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THE CONSUMER AWARENESS AND BEHAVIOUR TOWARDS FOOD PACKAGING IN POLAND

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ABSTRACT. Packaging is an inseparable element of all products on the market. High levels of demand for products from packaging industry comes from foodstuffs. With that, the increasing amount of waste from food packaging is one of the biggest threats for the environment, making sustainable consumption an important subject of research. An aware consumer plays the key role in it. The purpose of this article is to present the opinion of Polish respondents regarding the food packaging and the ways of their utilization. As the basic methods of utilization of food packaging, waste segregation in households and the disposal of used packaging into garbage were indicated. Environmental impact of food packaging was pointed out mostly by women, respondents from the middle age group, with low level of education and with the highest declared level of knowledge in the field of food packaging. Respondents with the highest level of knowledge regarding the packaging as well as the youngest respondents showed a greater interest in the methods of packaging utilization. Although consumer awareness towards food packaging utilization has increased in recent years, one should continue raising it.

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Introduction

One of the most essential needs of every human being is to satisfy their hunger. The vast majority of the population accomplishes this through a purchase of a food products. As a matter of principle, these products are offered in the various types of packaging. The packaging is one of the key attributes of the product, affecting consumers' shopping preferences (Wasiak, 2016). The packaging is also an essential marketing tool as it is an integral part of the product and its brand (Kotler & Keller, 2013).

The packaging is an inseparable element of the products on the market, including food of the various origins. Food related products require packaging that meets the highest quality standards, ensuring the quality of food and being convenient for the consumer. Packaging, through its characteristic appearance, identify the product with the producer, encourage a potential buyer to purchase it and guarantees security of its transport and storage, by maintaining the appropriate conditions (Barska & Wyrwa, 2016). The packaging is also one of the criteria for selecting a food product based on its functional features (Barska, 2013).

Over 70% of the purchase decisions are made directly in front of the shop shelf, a visit to the shop takes on average 20 minutes, and the purchase decision takes on average 12 seconds (Clement, 2007). Such a limited time shows the importance of packaging and the role it plays in decision making process. (Labrecque & Milne, 2012). In this short time, it must attract attention and get the potential customer to make a purchase. Numerous studies confirm that nearly 1/3 of the purchasing decisions are made based on what the packaging looks like (Deng & Srinivasan, 2013; Garber, Hyatt & Boyna, 2009). Therefore, in the era of an enormous competition, producers are competing in creating the packaging that will attract customers' attention (Vilnai-Yavetz, & Koren, 2013).

1. Literature review

The packaging must meet various requirements. It should protect the packed product from damage during the transport, storage and use (Świątecka & Podsiadło, 2007). It is estimated that among products on the market, over 95% of them require packaging. It is especially needed in the food industry. In case of the food packaging, a certain type of the material (raw material) used for its production, as it has a decisive impact on the packaging properties and quality and durability of the stored product. Today, the traditional packaging (paper, cardboard, glass, metal and plastics) prevails on the market, but the new packaging materials, designs and technologies are also increasingly used, such as: active, clever, interactive, smart, and intelligent ones. (Barska & Wyrwa, 2016).

The food industry, due to its expansion and creation of various products, has created new needs with regard to the packaging. According to the forecasts, changes in the packaging market structure in the coming years will concern a development of the plastic package segment (in particular the flexible one) as well as a modification of the paper and cardboard packaging.

The plastic packaging has been used since the twenties of the last century. It is characterised by large range of the desirable features that constantly increase the share of plastic packaging, in respect to the food products among others. The main features of plastic packaging is thermoplasticity, low specific gravity, barrier to the penetration of water vapour, gases, odours and lipids, a possibility of producing it in a wide range of colours as well as their transparency that allows for a visibility of the product. In the structure of product packaging in Poland 64.8% is food and drink packaging (EUR 5.26 billion), 5% is cosmetics packaging 5% (EUR 0.4 billion), drug packaging and personal hygiene is 6% (EUR 0.49 billion), packaging of industrial goods and household chemicals is 24% (1.95 billion euros) (http://opakowania.com.pl/). According to the data, in 2015, the value of the packaging market was EUR 8.62 billion (per capita, circa EUR 227), which meant nearly 40% increase compared to 2009 (Barska & Wyrwa, 2016).

