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PURCHASING DECISIONS OF FOOD IN INNOVATIVE PACKAGING AND THE KNOWLEDGE OF STUDENTS OF UR CRACOW

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Purpose: The aim of the work is to present a classification and the basic functions of packaging and the requirements placed upon it. Furthermore, it aims to present new, innovative solutions in smart and active packaging which are appearing in the food sector

Design/methodology/approach: The survey method was employed for the collection of primary data, using a survey questionnaire. It consisted of closed and open questions. A specially prepared survey was sent out by e-mail. The survey was sent out to 150 recipients, with 98 surveys returned, corresponding to 65% of their original number. The five-point Likert scale was used as a tool to measure the attitudes of those surveyed. The Likert scale is one of the most widely used tools for measuring attitudes. The aim of the work is to present a classification and the basic functions of packaging and the requirements placed upon it. Furthermore, it aims to present new, innovative solutions in smart and active packaging which are appearing in the food sector. The survey method was employed for the collection of primary data, using a survey questionnaire. It consisted of closed and open questions. A specially prepared survey was sent out by e-mail. The five-point Likert scale was used as a tool to measure the attitudes of those surveyed, where 1 means the feature is unimportant, 2 – not very important – 3 important, 4 – very important, 5 – most important. This method is most frequently used to measure complex socio-economic phenomena, including in management and quality sciences. The study was conducted in a non-random manner, and the selection was targeted. Students of Management from the Faculty of Agriculture and Economics and of Spatial Management from the Faculty of Environmental Engineering and Land Surveying were considered to be the most appropriate group to provide the most valuable information concerning the phenomenon studied.

Findings: the respondents were not very familiar with active and intelligent packaging. However, they are aware of the fact that packaging has a positive impact on the quality of the food product which is stored in it.

Originality/value: educating young people about the types of packaging and their importance for the storage of foodstuffs is necessary.

Keywords: food packaging, innovation, consumer.

Category of the paper: Research paper.

1. Introduction

The nature of food products requires that they be put into circulation in appropriate packaging, which serves to preserve their quality and reduce losses in nutritional value. Specific features of innovative packaging materials allow shelf life to be extended and the sensory qualities of the product to be preserved (Cyrek, 2015).

Food packaging plays a key role in the preservation of food throughout the entire chain of distribution. Without packaging, processing of food can be adversely affected by it coming into direct contact with contaminants.

Plastic materials have been an inevitable part of human life as they are convenient to use, lightweight, cheap, possess good physicochemical and processing properties. Use of plastics as a packaging material for food and beverages had increased widely in the form of cups, bottles, tubs, trays, sheets, and films. Plastics are conventionally manufactured from fossil fuels consuming finite and non-renewable resources. The increasing use of conventional plastics leads to an increase in the universal problem of plastic waste. A substantial volume of plastic waste has been deposited in the water bodies, landfill or the recovery sites where their classification or recovery demands both money and energy (Sharma, Jaiswal et al., 2020).

"Accumulation of huge amounts of plastic waste in the environment, and also rapid depletion of fossil reserves and increases in the cost of petroleum, are pushing the food packaging industry toward the development and application of eco-friendly materials, such as bioplastics" (https://reader.elsevier.com/reader/sd/pii/s221428942030569x?token=da8ef8f24dfe296242dae5af30e209452127dcc815aaf0c4f88279dc18b270f9e50b63388960262a00e1eb94b85d214e).

2. The role and the functions of packaging

It is impossible not to notice packaging. It is all around us. There is a countless variety of colors, different shapes and sizes, and a wealth of materials that can be used in its production. Today, every entity operating on the market should be aware of the fact that packaging which is not noticed by customers is not purchased by them. For the customer, packaging is a sometimes simple, sometimes superfluous creation of little significance, but one which in reality plays a defining role in shaping the product, the brand and also the company which produced it and packs its products in it (Krzepicka, 2011).

One important benefit of packaging is to provide the end consumer with information about the composition of the product, its origin and nutritional value. Satisfying the consumer's need to obtain sufficient information is the key to comparing rival products (Hales, 1999).

The purpose of packaging is to guarantee that the qualitative features of the goods are fully preserved. The most important task of its promotional and sales function is to attract the potential customer's interest, allow the product to be identified, stimulate a desire to possess it and lead to its purchase. Product packaging should be designed in such a way as to have a notable impact on the customer's psyche so that he or she makes a conscious or sub-conscious decision to purchase the product. This function relies on a combination of three elements of psychological impact on the consumer: it increases the value of and willingness to buy the goods, it advertises the product along with its producer, and it has an impact on growth in the volume of sales. Here, packaging fulfills a role of advertising at the point of sale; the attractiveness or originality of the packaging is very important for producers and consumers. The last of the functions mentioned – the informational function – is related to the fact that packaging provides customers, distributors and sellers with a great deal of information. Information on packaging may take the form of drawings, images, letters, written information, numbers or bar codes. This information allows people to familiarize themselves with the properties and composition of the raw materials used in the product and to find out how to use it, whilst also providing details about the brand, the producer, the price, weight and size of the product, and the expiry date; safety symbols are also displayed on the packaging (Nowogródzka, Pieniak-Lendzion, Nyszk, 2014).

