CONSUMER ATTITUDES TOWARDS HOUSEHOLD WASTE SORTING

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Abstract

Manufacturers of consumer chemicals have been endeavouring in recent years to increase the sustainability of their product packaging. They apply various strategies, in particular reduce, reuse and recycle. The recycle strategy presupposes the cooperation of final consumers. The role of final consumers in relation to the recycling process and household waste sorting has not yet been addressed in the literature. Therefore, a primary quantitative research was conducted among 350 users of consumer chemicals aimed at finding out their attitudes to individual activities in the sorting of household waste. It was found that consumers' willingness to engage in these activities varies, also depending on the classification characteristics of the respondents (gender, age, education, income level and form of housing). A critical group in terms of willingness to sort the waste are university-educated young high-income men living in flats.

Introduction

Packaging is often considered to be one of the main culprits in the pollution of our planet, because its time of use is relatively short. The packaging becomes waste essentially immediately after it has been used[1]. Packaging waste significantly increases the volume of solid waste in cities and municipalities. In the dominant industrial economies, packaging waste accounts for about 20% of municipal solid waste[2]. Therefore, companies in various industries are looking for a way to minimize the negative impact of packaging on the environment, without giving up the opportunity to benefit from its positive properties[1]. According to Mehereshi (2019), these sectors are mainly the food industry, however, companies in the chemical and pharmaceutical industries have started to implement sustainable packaging as well[3]. Companies such as Henkel, Colgate-Palmolive or Dow are working hard on the sustainable packaging of their own end-use products[1,4,5]. Their efforts are mainly focused on limiting the single use of primary plastic packaging.

Packaging waste can be reduced through three important and effective strategies, namely reduce, reuse and recycle[3,6]. The focus is on all three strategies. However, as many consumers are reluctant to cooperate in return systems[7], the reduce and/or recycle strategies could be more interesting for businesses. Dow Chemicals is focusing on reducing the amount of plastic per package[3], and Colgate Palmolive is introducing fully recyclable packaging for all products in three (out of four) product lines in order to enhance the recycle strategy.

The increased recycling rate of plastic packaging leads to a significant reduction in environmental impact[8]. In the field of plastic recycling, the greatest interest is in recycling PET bottles, as the recycled material is used the most[9]. Recycled PET can be used to produce new PET bottles or silicone fibre, which is then used for the production of car interiors, fillings for sleeping bags and home bedding, roofing, etc. In the case of processing mixed plastics, a lower-quality recycled material is produced (used for the production of garden and park furniture, crates and pallets, playgrounds, etc.)[10].

There are a number of barriers to a higher recycling rate. These include the use of a large number of different types of plastics[11], the combination of different materials in the production of one package[11,12], insufficient collection of used packaging[13], dirt in collected plastics[10], insufficient recycling infrastructure and high sorting costs[10,13]. In particular, this causes incorrectly sorted materials to enter recycling systems, which can cause a number of other environmental and economic problems[14].

Sběr a třídění odpadů (a v rámci nich obalů z výrobků) probíhá na třech základních úrovních, a to na úrovni domácností, na úrovni měst a obcí a konečně ve specializovaných firmách, které provádějí recyklaci nebo vytříděné obaly k recyklaci dodávají. These companies eliminate the shortcomings in the classification at previous levels. They use not only mechanical but often also automatic systems for sorting, including increasingly reliable detectors and sophisticated software[15]. However, investment in and use of these technologies increases recycling costs and causes packaging manufacturers to give preference to raw materials over recycled use for economic reasons[10].

Insufficient sorting of waste (including packaging waste) in households is caused by a number of existing barriers. According to the literature[10,14,16,17,18,19] the barriers include in particular:

- necessity to sacrifice the time associated with sorting (time for washing, disassembling packaging by different types of materials, removing labels, etc.),
- reduction of convenience - the consumer must make an effort to sort waste,
- financial costs - arise in connection with, for example, washing and removing labels (e.g. water consumption, energy consumption for heating used water),
- lack of space for storage of sorted waste,
- limited possibility for households to place sorted waste in special containers due to insufficient infrastructure in the place of residence,
- distrust of the need for sorting - the consumer does not appreciate the role of sorting from the point of view of environmental protection and/or his/her own role in environmental protection.