The quality and quantity of packaging, due to the widespread turnover of food, are of interest not only to the food producers, but also the carriers, commercial establishments, consumers and waste disposal plants. Food producers primarily pay attention to the protective properties of packaging, while traders and marketing specialists focus on its importance for

the promotion of the products, and the environmentalists centre on the environmental burden of the used packaging.

In terms of quality, foodstuffs are perhaps the most demanding of all other products for the packaging industry. (Świątecka & Podsiadło, 2007). In any case, packaging cannot affect food quality, which - in case of the products intended for consumption - takes into account their healthiness, sensory attractiveness, as well as the functional characteristics of its content, i.e. ease of its preparation for the consumption and durability, as well as a size of package.

The usage of materials intended for a production of food packaging is dominated by plastics, while the second item is paper and cardboard. At the end of 2013, the material structure of the Polish packaging market was as follows: plastic packaging - 37.3 percent, paper and cardboard packaging - 32.7 percent, metal packaging - 12.2 percent, glass packaging – 11.3 percent, wooden packaging and other - 6.5 percent (http://opakowania.com.pl/news/waclaw-wasiak-dyrektor-pio-w-rozmowie-o-przyszlosci-rynku-opakowan-w-polsce-64039.html).

Today, the traditional packaging has primarily share on the market, but the new packaging materials, designs and technologies are also increasingly used (Sykut, Kowalik & Droździel, 2013). The attributes such as biodegradable packaging, reclosable trays/bags and long “best by” dates are appreciated by the consumers (Arboretti & Bordignon, 2016; Naumova et al., 2019). Thus, the packaging is highly relevant to the conscious consumption (Vieira et al., 2015).

The number of packaging increases with a multiplication of the production of the goods. The more products is purchased and consumed, the faster a heap of used packaging grows, which consequently becomes waste. In Western Europe, over 140 million tonnes of the municipal solid waste is generated annually, with around 40% being used packaging, of which about 25% is the food packaging (http://www.print-partner.com.pl)

The increasing amount of waste from the food packaging is one of the first enemies of the environment, mainly because we do not recover many valuable materials from which they are made. The plastic package is not harmful to the natural environment if it is properly disposed of. The plastic package means less waste, less energy consumed, less used resources, lower costs and lower greenhouse gas emissions throughout a life cycle of the product.

(The market for the package made of the film and plastic, based on: http://www.print-partner.com.pl/print_pub/publik/2015/rynek-opakowan-z-folii-i-z-tworzyw.html).

Unfortunately, the amount of waste is increasing every year, including the food packaging made from plastics, and is one of the main factors of the pollution and environmental degradation. Therefore, for many years, a dispute has been noticed between the proponents of the traditional materials for the packaging and the propagators of the plastics. This problem can only be resolved by the so-called "Ecological balances" in which energy and a consumption of the natural resources, emissions and an amount of the final waste are assessed.

The ways to reduce an amount of packaging waste are, among others: a segregation of the packaging waste, processing of the segregated waste, purchasing fewer products, selecting the least packaged products, choosing the packaging that is easy to process and limiting the marketing of the plastic bags. The general strategy that is currently in force in Europe assumes that waste generation, including packaging, should be prevented and minimised. With regard to the methods of management of already generated waste, recycling, then energy recovery is preferred, and finally for the waste that cannot be used industrially – a disposal by depositing in the landfills. (Żakowska, 2017).

The need to protect the environment affects the development of the packaging materials and contributes to a creation of the environmentally friendly packaging. The

increasing environmental awareness means that consumers choose the packaging that is made from less material, is easy to reuse, can be recycled or incinerated with the energy recovery (Barska & Wyrwa, 2016; Marsch & Bugusu, 2017). A basis in the fight against packaging waste constitutes a sustainable consumption, or a responsible use of the natural resources according to the principles of the sustainable development. The sustainable consumption consists of limiting waste, waste generation and pollution mainly through a selection of the goods that meet the social and environmental standards.

The purpose of this article is to present an opinion of more than 1,300 respondents regarding the properties and functions of the food packaging and the manners of disposing of it, as well as the determinants of these assessments. One of the questions included in the questionnaire was also aimed at verifying their knowledge concerning a scale of the problem related to the food packaging.

2. Methodological approach

The analysis of the studied phenomena was based on the 1,310 questionnaire surveys conducted in 2017 by the authors of this paper. As many as 1239 respondents were from Podkarpackie Voivodeship, 33 from Lesser Poland Voivodeship, 16 from Kuyavian-Pomeranian Voivodeship, 12 from Greater Poland Voivodeship and several persons from the following voivodeships: Mazovian, West Pomeranian, Lublin and Silesian. In the vast majority of the questions considered in the survey, several alternative answers were assigned. Most often, these answers were to be assigned, according to a decreasing degree of their acceptance, measured in accordance with a three-grade scale.

