to waste management. Consumers can either behave in a circular way themselves, or they can be mobilised to do so by other actors, such as businesses or

DOI: 10.34659/eis.2024.89.2.703

non-profit organisations involved in environmental education. The focus is on reducing the need for resources by reducing the demand for products and shifting to satisfying demand. Circular behaviour is distinguished from pro-ecological behaviour. In the latter, the focus is on maximising the use of resources used to produce existing things. The long-term effect of circular behaviour should be to reduce the demand for primary resources. Of course, circular behaviour is part of pro-environmental behaviour, and the main differentiating factor is the long-term effect of reducing the demand for primary resources. Examples of such behaviours include extracting components from used things that can be used for something else or using products that reduce the consumption of a resource. These behaviours can, of course, be classified and graded according to levels of circularity, as is the case in the analysis of such activities in companies (Kirchner et al., 2017; Manickam & Duraisamy, 2019). Therefore, some (usually simple) have less circular potential, while others (often requiring investment) have more. A simple behaviour whose circular potential relates to energy recovery or simple recycling (reuse of raw materials from products) is waste separation. As shown by the results of similar studies carried out among employees of social economy organisations, the adoption of circular behaviours is based on their similarity (Szczygieł & Śliwa, 2023). For this reason, it can be assumed that waste separation policies can encourage increasingly sophisticated behaviour with greater potential for circularity. It is therefore important to understand the factors that encourage people to take action to separate their waste in order to actively shape the integration of different types of behaviour.

Research methods

The main purpose of this study is to identify the key characteristics of households that may influence the way their members manage waste. By key characteristics the authors mean the socio-economic characteristics of the households, i.e.: gender, place of residence, level of education, personal composition of the household and material status. The main hypothesis of this article is the following: the way of waste management is an element of circular behaviour and similarly it differs according to the socio-economic characteristics of the households.

On this basis, seven hypotheses were accepted for testing:

H_1 – Waste separation is associated with the adoption of circular behaviour.
H_2 – The gender of the head of household is the most important differentiator of waste management.
H_3 – Women separate waste more often than men.
H_4 – Households with fewer members are more likely to separate waste.
H_5 – Living in the country favours waste separation more often.
H_6 – A higher level of education favours waste separation more often.
H_7 – The higher the material status of the household, the higher the rate of waste separation.

Pearson's correlation coefficient, Chi2 test of independence and Kruskal-Wallis ANOVA were used to test these hypotheses (α=0.05, $p<\alpha$; statistical significance: $p<0.05$ – present (*), $p<0.01$ – high (**), $p<0.001$ – very high (***)). The data used in the article comes from the original research carried out by one of the authors as part of an internal grant from the University of the National Education Commission, Krakow (no. BN.610 – 64/PBU/2020) entitled: "Circular behaviours in households and the quality of life of their inhabitants". The research was conducted in December 2020 on the territory of Małopolskie and Podkarpackie voivodships (N=400 households). The research sample reflected the distribution of the population in the provinces (245 respondents from Małopolskie and 155 from Podkarpackie; 208 women and 192 men; 149 respondents from villages and 251 from urban areas). The study was carried out by a research organisation at the request of one of the authors, using a survey questionnaire (CAWI technique). The main scope of the research project concerned the adoption of circular behaviour by households and its influence on their quality of life.

DOI: 10.34659/eis.2024.89.2.703

Waste management in Polish households – the result of own research

The majority of people in the households surveyed spend about 5 minutes a day separating waste (49%). For 34%, it takes about 10 minutes and for 13% 15 minutes. Members of the households surveyed were asked to rate a number of statements about the usefulness of separate collection. Some of the statements were positive, while others expressed negative attitudes and criticism of such practices (Table 1). The rating scale included Osgood's 5-point scale (1 – *strongly disagree*, 2, 3, 4, 5 – *strongly agree*). It allows us to calculate the mean for each sentence.