However, despite the existence of these barriers, the sorting of household and packaging waste takes place. This may be related to both the motivation caused by public pressure[20], and the satisfaction evoked by the perceived value of sorting and the level of recycling infrastructure. According to the literature,[21] the level of satisfaction resulting from sorting depends on education, income and age and affects three dimensions of involvement: enthusiasm (trying to learn more about sorting), social interaction (sharing sorting-related experiences with friends and other community) and active participation in sorting.
Overcoming the above-mentioned barriers, resistance to various external pressures and the size of the perceived value of sorting are fundamentally related to the willingness of households to sort waste and the packaging of products used within it. However, this willingness has not yet been theoretically examined, although the issue is already being highlighted. For example,[18,19] state that the reluctance of consumers to participate in the recycling scheme is a major problem that needs to be thoroughly examined. Therefore, primary quantitative research was focused on this area. Its purpose was to reveal the willingness of consumers to carry out individual activities related to waste sorting (including packaging waste) in their own households.

Research methodology

The aim of the primary research was to specify the willingness of consumers to carry out activities that facilitate recycling. The objectives were to find out:

- what activities consumers are willing to do in preparing packaging for recycling,
- what is the willingness of consumers to sort waste, and
- how long consumers are willing to keep sorted waste in the household and to what distance they are willing to take it.

The research was organized as a quantitative one, an electronic questionnaire was used to collect data. It contained 14 statements, in which the respondents expressed the degree of agreement. A five-point Likert scale was used to express the degree of agreement (where 1 indicated the position "strongly disagree" and 5 the position "strongly agree"). The questionnaire also included questions examining the characteristics of the respondents such as gender, age, education, monthly income and type of household.
Data collection took place from 9 March to 9 April 2021 in the economically active population of the Czech Republic aged 15–64. 350 respondents took part in the research. Their structure by age and gender is shown in Table 1.

Table I
Structure of respondents by gender and age

Gender	Age (Frequencies)					
	15–24	25–34	35–34	45–44	55–54	Total
Male	25	32	16	14	5	92
Female	76	69	39	40	34	258
Total	101	101	55	54	39	350

The sample of 350 respondents included 182 (52%) respondents without a university degree and 168 (48%) respondents with a university degree, 179 (51%) respondents living in housing units and 171 (49%) respondents living in family houses. The structure of respondents by income is shown in Table 2.

Table II
Structure of respondents by income

Income	Frequencies	Percentages
Up to CZK 20,000	98	28 %
CZK 20,001 – 30,000	66	19 %
CZK 30,001 – 40,000	72	21 %
CZK 40,001 and more	54	15 %
I do not want to answer	60	17 %
Total	350	100 %

After the data collection was completed, they were checked and adjusted. The data obtained were checked for representativeness in terms of gender and age. The detected deviations were removed by weighing the data according to the available information on the structure of the examined population[22]. Subsequently, the categories of respondents by education were merged (so that only two evenly represented segments of respondents were created).
The research results were processed by descriptive statistical analysis using IBM SPSS Statistics software. First, the entire sample of individual research areas was processed in accordance with the objectives. Subsequently, a comparison of groups of respondents according to their characteristics (gender, age, education, income and type of household) was performed. In both cases, the mean and median were calculated. Missing answers were not included in the analysis ("I can't judge" category).

Discussion and result analysis

The research made it possible to find out a number of facts concerning the willingness of households to prepare waste for recycling, to sort it and to store it at home and take it out.
Regarding the willingness of consumers to prepare packaging for recycling, it was found that consumers are most willing to use common equipment (common composter and common plastic press) and to wash packaging from product residues (see Table 3).

Table III
Consumer willingness to prepare waste for recycling

Consumer willingness to prepare waste for recycling	Mean	Median
I am willing to wash the packaging from product residues	3.8	4
I am willing to remove stickers and top foils from the packaging	3.5	4
I am willing to buy a biodegradable waste composter for my own household	3.2	3
I am willing to use a composter shared several households	4.0	4
I am willing to buy a press for plastics for my own household, thus reducing the volume of packaging waste	2.4	2
I am willing to use a press for plastics shared by several households	3.7	4

Analysis of the difference of opinion according to the individual classification features showed that:

- Women are more willing to prepare waste for recycling than men. In particular, they are more willing than men to wash packaging from product residues and remove stickers.
- Young respondents (under 34) are less willing to prepare waste for recycling than older respondents. The oldest consumers (aged 55-64) are most willing to prepare waste for recycling.
- Respondents without a university degree are more willing to wash the packaging from product residues, remove stickers and top foils from the packaging than respondents with a university degree. Less educated people are more willing to buy a composter for biodegradable waste, while college graduates are more willing to use a common composter purchased for multiple households.
- Higher income groups are less willing to prepare waste for recycling. In principle, the higher the income, the less willingness to prepare waste for recycling.
- Respondents living in family houses are more willing to do all activities in the preparation of waste for recycling than respondents living in housing units. They are significantly more willing to buy a composter and a plastic press for their own household.