The fact that about 5% of people that participated in the study were from outside of the Podkarpackie province was only informative, due to the fast that the interregional approach to the analyzed phenomena was neither the goal nor the subject of the study.

The main questionnaire was preceded by several analyzes of the questionnaire itself, as well as pilot studies. Pilot studies and their analysis have allowed for limiting the number of categories of phenomena studied due to their significance from 5 to 3 or 2, and limiting the types of meaning attributed to food packaging. An additional benefit of pilot studies was the limiting of properties attributed to food packaging. During the research, it was noticed that the respondents were sometimes reluctant to participate in it. This reluctance was diminished when the purpose of the study was presented to a given person and the anonymity of the opinions was guaranteed.

The respondents were divided into three groups on the basis of the age, level of education and the declared level of knowledge in the field of the packaging. Additionally, the two groups of respondents were broken down by sex. The first part of the analysis presents a structure of the answers only based on a meaning assigned to them by the respondents, thus omitting the features describing the surveyed persons. This allowed us to capture a rank of the individual response alternatives throughout a research sample.

In the second part of the analysis, the links between respondents' characteristics and weights, which they attributed to the individual alternatives of the answers to the subsequent questions, were presented. It was possible by gathering a number of the statements in the two-dimensional tables, in which the answers were given in the rows, and in the columns – the features describing the respondents.

In order to assess an impact of variables in the rows and columns of the tables on the frequency distribution of the responses in the statistical manner and assume in this respect a null hypothesis on the independence of these variables, a non-parametric significance test $\chi 2$ (chi-square test) was used (Jozwiak & Podgórski, 2012).

Assuming that p_{ij} is a probability of belonging a randomly chosen element to the class i and i due to the two variables included in the array, and $p_{i.}$ and $p_{.j}$ are border probabilities in its rows and columns, the null hypothesis can be written as follows:

H0: $p_{ij} = p_{i.}p_{.j}$ for the pairs of indicators i, j,

and the alternative hypothesis is expressed as follows:

H1: $p_{ij} \neq p_{i.}p_{.j}$ for some pairs of indicators i, j.

The border probabilities were estimated as below:

$\hat{p}_{ij} = n_{i.} / n$ and $\hat{p}_{.j} = n_{.j} / n.$

The expected values, assuming an independence of the variables in the analysed table, were determined as follows: $\hat{n}_{ij} = n\hat{p}_{i.}\hat{p}_{.j} = n(n_{i.} / n)(n_{.j} / n) = (n_{i.}n_{.j}) / n.$

The test, statistic $\chi 2$ is calculated from the following formula:

$$\chi^2 = \sum_{i=1}^{k}\sum_{j=1}^{l}\frac{(|n_{ij} - \hat{n}_{ij}| - 0{,}5)^2}{n_{ij}}$$

including a Yates correction for 2x2 tables, resulting from an approximation of the discrete test statistic distribution by the continuous distribution $\chi 2$. The number of the degrees of freedom was determined as a product decreased by 1 a number of the columns and rows (k-1) (l-1) (Aczel, 2000). The null hypothesis was rejected at the significance level of $\alpha = 0.05$, when $\chi^2 \geq \chi^2_{\alpha,(k-1),(l-1)}$. Its value was marked symbolically at each first data in the tables presenting the studied relationships.

3. Results

As it was already indicated above, the analysis of the collected data was divided into two parts. In the first part, the studied phenomena were discussed in respect of a prevalence of their occurrence, while in the second, a statistical significance of the links between these phenomena and their determinants was checked. The heads of the tables were given the actual number of persons who answered the questions presented in it.

Table 1 presents a structure of the respondents broken down by characteristic describing them, i.e. age, sex, education and declared level of knowledge in the field of the food packaging expressed in percent. These variables were considered in the further part of the analysis for the determinants of discussed phenomena.