Table 1. Assessment of the sentences related to waste separation

Statement	Nature	Mean	Median	Mode	No. of Mode	Variance	Std. Dev.
Separating waste helps protect the environment and save resources.	P	4.38	5	5	263	1.028	1.01
There is no need to separate waste because all waste goes to landfill anyway.	N	1.92	1	1	229	1.611	1.27
I am very interested in waste separation because it allows me to take part in environmental activities.	P	3.93	4	5	159	1.283	1.13
Separating waste in my household does not make a big difference to the environment as a whole.	N	2.19	2	1	179	1.770	1.33
Waste separation shows the personal hygiene of the household members.	P	3.89	4	5	166	1.446	1.20
A rubbish truck comes to collect different types of separated waste, so this activity does not make sense.	N	2.41	2	1	148	1.886	1.37
Separated recyclable waste can be sold to generate extra income.	P	3.49	3	3	133	1.388	1.18
I can give an example to my children or relatives by separating my waste	P	4.30	5	5	240	1.085	1.04
Waste separation is just a catchy marketing strategy.	N	2.02	1,5	1	200	1.603	1.27
Separating waste can help the country reduce the cost of environmental protection.	P	3.96	4	5	165	1.228	1.11
Waste separation is a key element of a circular economy.	P	3.84	4	4	132	1.016	1.01
Waste separation makes money mainly for waste treatment companies.	N	3.06	3	3	156	1.359	1.17

Note: Nature P – positive, N – negative

The positive sentences expressing legitimacy and positive benefits were, on average, rated higher by the respondents. They were more likely to agree with the statements given, with '5' (mode) ratings predominating. In the case of negative statements, they had lower ratings (mode was mostly '1'). There was a statistically significant difference between the sentences (p=0.005766). In other words, respondents agreed with positive messages and the validity of sorting waste but disagreed with negative, exaggerated or untrue statements. The survey looked at the frequency with which different types of waste were separated (10 groups were listed). Based on the frequency rating, an overall waste separation rate was estimated and used for further analysis. The rating scale included 5 verbal statements related to the frequency of the activities performed: Never, Rarely, Sometimes, Often, Always. As the scale was directional, it was possible to calculate the mean value (Figure 1).

DOI: 10.34659/eis.2024.89.2.703

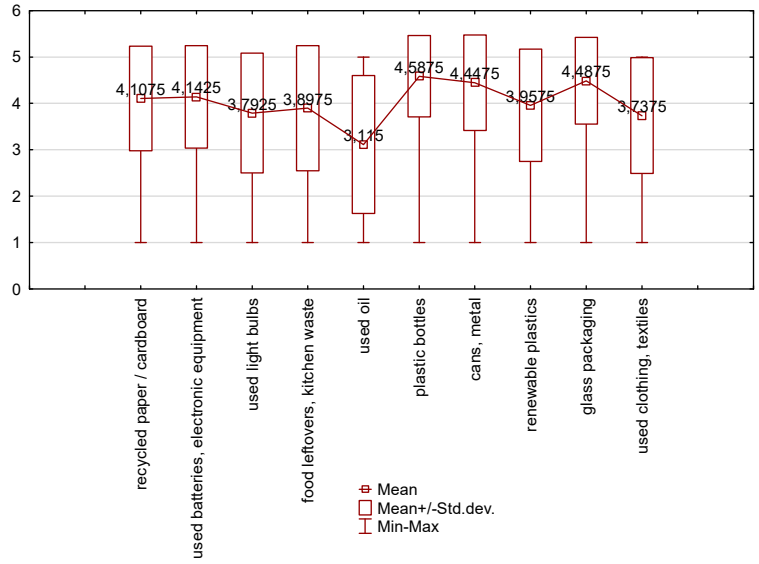

Figure 1. Average frequency of waste separation by companies

Five of the waste types surveyed were almost always separated (scores above 4). These were: recycled paper/cardboard (4.1), used batteries, electronic equipment (4.14), plastic bottles (4.58), cans, metal (4.44), and glass packaging (4.48). Separation of this waste is relatively easy and does not pose many problems (as in the case of separation of waste oil, which has to be returned to the PSZOK). For the other types of waste, the lower scores may be due to some difficulties in separation. For example, some households may have doubts about whether the plastic film used to wrap products should be put in the plastic waste bin or not, as well as clothing, for which there are additional separate containers that are not always available. Respondents were asked to rate certain logistical aspects of the waste separation process in their household (Figure 2).