In terms of consumers' willingness to sort waste, there is a greater willingness to actually sort than to keep different containers or bags for sorted waste. There is a greater willingness to sort waste by different types of materials (paper, plastics, glass…) than by the type or colour of the material. There is also a greater willingness to keep fewer containers (bags) for sorted waste than to keep a larger number of containers (bags), see Table 4.

Table IV
Consumer willingness to sort waste

Consumer Willingness to Sort Waste	Mean	Median
I am willing to sort packaging waste consisting of several types of materials (especially plastics, paper, glass, …)	4.3	4
I am willing to sort packaging waste according to other criteria (eg. type or color of material)	3.5	4
I am willing to keep a maximum of 10 containers (bags) for sorted waste in my household	3.4	4
I am willing to keep more than 10 containers (bags) for sorted waste in my household	2.2	2

However, the willingness to sort waste varies depending on the characteristics of the respondents.

- Women are more willing to sort waste than men. Unlike men, they are more willing to sort packaging waste by the type or colour of the material and to keep more than 10 containers for sorted waste at home.
- With age, the willingness to sort waste by the type or colour of materials increases. Younger respondents (up to 34 years) are more willing to keep a smaller number of containers (bags) for sorted waste in the household, while older respondents (from 45 years) are more willing to keep a larger number of containers (bags).
- In principle, the willingness of consumers to sort waste does not depend on education. Only one minor difference was revealed, namely the willingness to keep more than 10 containers (bags) for sorted waste in the household. More willing to do so are respondents without a university degree.
- With the income, the willingness to sort packaging waste by basic materials (plastic, metal, glass...) and also the willingness to keep containers (bags) for sorted waste decreases.
- Respondents living in family homes are more willing to keep containers for sorted waste, either in smaller or larger quantities.

An analysis of the results of research in the field of storage and disposal of sorted waste showed that respondents are more willing to take sorted waste to a collection point within 300 m of the household and to store sorted waste in households for one week (see Table 5). Significantly less willingness was identified to carry the sorted waste over a longer distance and to keep the sorted waste in the household for more than one week (see Table 5).

Table V
Consumer willingness to store and take out sorted waste

Consumer willingness to store and take out sorted waste	Mean	Median
I am willing to take out sorted waste to a collection point within 300 m of my household	4.3	4
I am willing to take out sorted waste to a collection point more than 300 m from my household	3.5	4
I am willing to store sorted waste in my household (within 1 week) and prepare it for periodic local collection from households	4.1	4
I am willing to store sorted waste in my household (for more than 1 week) and prepare it for periodic local collection from households	3.4	4

Regarding the differences of opinion according to the different groups of respondents, it was found that:

- Women are more willing to store and take out sorted waste than men. They are more willing to store sorted waste in the household for more than one week and to take the sorted waste to a collection point more than 300 meters away. Men are more willing than women to just take sorted waste to a collection point within 300 m of the household.
- Middle-aged respondents (35-44 years), followed by the oldest respondents aged 55-64, are most willing to do any sorting and disposal activities.
- The willingness of consumers to store and take out sorted waste does not depend on education.

- Respondents with the highest income are the least willing to take household waste more than 300 m away and keep sorted waste for more than one week.
- Respondents living in family houses are significantly more willing to take sorted waste to more distant collection points and at the same time keep sorted waste in the household for more than one week.

Conclusion

Based on the results of the research, it can be stated that consumers are willing to prepare household waste for recycling. However, their willingness varies depending on the specific activities. This fact must be respected and the system of sorting (and collection) of waste at the municipal level and in specialized companies reselling or processing sorted waste must be adapted accordingly. If we consider the possibilities of improving the classification on the part of households, financial motivation as well as consumer education and training are important[21]. To actually raise awareness about environmental protection, it should start as early as in kindergarten[21]. Based on the results of research, it can be estimated that education will be a more effective tool. This should be primarily aimed at college educated young men (under 34) with high incomes living in flats. They represent a critical group, currently the least willing to sort waste.

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