Table 1. The characteristics of the respondents

Characteristics	Characteristics (1310)										
	Age			Sex		Education			Knowledge about packaging		
	≤ 25	26-45	>45	F	M	primary	secondary	higher	poor	average	high
Frequency	440	532	338	789	521	257	590	463	551	555	204
[%]	33.6	40.6	25.8	60.2	39.8	19.6	45.0	35.3	42.0	42.4	15.6

Source: *own compilation*

Due to the characteristics provided, the respondents were most represented by women, secondary school graduates, persons of the middle age group (25-45 years), and a prevailing percentage of the persons who, in their opinion had poor and average knowledge of the food packaging, were similar.

In order to provide an indicative assessment of the level of knowledge of the respondents in the field of food packaging , the survey included a request to choose one of 5

quantities related to their annual consumption (per capita), and the answers obtained are presented in *Table 2.*

Table 2. The percentages of the respondents broken down by their estimates of annual food packaging usage (kg) per capita

Characteristics	Estimates of the usage of the food packaging (1304)		
	Too low (< 40kg)	Appropriate (40 kg)	Too high (> 40 kg)
Frequency	130	348	826
[%]	10.0	26.7	63.3

Source: *own compilation*

As it turned out, only a little more than one in four participants were able to determine properly a scale of the used food packaging, i.e. approx. 40 kg. Therefore, it clearly proves that a society is not informed enough about a scale of the aforementioned phenomenon, and at the same time indicates a common tendency to overestimate threats from the human side on natural environment. The next question concerned the respondents' determination of the level of knowledge in the field of the food packaging, and the opinions in this regard are presented in *Table 3*.

Table 3. The Percentages of the respondents broken down by their assessment of knowledge in the field of food packaging

Characteristics	Knowledge of packaging (1310)		
	poor	average	high
Frequency	836	394	80
[%]	63.8	30.1	6.1

Source: *own compilation*

The statements prove that the respondents had turned out to be more critical towards the rest of the society than to themselves when it comes to assessing the knowledge of packaging of the food products, thus indicating a generally low level of knowledge in the aforementioned field area.

The food products are very often sold in the various types of the packaging. This is very closely related to the functions of the packaging, and their significance is presented in *Table 4.*

Table 4. The Percentages of the respondents broken down by importance of the function assigned to the food products packaging

The meaning of the packaging function	Packaging function (1309)			
	protective	usable	informative	promotional
high	54,2	22,6	14,9	8,3
average	35,1	65,4	72,6	26,8
little	10,7	12,0	12,5	64,9

Source: *own compilation*

Most often, the food packaging was assigned a broadly understood protective function. The significance of the remaining functions, measured by a frequency of their indications, decreased by approximately a half compared to the previous ones, and as less important was given successively: the functional, information and promotional function. This probably indicates the high pragmatism of the respondents.

The fulfilment of the various functions by the packaging of the food products is often associated with some of their properties, and the opinions of the respondents in this regard are presented in *Table 5*.

Table 5. The percentages of the respondents broken down by importance of the assigned characteristic of the food products packaging

The importance of the packaging characteristics	Packaging characteristics (1296)				
	durability	tightness	ecology	aesthetic	size
high	66.4	58.0	32.0	24.1	19.5
average	18.5	20.7	25.8	17.6	17.4
little	15.1	21.3	42.2	58.3	63.1

Source: *own compilation*

It turns out that the most-expected property of the food packaging is its durability and tightness, which are to guarantee a barrier between the products intended for consumption and the outside world. Approximately 2-3 times less frequently, the environmental performance was pointed out, followed by the aesthetics and size of these packaging as their properties of a great importance.

The food packaging is usually used as a carrier of the various types of information, a weight of which in the opinion of respondents is presented in *Table 6*.

Table 6. The percentages of the respondents broken down by importance of the descriptions and symbols provided on the food product packaging

Rank of the type of information	Type of information (1307)							
	date of consumption	ingredients	storage conditions	allergen content	method of predation	producer's data	harmfulness	disposal method
high	78.6	77.1	38.7	32.1	25.3	22.3	17.8	8.0
average	12.8	15.2	39.3	37.2	40.5	20.4	22.2	12.6
little	8.6	7.7	22.0	30.7	34.2	57.3	60.0	79.4

Source: *own compilation*

The data on a consumption and a composition of the product was considered as the most important information on the packaging. The description of the storage conditions and a content of allergens, followed by a method of the preparation and the data related to the producer was attributed over a half of the significance. The least important was the information about the harmfulness of the packaging and a manner of its disposal, hence again prevailed over the pragmatism of the respondents, but in a narrowly understood own and temporary interest.

The food products are very often offered in the plastic packages.