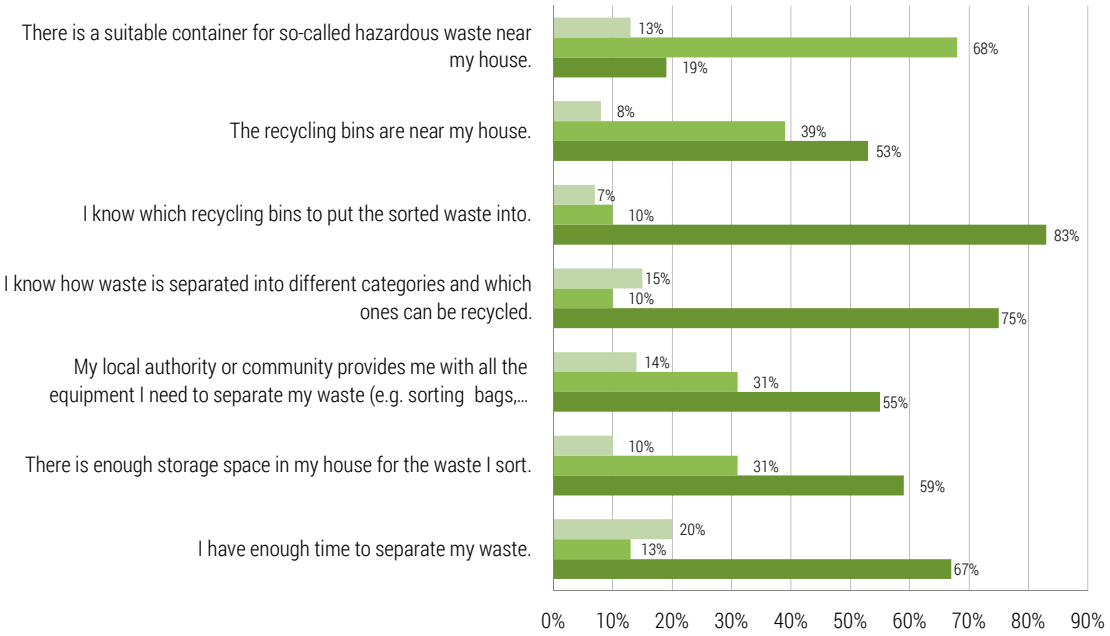

Figure 2. Logistical aspects of waste separation

DOI: 10.34659/eis.2024.89.2.703

The majority of respondents (67%) said that they had enough time to sort their rubbish, which was not a big challenge with a reported 5 minutes per day. Slightly fewer (59%) felt they had enough space at home. This is due to the need for minimum separation of bins for wet and dry fractions (and often in municipalities also for individual other types of waste: non-segregated, bio, plastic, glass). Only half of respondents felt that their local authority helped them to separate waste, for example, by providing bins or bags. Three-quarters of respondents said they knew how to separate their waste, and 83% said they knew which bin was for which type of waste (this is because there are signs on the bins). However, it is worth noting that almost 40% of respondents said that there were no bins near their homes. This may be related to the increase in time spent sorting waste (p=0.0507). Interestingly, rural dwellers were more likely to report that they did not have adequate bins near their homes, but these are mandatory on private properties. There is a statistically significant difference between rural and urban areas in this respect (p=0.0000). 68% of respondents said that they did not have access to bins for so-called 'hazardous waste' in their area. This can include things like used oil or light bulbs and used white goods.

The following results were obtained when testing the research hypotheses. The relationship between waste separation and circular behaviour was found to be positive and statistically significant. The value of Pearson's linear correlation coefficient was r=0.5953 (p=0.000). This means a high correlation (Stanisz, 1998). It should be noted that in this case an index of waste separation, calculated as the average frequency of separating 10 types of waste, and an index of circularity of household behaviour, calculated as the average of the frequency of 37 circular behaviours performed, were used (Szczygiel, 2021). Thus, the result obtained allows us to accept the stated research hypothesis H_1 (*The separation of waste is linked to the adoption of circular behaviour*). Similar conclusions were reached by Nik Masdek and their research team (2023), who examined that "sustainable food waste management helps in promoting the circular economy concept through the application of reusing food leftovers, separating food and non-food waste right from the source".

For the second research hypothesis (H_2 *-The gender of the household head is the most important characteristic differentiating waste management*), differences in the reported frequency of separating the 10 types of waste were taken into account in relation to seven socio-demographic characteristics describing households: Gender, age group, education, place of residence, labour market status, household composition and material status. Of these, the gender of the respondent was the most important and differentiated the study group the most. For seven types of waste, the gender difference was statistically significant (Chi^2 Test of Independence) (Table 2).

Table 2. Gender differences in the separation of different types of waste

Type of waste	Mean		Chi^2
	Man	Woman	p-value
recycled paper / card board	3.91	4.28	**0.00097*** **
used batteries, electronic equipment	3.98	4.29	**0.02019***
used light bulbs	3.65	3.92	0.29238
food leftovers, kitchen waste	3.71	4.07	**0.04743***
used oil	3.16	3.08	0.51185
plastic bottles	4.41	4.75	**0.00282****
cans, metal	4.25	4.63	**0.00400****
renewable plastics	3.84	4.07	0.27230
glass packaging	4.33	4.63	**0.00787****
used clothing, textiles	3.5	3.96	**0.00011*** **

Note: α=0.05, p<α; statistical significance: p<0.05 – present (*), p<0.01 – high (**), p< 0.001 – very high (***)).