The need arises for their proper disposal. The respondents used different methods for this purpose, assigning them the meaning given in *Table 7*.

Table 7. The percentages of the respondents broken down by ways of disposing of the plastic packages of the food products

The importance of the method of a disposal of the plastic packaging	Ways of packaging disposal (1297)				
	waste segregation	throwing it on the trash	incinerating in the furnace	incinerating in the garden	throwing away anywhere
higher	62.5	31.7	4.3	1.0	0.5
lower	29.8	59.8	6.7	1.9	1.8

Source: *own compilation*

Prior to a discussion about the data presented in the above and next table, it should be noted that in both of these cases, when determining an importance of the packaging disposal methods, the respondents were required to select only the two most important ones. Such an approach enabled to provide a more rigorous gradation of the methods of action against the background of all others, and not, as it was the case, when the individual responses could be assigned an independent rank from 1 to 3.

In this situation, the percentages granted to the individual phenomena did not add up to 100, but the percentages allocated to the particular (both) ranks assigned to all phenomena.

Based on the collected data, it can be concluded that the plastic food packaging was mainly segregated (around 62%) and were thrown away (around 32%). However, in 6% of cases, they were incinerated or discarded anywhere.

Table 8 presents a percentage of the responses broken down by assessments of the disposal methods of the plastic food packaging used by the co-residents of the respondents. These quantities strongly correlate with the previously obtained ones; however, it is noteworthy that incinerating these packages in the garden, or throwing them anywhere takes the values about twice as high as it was in determining the versatility of these activities among the respondents themselves.

Table 8. The percentages of the number of the respondents broken down by opinions on how to dispose the plastic food package in their place of residence

The importance of the disposal method of the plastic packages	Ways of the package disposal (1296)				
	waste segregation	throwing it on the trash	incinerating in the furnace	incinerating in the garden	throwing away anywhere
higher	57.0	32.0	8.0	1.9	1.1
lower	27.7	52.6	11.4	4.2	4.1

Source: *own compilation*

Thus, the respondents turned out to be far more critical in assessing the above behaviours in relation to the third parties than to themselves. However, the most important and, at the same time, worrying issue is the high percentage of the plastic packages, the method of disposal of which directly threatens the health of the humans and the environment.

4. Discussion

The analysis presented above concerned only the prevalence and significance of the phenomena studied. Below some of the conditions and a statistical assessment of the relationships are presented.

As in the first part of the analysis, the considerations began with the assessment of an accuracy of the respondents' opinions on the estimates of the annual usage of the food packages per capita in Poland (*Table 9*).

Table 9. The percentage of the groups of the respondents broken down by their estimates of the annual consumption of the food package per capita in Poland

Estimates of the share of the package	Characteristics of the respondents (1304)										
	age			sex		education			knowledge about package		
	≤ 25	26-45	>45	F	M	primary	secondary	higher	little	average	high
too low	9.6*	8.7	12.5	9.2*	11.2	16.8**	8.7	7.8	12.4*	8.7	6.9
appropriate	22.7	27.1	31.1	24.6	29.9	27.0	27.4	25.7	25.5	29.0	23.5
too high	67.7	64.2	56.4	66.2	58.9	56.2	63.9	66.5	62.1	62.3	69.6

* p = 0.05 level of significance
** p = 0.01 level of significance
Source: *own compilation*

Certainly, as previously noted, the figures in the above-mentioned approach were, in general, overestimated. Furthermore, it turns out that the answers that are the closest to the proper ones were given by men, the elderly, secondary education graduates and presenting in their opinion the average level of knowledge about the packaging. Among these groups, the closest to the truth were the elderly, although their percentage was only approximately of 31%. Therefore, it can be stated that life experience has been a major factor here, whereas an overestimation of this indicator in persons with a high degree of knowledge about the packaging might occurred due to a certain sensitivity in this field area, at the same time providing a subjective opinion of the respondents.

Another issue assessed by the respondents was a level of the public knowledge in the field of the food packaging, which is illustrated by the data presented in *Table 10*. The knowledge of the aforementioned issues among the public at the highest rated the elderly, persons with the lowest level of the education and the greatest knowledge of the food packaging. The percentage of the latter group was the highest and could have an impact on their own way of perceiving the issues related to the packaging.