DOI: 10.34659/eis.2024.89.2.703

In the remaining cases, the characteristics differentiated the group for a maximum of three types of waste. Therefore, the second research hypothesis can be accepted. A similar result was obtained in the study (Heidari et al., 2018), where it was gender and educational field of study that most strongly differentiated the behaviour undertaken towards waste sorting. Likewise (Sun et al., 2017; Oyekale, 2018) pointed out that gender is a key differentiating factor in sorting behaviour.

In the case of the third hypothesis (H_3 – *Women segregate waste more often than men*), it can be said that it has been confirmed. The average frequency of segregation is higher for the nine types of waste (Table 2). Only in one case (waste oil) were men more likely to separate. This may be due to the fact that waste oil includes not only cooking oil but also motor oil. Looking at the overall rate of waste separation, it is indeed women who are more likely to do this. These differences between the sexes of the respondents are statistically significant in all cases (Kruskal-Wallis ANOVA p=0.007). The gender of the head of the household is crucial for taking action on waste segregation. It is women who are more likely and more active in segregating, as confirmed by the results of previous studies (Heidari et al., 2018; Oyekale, 2018).

The number of households also has no significant effect on the frequency of waste separation. Taking into account the results of the Kruskal-Wallis ANOVA analysis, it can be observed that the rate of waste separation is highest in single-parent households (4.46) and lowest in one-person households (3.84) (p=0.2383). For households with children, there are no major differences in the frequency of separation according to the number of children (Figure 3). Thus, the fourth research hypothesis (H_4 – *Households with fewer members are more likely to separate waste*) is not confirmed. These conclusions are in contrast to the results of García-Valiñas et al. (2023), where "as the number of people living in a household decreases, the likelihood of having very good environmental habits increases".

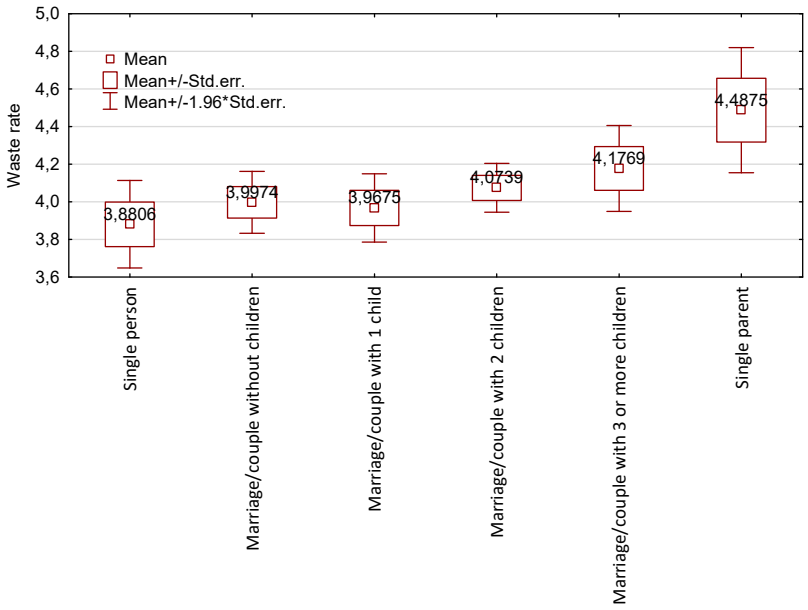

Figure 3. Frequency of waste separation by household composition

When analysing whether living in the countryside favours more frequent waste separation (H_5 – *Living in the countryside favours more frequent waste separation*), there were no statistically significant differences between the different types of villages (Kruskal-Wallis ANOVA p=0.0832). Although there was a difference between urban and rural areas in terms of the presence of rubbish bins (mentioned above, p=0.0000), the frequency of sorting did not differ significantly according to the place of residence (Figure 4). The results of a study (Janmaimool & Denpaiboon, 2016) indicate a non-linear relationship between place of residence and taking action to sort waste.

The study found that the higher the level of education, the less likely people were to separate waste (Kruskal-Wallis ANOVA p=0.5484) (Figure 5). A similar lack of a linear relationship between

DOI: 10.34659/eis.2024.89.2.703

education and the adoption of specific behaviours was found in relation to circular behaviour (Szczygieł, 2021). Thus, the sixth research hypothesis (H_6 – *Higher levels of education favour more frequent waste separation*) was not confirmed. Some explanation for the lack of direct influence of some socio-economic factors may be provided by the observation of Ma et al. (2020), who pointed out that instead of socio-economic factors, socio-psychological factors may partly explain waste management behaviour. This is the case, for example, in the Theory of Planned behaviour concept. Similar conclusions were also reached by Xu et al. (2017). The lack of a clear effect of education on waste segregation has also been shown in other studies (e.g. Zhang et al., 2015), where a higher frequency of segregation was only found for the student group.