Table 10. The percentage of the respondent groups broken down by their assessment of the public knowledge in the field of food packaging

Knowledge level	Characteristics of the Respondents (1310)								
	age			education			knowledge about packaging		
	≤ 25	26-45	>45	primary	secondary	higher	low	average	high
high	5.9**	5.1	8.0	9.0**	5.1	5.8	2.2**	4.7	20.6
average	26.1	27.8	38.8	39.3	26.9	28.9	16.0	40.9	38.7
low	68.0	67.1	53.2	51.7	68.0	65.2	81.8	54.4	40.7

* p = 0.05 level of significance
** p = 0.01 level of significance
Source: *own compilation*

The respondents' opinions related to a rank of the various functions of the food packaging are presented in *Table 11*. In the first part of the analysis, it was indicated that among these functions, a food protection was considered as the most important, and the assessment of its importance was the most diversified among the respondents. The highest rank of this property was given by persons with the highest level of knowledge about the packaging, and then the university graduates and older persons. The characteristics that facilitate the use of the products were highly valued by the least educated persons and the lowest level of knowledge about packaging, and therefore more pragmatic persons when it comes to their behaviour.

The highest importance to the information about the product on the packaging was attached by the persons with the lowest level of the education and the average knowledge in

the field of the packaging, while only those who had a low level of knowledge, perceived the food packagings also as used for the purposes of promotion.

Table 11. The percentage of the groups of the respondents broken down by diversity of the functions attributed to the food products packaging

Packaging function	Meaning of the function	Characteristics of the respondents (1309)								
		age			education			knowledge about packaging		
		≤ 25	26-45	>45	primary	secondary	higher	low	average	high
protective	high	19.1*	21.6	28.7	42.4**	56.0	58.3	51.0*	55.6	58.8
	average	67.9	66.7	60.1	44.4	34.8	30.5	36.7	36.1	28.4
	low	13.0	11.7	11.2	13.2	9.2	11.2	12.3	8.3	12.8
the use of product	high				25.3*	22.2	21.6	24.9**	22.0	18.1
	average				59.5	64.7	69.5	63.9	67.9	62.8
	low				15.2	13.1	8.9	11.2	10.1	19.1
information	high				12.5*	8.8	5.4	12.5*	17.0	15.7
	average				28.8	25.8	27.0	73.3	70.2	77.4
	low				58.7	65.4	67.6	14.2	12.8	6.9
promotion	high							11.6**	5.4	7.3
	average							26.1	25.8	31.4
	low							62.3	68.8	61.3

* p=0.05 level of significance
** p=0.01 level of significance
Source: *own compilation*

The degree of importance of the different packaging characteristics is summarised in *Table 12*. The durability and then tightness were the most important among them. The customers wanted to have first of all the certainty that the purchased items are safely delivered home and probably use them.

Table 12. The percentage of the groups of the respondents broken down by diversity of the importance of the food packaging characteristics

Packaging characteristic	Meaning	Characteristics of respondents (1296)										
		education			knowledge		education			knowledge about packaging		
		≤ 25	26-45	>45	F	M	primary	secondary	higher	low	average	high
durability	high	62.1**	70.8	65.3			58.8*	66.4	70.7			
	average	18.4	17.4	20.3			23.1	17.3	17.5			
	low	19.5	11.8	14.4			11.0	16.3	11.8			
tightness	high	63.0*	57.3	52.7			49.8*	60.2	59.8			
	average	19.3	21.3	21.6			22.4	19.4	21.4			
	low	17.7	21.4	25.7			27.8	20.4	18.8			
ecology	high	26.2*	35.5	34.1	35.2*	27.2	34.9*	28.7	34.7	26.9**	33.0	43.1
	average	25.8	25.8	25.8	26.0	25.4	18.8	28.1	26.6	23.6	29.0	22.8
	low	48.0	38.7	40.1	38.8	47.4	46.3	43.2	38.7	49.5	38.0	34.1
aesthetic	high						31.0**	25.4	18.5			
	average						17.2	16.8	18.8			
	low						51.8	57.8	62.7			
size	high	24.4**	15.2	19.7			25.5	19.4	16.2	21.8**	16.5	21.3
	average	19.1	17.8	14.7			18.4	18.3	15.7	20.5	15.6	14.3
	low	56.5	70.0	65.6			56.1	62.3	68.1	37.7	67.9	64.4

* p=0.05 level of significance
** p=0.01 level of significance
Source: *own compilation*

The statistically significant differences due to the requirement related to durability of the packaging appeared among persons of the different ages and at the different education levels, with the highest importance attributed to the aforementioned by the middle-aged respondents and university graduates, and it was of greater importance for the younger and

high school graduates. In a statistically significant manner, the ecological nature of the packaging differed the respondents the most. In this respect, of the greatest significance were those who declared the highest level of knowledge about the packaging, followed by the middle-aged persons, women and the least-educated respondents. The least-educated persons most often paid attention to aesthetics of the packaging, and those who were the youngest, as well as those who described their knowledge about packaging as poor also valued the size of the packaging in comparison to the others. In general, it can be concluded that when assessing the packaging properties, it is difficult to notice the clear dependency trends.