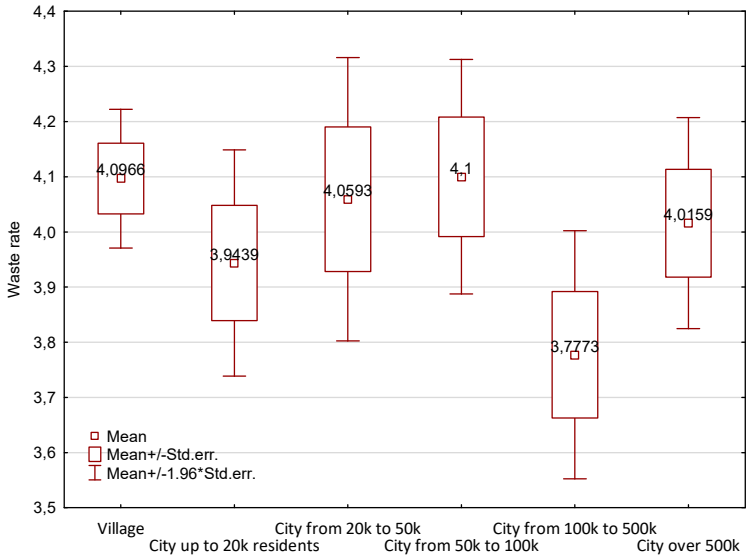

Figure 4. Frequency of waste separation by place of residence

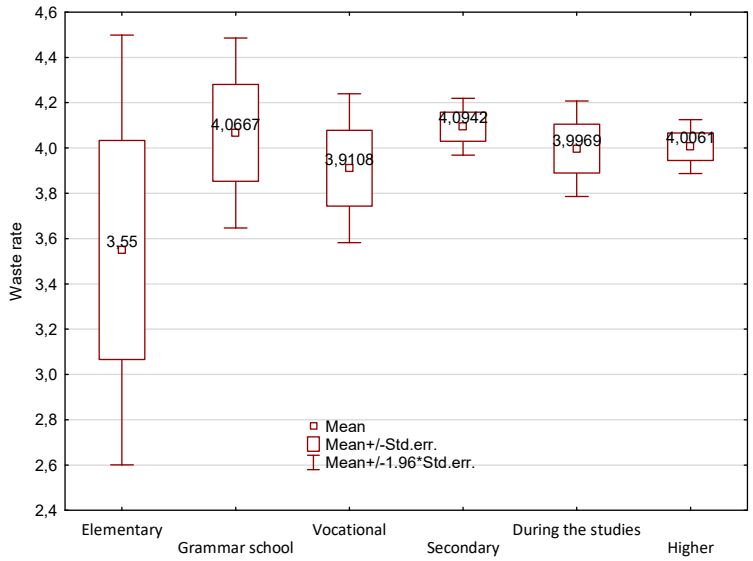

Figure 5. Frequency of waste separation by level of education

With regard to the last research hypothesis (H_7 – *The higher the household's assessment of its material status, the higher the rate of waste separation*), the results obtained indicated that there were no statistically significant differences (p=0.346). The evaluation of the material status does not differentiate the frequency of waste separation in households. Although there is a difference between households that consider their situation to be 'very bad' (3.15), further (higher) ratings do not differ significantly (mean varies between 3.98 and 4.09) (Figure 6). Factors such as income and the assess-

DOI: 10.34659/eis.2024.89.2.703

ment of one's material situation are sometimes ambiguous in their assessment. Some studies to date have indicated that only for certain groups can the influence of income be established as a factor indicating willingness to engage in pro-environmental behaviour and actions (Ananno et al., 2021; Oyekale, 2018; Ma et al., 2020; Janmaimool & Denpaiboon, 2016).

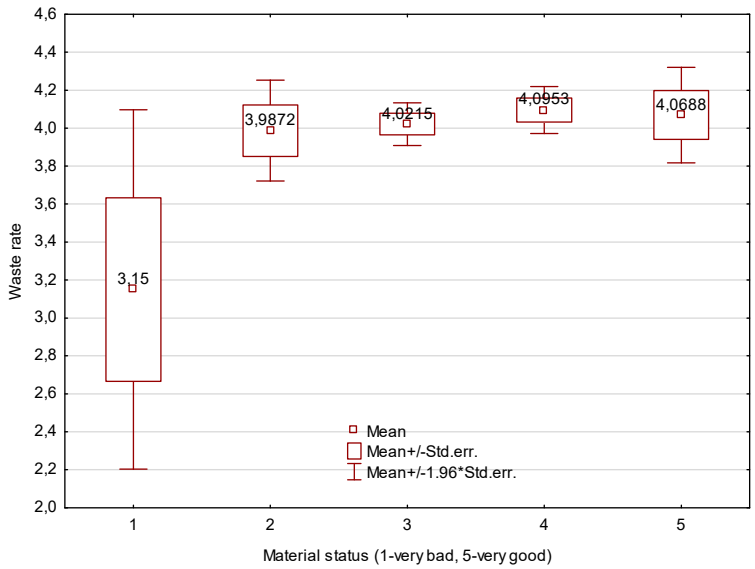

Figure 6. Frequency of waste separation by material status

The typical profile of a person who is more likely to sort waste could be described by the following characteristics: female, aged between 50 and 59, with a secondary education, living in a town with a population of 50,000 to 100,000, single parent and considering her material status to be 'good'. However, this characterisation only partially captures the true picture of those who separate waste. The most important characteristic is gender, and in fact, women are more likely than men to separate waste. The place of residence and the size of the household do not make a significant difference to the frequency of waste separation. The same applies to the level of education and the assessment of one's own material situation. This fact should be seen in a positive light, as it may indicate that different groups of people and different types of households are taking measures to separate waste. The fact that there are no differences in the waste separation activities carried out is an indication that these activities are carried out by everyone. In fact, women are more likely to separate waste, which is related to their nature and the range of household tasks they perform. According to GUS (2016), women spend significantly more time on housework than men (the difference varies from a quarter to half an hour between different groups). This may explain the statistically significantly higher rates of waste segregation among women.

Conclusions

The implementation of a circular economy is currently one of the most important areas of activity in the European Union. A wide range of public and private actors are active in this field. The literature raises a number of issues related to the implementation of a circular economy. An increasing number of publications refer to the role and importance of consumers in this context. The aim of this publication was to highlight circular consumer behaviour in one specific area – household waste separation. On the basis of the research carried out, it was possible to establish that:

- waste separation is associated with the adoption of recycling behaviour,
- the gender of the head of the household is the most important differentiating factor in waste management – women play a leading role.

DOI: 10.34659/eis.2024.89.2.703

Interestingly, level of education, number of household members and location do not influence the level of participation in waste separation. The following conclusions can be drawn:

1) The motivations of those who engage in responsible waste separation should be further explored. In this context, questions need to be answered as to what, apart from socio-demographic factors, might influence the uptake of these activities and whether these are psychological factors (including motives of a different nature).
2) In addition, it would be necessary to examine how categories such as attitude, knowledge, sense of agency or control might influence the uptake of actions aimed at implementing pro-circular activities.
3) Given that men are less involved in waste separation activities, the reasons for this should be analysed, and they should be encouraged to become more active in waste separation.

In conclusion, waste selection is an important circular behaviour, its importance for the circular economy cannot be overestimated and research should be developed in this area.

Acknowledgements

This research has been supported by the University of National Education Commission, Krakow, within the framework of project No. BN.610 – 64/PBU/2020, *Circular behaviours in households and the quality of life of their inhabitants*.

The contribution of the authors

Conceptualization, E.Sz. and P.Sz.; literature review, P.Sz., K.K. and R.Ś.; methodology, E.Sz.; formal analysis, E.Sz.; writing, E.Sz. and P.Sz.; conclusions and discussion, E.Sz. and P.Sz.

References

Ananno, A. A., Masud, M. H., Dabnichki, P., Mahjabeen, M., & Chowdhury, S. A. (2021). Survey and analysis of consumers' behaviour for electronic waste management in Bangladesh. Journal of Environmental Management, 282, 111943. https://doi.org/10.1016/j.jenvman.2021.111943

Cramer, J. (2022). Effective governance of circular economies: An international comparison. Journal of Cleaner Production, 343, 130874. https://doi.org/10.1016/j.jclepro.2022.130874

EEA. (2016). *Circular economy in Europe. Developing the knowledge base*. Report. https://www.eea.europa.eu/publications/circular-economy-in-europe

Ellen MacArthur Foundation. (2015). *Growth within: A circular economy vision for a competitive Europe.* https://unfccc.int/sites/default/files/resource/Circular%20economy%203.pdf

García-Valiñas, M., Arbués, F., & Balado-Naves, R. (2023). Assessing environmental profiles: An analysis of water consumption and waste recycling habits. Journal of Environmental Management, 348, 119247. https://doi.org/10.1016/j.jenvman.2023.119247