Another aspect of the assessment of the food packaging were the descriptions and symbols placed on them, and a degree of interest in them that are presented in *Table 13.*

Table 13. The percentage of the groups of the respondents broken down by diversity of the opinions of the meaning attributed to the descriptions and symbols presented on the packaging of food products

Description or symbol	Meaning	Characteristics of the Respondents (1307)										
		age			sex		education			knowledge about packaging		
		≤ 25	26-45	>45	F	M	primary	secondary	higher	low	average	high
composition	high				80.0**	72.5	67.3**	76.7	82.9			
	average				13.5	17.9	20.6	15.3	12.1			
	low				6.5	9.6	12.1	8.0	5.0			
date of consumption	high						70.1**	80.6	80.7			
	average						16.7	11.7	11.9			
	low						13.2	7.7	7.4			
storage conditions	high				35.8*	43.1				43.2**	38.3	27.9
	average				40.4	37.7				40.6	37.7	40.2
	low				23.8	19.2				16.2	24.0	31.9
allergen content	high	37.1**	33.4	23.7						34.0*	28.9	35.8
	average	32.7	39.4	39.5						33.9	42.6	31.4
	low	30.2	27.2	36.8						32.1	28.5	32.8
manufacturer	high	19.5**	20.2	29.4	20.4*	25.2						
	average	18.9	20.0	22.8	19.6	21.5						
	low	61.6	59.8	47.8	60.0	53.3						
way of preparing	high									27.9**	25.5	18.2
	average									44.3	39.3	33.3
	low									27.9	35.2	48.5
harmfulness	high						25.7**	16.7	14.9	12.9**	20.8	23.0
	average						22.2	21.8	22.7	19.7	21.8	29.9
	low						52.1	61.5	62.3	67.4	57.4	47.1
way of removal	high	8.9*	8.7	5.9						6.0**	7.8	14.2
	average	15.7	11.9	9.5						10.4	13.2	16.7
	low	75.4	7.4	84.6						83.6	79.0	69.1

* p=0.05 level of significance
** p=0.01 level of significance
Source: *own compilation*

The importance attributed to the description of the composition of the products varied statistically significantly in relation to respondents' sex and education, and women and higher education graduates gave more attention to this information. The most-edged data was given the greater importance by the best-educated persons, and the characteristics of the storage conditions - men and persons with the poorest knowledge with regard to the packaging. An occurrence of the allergens was more interesting for the younger persons and more knowledgeable when it comes to the packages, which may indicate a growing sensitivity to these substances in society. The information about the producer was more important to the elderly persons and men, and to the way of preparing the product – the persons with less

knowledge in the field of the packaging. On the other hand, the least-educated respondents and having the largest amount of knowledge about the packaging were more likely to indicate harmfulness of the packages, while at the same time the latter paid the greatest attention to the way in which the packaging was disposed of.

The last studied issue was the method of disposing the plastic food packaging, and the practices of the respondents in this regard are presented in *Table 14*.

Table 14. The percentage of the groups of the respondents broken down by diversity of the importance attributed to the methods of disposing of the plastic food packaging

Method of disposal	Meaning	Characteristics of the Respondents (1297)										
		age			sex		education			knowledge about		
		≤ 25	26-45	>45	F	M	primary	secondary	higher	low	average	high
waste segregation	higher				40.2**	22.3	9.5**	28.2	24.8	23.3**	27.3	11.9
	lower				16.6	13.2	7.2	13.8	8.8	14.7	13.0	2.1
throwing it on the trash	higher	12.3*	12.0	7.4	16.8**	14.9	7.8**	14.4	9.5	16.3**	13.0	2.3
	lower	18.1	25.7	16.0	38.3	21.5	10.0	25.3	24.5	22.1	26.0	11.8

* p=0.05 level of significance
** p=0.01 level of significance
Source: *own compilation*

The statistically significant diversity of behaviours in this field area consisted in the greater importance of the waste segregation, given by women, secondary education graduates and having the average knowledge of the packaging, while more often packaging were thrown away by women, followed by persons with the lowest level of knowledge of the packaging, school graduates, and younger persons.