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy. A new sustainability paradigm? Journal of Cleaner Production, 143, 757-768. https://doi.org/10.1016/j.jclepro.2016.12.048

Ghisellini, P., Cialani, C., & Ulgiati, S. (2016). A review on circular economy: the expected transition to a balanced interplay of environmental and economic systems. Journal of Cleaner Production, 114, 11-32. https://doi.org/10.1016/j.jclepro.2015.09.007

GUS. (2016). *Budżet czasu ludności w 2013 r. część II (wraz z częścią I).* https://stat.gov.pl/obszary-tematyczne/warunki-zycia/dochody-wydatki-i-warunki-zycia-ludnosci/budzet-czasu-ludnosci-w-2013-r-czesc-ii-wraz-z-czescia-i,19,2.html (in Polish).

GUS. (2023). *Local Data Bank.* https://bdl.stat.gov.pl/bdl/start (in Polish).

Heidari, A., Kolahi, M., Behravesh, N., Ghorbanyon, M., Ehsanmansh, F., Hashemolhosini, N., & Zanganeh, F. (2018). Youth and sustainable waste management: a SEM approach and extended theory of planned behavior. Journal of Material Cycles and Waste Management, 20, 2041-2053. https://doi.org/10.1007/s10163-018-0754-1

Janmaimool, P., & Denpaiboon, C. (2016). Evaluating determinants of rural Villagers' engagement in conservation and waste management behaviors based on integrated conceptual framework of Pro-environmental behavior. Life Sciences, Society and Policy, 12(1), 12. https://doi.org/10.1186/s40504-016-0045-3

Kirchherr, J., Reike, D., & Hekkerts, M. (2017). Conceptualizing the circular economy. An analysis of 114 definitions. Resources, Conservation & Recycling, 127, 221-232. https://doi.org/10.1016/j.resconrec.2017.09.005

Langsdorf, S., & Laurens, D. (2022). *The circular economy and its impact on developing and emerging countries. An explorative study.* https://www.ecologic.eu/sites/default/files/publication/2022/50068-Circular-Economy-and-Developing-Countries-final.pdf

Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. Journal of Cleaner Production, 115, 36-51. https://doi.org/10.1016/j.jclepro.2015.12.042

Ma, Y., Wang, H., & Kong, R. (2020). The effect of policy instruments on rural households' solid waste separation behavior and the mediation of perceived value using SEM. Environmental Science and Pollution Research, 27(16), 19398-19409. https://doi.org/10.1007/s11356-020-08410-2

Manickam, P., & Duraisamy, G. (2019). 3Rs and circular economy. In S.S. Muthu (Ed.), *Circular economy in textiles and apparel. Processing, manufacturing, and design* (pp. 77-93). Cambridge: Woodhead Publishing. https://doi.org/10.1016/B978-0-08-102630-4.00004-2

Michalak, D., Rosiek, K., & Szyja, P. (2020). *Gospodarka niskoemisyjna, gospodarka cyrkularna, zielona gospodarka. Uwarunkowania i wzajemne powiazania.* Łódź: Wydawnictwo Uniwersytetu Łódzkiego. (in Polish).

Nik Masdek, N. R., Wong, K. S. K., Mohd Nawi, N., Sharifuddin, J., & Wong, W. L. (2023). Antecedents of Sustainable Food Waste Management: Empirical evidence from urban households in Malaysia. Management & Marketing, 18(1), 53-77. https://doi.org/10.2478/mmcks-2023-0004

Nowakowska, A., & Grodzicka-Kowalczyk, M. (2019). Circular Economy approach in revitalization: an opportunity for effective urban regeneration. Economics and Environment, 71(4), 8-20. https://doi.org/10.34659/2019/4/45

Oyekale, A. S. (2018). Determinants of households' involvement in waste separation and collection for recycling in South Africa. Environment, Development and Sustainability, 20, 2343-2371. https://doi.org/10.1007/s10668-017-9993-x

Shevchenko, T., Saidani, M., Ranjbari, M., Kronenberg, J., Danko, Y., & Laitala, K. (2023). Consumer behavior in the circular economy: Developing a product-centric framework. Journal of Cleaner Production, 384, 135568. https://doi.org/10.1016/j.jclepro.2022.135568

Skawińska, E. (2019). Innovative and socially responsible consumer behaviour in paradigm of circular economy. Acta Scientiarum Polonorum. Oeconomia, 18(3), 83-90. https://doi.org/10.22630/ASPE.2019.18.3.35

Sobol, A. (2019). Circular Economy in sustainable development of cities. Economics and Environment, 71(4), 176-187. https://doi.org/10.34659/2019/4/56

Stanisz, A. (1998). *Przystępny kurs statystyki w oparciu o program STATISTICA PL na przykładach z medycyny.* Kraków: StatSoft. (in Polish).

Sun, Y., Wang, S., Li, J., Zhao, D., & Fan, J. (2017). Understanding consumers' intention to use plastic bags: using an extended theory of planned behaviour model. Natural Hazards, 89, 1327-1342. https://doi.org/10.1007/s11069-017-3022-0

Szczygieł, E. (2021). Circular behaviours undertaken by Polish households – a preliminary analysis of research results. Studies of the Industrial Geography Commission of the Polish Geographical Society, 35(4), 188-204. https://doi.org/10.24917/20801653.354.12

Szczygieł, E., & Kowalska, K. (2021). Meeting Halfway – Understanding Circular Behaviours among Households as a Starting Point for Business Practices. European Research Study Journal, XXIV(3B), 967-980. https://doi.org/10.35808/ersj/2550

Szczygieł, E., & Śliwa, R. (2023). Social economy entities as a place to develop green skills – research findings. Social Economy Review, 1, 44-56. http://dx.doi.org/10.15678/SER.2023.1.03

UNECE. (2021). *Measuring and monitoring the circular economy and use of data for policy-making.* https://unece.org/sites/default/files/2022-02/Background%20report%20on%20measuring%20circular%20economy_ENG_updated.pdf

Vidal-Ayuso, F., Akhmedova, A., & Jaca, C. (2023). The circular economy and consumer behaviour: Literature review and research directions. Journal of Cleaner Production, 418, 137824. https://doi.org/10.1016/j.jclepro.2023.137824

Wastling, T., Charnley, F., & Moreno, M. (2018). Design for Circular Behaviour: Considering Users in a Circular Economy. Sustainability, 10(6), 1743. https://doi.org/10.3390/su10061743

Whalen, K. (2020). *Circular Business Models that Extend Product Value: Going Beyond Recycling to Create New Circular Business Opportunities* [Doctoral dissertation]. Lund University.

Xu, L., Ling, M., Lu, Y., & Shen, M. (2017). Understanding Household Waste Separation Behaviour: Testing the Roles of Moral, Past Experience, and Perceived Policy Effectiveness within the Theory of Planned Behaviour. Sustainability, 9(4), 625. https://doi.org/10.3390/su9040625

Zhang, D., Huang, G., Yin, X., & Gong, Q. (2015). Residents' Waste Separation Behaviors at the Source: Using SEM with the Theory of Planned Behavior in Guangzhou, China. International Journal of Environmental Research and Public Health, 12(8), 9475-9491. https://doi.org/10.3390/ijerph120809475

Elżbieta SZCZYGIEŁ • Paulina SZYJA • Katarzyna KOWALSKA • Renata ŚLIWA

GOSPODARKA ODPADAMI POLSKICH GOSPODARSTW DOMOWYCH JAKO ELEMENT ZACHOWAŃ CYRKULARNYCH – ANALIZA WYNIKÓW BADAŃ

STRESZCZENIE: Rosnąca ilość odpadów generowanych przez gospodarstwa domowe wymaga podjęcia określonych działań ze względu na konieczność zmian dyktowanych przez gospodarkę cyrkularną. W tym celu konieczne jest zdiagnozowanie kluczowych cech gospodarstw domowych, które mogą wpływać na sposób gospodarowania odpadami przez ich członków, a następnie na kształtowanie zachowań cyrkularnych. Niniejszy artykuł jest próbą identyfikacji kluczowych cech gospodarstw domowych, które mogą wpływać na sposób, w jaki ich członkowie gospodarują odpadami. W artykule autorzy przedstawiają przegląd literatury na temat gospodarki o obiegu zamkniętym w zakresie zachowań członków gospodarstw domowych. Głównym celem jest analiza statystyczna różnic w sposobie gospodarowania odpadami ze względu na cechy społeczno-ekonomiczne gospodarstw domowych, która została przeprowadzona z wykorzystaniem danych z badań własnych przeprowadzonych przez jednego z autorów. W ramach analizy autorzy przedstawili profil społeczno-ekonomiczny osoby starannie gospodarującej odpadami. W artykule przetestowano siedem hipotez. Tylko trzy zostały potwierdzone.

SŁOWA KLUCZOWE: gospodarka obiegu zamkniętego, gospodarstwa domowe, zrównoważony rozwój, gospodarka odpadami

DOI: 10.34659/eis.2024.89.2.703