The information presented in *Table 15* also pertain the ways of disposing of the plastic food packaging. This time, however, these are the opinions of the survey participants referring to the practices of persons living in the cities from which the respondents came from.

Table 15. the percentage of the groups of the respondents broken down by diversity of the importance attributed to the ways of disposing the plastic food packaging in their place of residence

Method of a disposal	Meaning	Characteristics of respondents (1296)										
		age			sex		education			knowledge about packaging		
		≤ 25	26-45	>45	F	M	primary	secondary	higher	low	average	high
waste segregation	higher	16.7**	23.7	16.7	38.3**	18.7				21.4	25.4	10.2
	lower	9.9	12.2	5.5	14.1	13.6				14.0	11.2	2.5
throwing it on the trash	higher	11.9**	13.7	6.5	16.5**	15.5				16.4**	12.4	3.2
	lower	15.0	21.9	15.6	34.3	18.3				19.5	23.2	9.9
incineration in the furnace	higher				3.9**	4.1	2.2*	4.2	1.6			
	lower				7.4	4.0	1.9	6.0	3.5			

* p=0.05 level of significance
** p=0.01 level of significance
Source: *own compilation*

The segregation of these packages was most often indicated by women and persons with an average level of knowledge about the packaging, which clearly correlates with the activities in this field area presented by the participants themselves. When it comes to throwing this waste into the trash, women, and then persons having the average knowledge about the packaging and middle-aged, were more likely to pay attention to such activities. On the other hand, the opinion on an incineration of the packaging in the furnace by the residents

of the cities from which the respondents came from was more common among the secondary education graduates and in general among women. It should be noted that the place of residence could have a significant impact on practice of disposing of packaging, both among respondents and their co-inhabitants.

Conclusion

The results of the frequency distribution of the analysed phenomena presented in the first part of the analysis (without taking into account their determinants), enable to conclude that among the considered functions of the food packaging the most important were the protective ones and then those linked to the utilisation, while the most important property of the packaging was its durability and tightness. The main role of packaging was therefore perceived as related to a protection and reliability to separate the purchased food from the external environment.

While taking into account the usefulness of the various information and symbols placed on the packaging, the respondents drew attention to the data concerning primarily an expiration date and a composition of the product. The last objective of this part of the analysis was to assess the main ways of disposing the used food packaging, both by the respondents themselves and by the persons with whom they reside. In both cases, the types of behaviours in this respect were similar, with the segregation of waste as the first manner and throwing it to the rubbish as the second manner of disposure of packaging. It is also worth paying attention to the level prevalence of behaviours involving the incineration of the packaging. This indicator was about twice as large in case of the cities from which the respondents came from, rather than in relation to the respondents themselves. Certainly, it is a matter of a debate on which of these assessments is more suited to the reality.

In the second part of the analysis, the relationships between the opinions and the actions of the respondents were assessed. The most important statistically significant differences between the respondents with regard to their age were expressed in the fact that the oldest respondents more frequently assessed properly the level of the food packaging usage per capita in Poland. On the other hand, the youngest persons prevailed in terms of paying attention to the content of allergens in food and a way of the packaging utilisation.

The differences between women and men consisted mainly in the fact that men showed a greater correctness of the assessment of the level of the food packaging usage in Poland. The sensitivity to the environmental friendliness of the food packaging, the appropriate ways its disposal by themselves, as well as and by their neighbours was definitely more common for women.

The impact of the level of education has been expressed in the fact that the secondary school graduates more accurately pointed to the usage of the food packaging in Poland, while the least educated persons pointed to the ecological nature of the food packaging and their harmfulness more often than others.

The last criterion differentiating the respondents was the level of their knowledge regarding the food packaging. The persons with the highest level of knowledge in this field area were relatively more interested in the ecological properties of the packages, their harmfulness and ways of utilisation, as well as the content of allergens in the food products. At the same time, it should be stated that the estimates of these persons in terms of the quantity of the food packaging usage in Poland turned out to be less accurate than the respondents who considered themselves as orientated in the packaging issues only on average. The reason for this may be the understanding of the problem of the packaging by these respondents, more as sensitivity and activities taken in this field area than the knowledge associated with it.

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