Packaging above all performs a protective function, the purpose of which is to protect the packed goods against the harmful effects of the external environment. Appropriate protection of the product prevents different types of losses – mainly those of a qualitative and quantitative nature (Kaźmierczak, 2017). The key safety objective for traditional materials in contact with foods is to be inert as possible, i.e. there should be a minimum of interaction between food and packaging. Traditional food packaging is meant for mechanical supporting of food, and protecting food from external influences, like microorganisms, oxygen, off-odours, light etc. and, by doing so, guaranteeing convenience in food handling and preserving the food quality for an extended time period (Dainelli et al., 2008). "Properly designed and manufactured packaging is a guarantee for all links in the trade chain that the product will not spoil during transport and storage. Packaging meets the need for safety by:

- keeping the highest product quality, which can be obtained with the use of new-generation packaging – active and intelligent,
- ensuring product authenticity,
- delivering reliable and legible information, and also using environment-friendly technological solutions" (Barska, Wyrwa, 2016).

Other functions that packaging performs are transport – packaging which optimizes the path of goods and maximizes use of vehicle load capacity, and providing information – such packaging helps to increase sales and is useful to the consumer (http://www.portal kujawski.pl/polecane/item/12795-typy-opakowan-produktow-spozywczych).

Food contact materials (FCMs) play a key role in the production, processing, storage, transport, preparation, serving and consumption of food. They facilitate the daily life of consumers globally (Muncke et al., 2017).

The food industry has been under growing pressure to feed an exponentially increasing world population and challenged to meet rigorous food safety law and regulation. The application of active and intelligent packaging has been commercially adopted by the food industry as a solution for the future for extending shelf life and simplifying production processes; facilitating complex distribution logistics; reducing, if not eliminating the need for preservatives in food products; enabling restricted food packaging applications; providing convenience, improving quality, variety and marketing features; as well as providing essential information to ensure consumer safety (Janjarasskul, Suppakul, 2017).

Active and intelligent food packaging is based on a deliberate interaction of the packaging with the food and/or its direct environment (Dainelli et al., 2008). Unlike traditional packaging, which must be completely inert, active packaging is designed in such a way as not to interact with the content and/or the surrounding environment. Active packaging systems have been successfully used to extend the shelf life of processed foods. They can be divided into adsorptive and releasing systems (for example oxygen absorbers, ethylene scavengers, liquid and moisture absorbers, taste and odor absorbers or releasers, antimicrobial agents, etc.). Types of active packaging, as well as their forms and functions are shown in Table 1.

Table 1.
Selected types of active packaging and their functions are shown in the food chain

Type	Form	Function
Oxygen absorbers	Sachets, labels, films, bottle closures	Inhibition of decomposition of products and vitamin degradation
Ethylene absorbers	Sachets, films	Extending the freshness of products, regulating the ripening of fruits and vegetables
Relative humidity regulators	Sachets, films	Maintaining high sensory quality of products
Antibacterial agents	Sachets, films	Inhibition of the development of micro-organisms
Antioxidants	Sachets, films	Inhibition of processes of oxidation

Source: Fajczak-Kowalska, A., Rudowska, P., Ziemiński, P. 2016. Opakowania aktywne i inteligentne w łańcuchu żywnościowym [in] Zarządzanie i bezpieczeństwo w łańcuchu żywnościowym Scientific ed. Walaszczyk, A., Jałmużna, I., Lewandowsk, J., Monograph published by the Łódź University of Technology, Łódź, pp. 33-49.

Intelligent packaging is characterized by its ability to monitor the condition of packaged food or the environment by providing information about different factors during transportation and storage. Intelligent packaging includes time-temperature indicators, and freshness and/or ripening indicators. At the same time, advances in nanotechnology and the improvement of nanomaterials will enable the development of better and new active and intelligent packaging. Such packaging provides great benefits to the food industry to improve freshness, shelf-life of

food, and allows monitoring to control the storage conditions from the place of production to consumption by the final consumer (Pereira de Abreu, Cruz, Paseiro Losada, 2012).

3. Innovative packaging and their function

Innovation is something that may be considered both from the perspective of the consumer and that of the producer. P. Kotler defines innovation emphasizing the subjective point of view of the consumer. He defines an innovation as any good, service, or idea that is perceived by someone as new. The idea may have a long history, but it is an innovation to the person who sees it as new (Kotler 1990) In turn, the business point of view of reflects Chris Freeman's definition, according to which an innovation is accomplished with the first commercial introduction (application) of the new product, process, system or device (Bhoovaraghavan et al., 1996).

Consumers take an interest in the parameters and characteristics of food products prior to their purchase. They obtain and filter information, also based on their original source, and products are checked, tested, and compared. These behaviors show the importance of needs for information and that there is a desire for them to be met by consumers (Gazdecki, Goryńska-Goldmann, 2019). “Innovation and innovative activities are gaining in popularity and understanding in Poland”. Marketing innovations consist of introducing a new marketing method that involves significant changes in the design or construction of the product or in its packaging, distribution, promotion, or pricing strategy. An important determining factor in the emergence of innovative food products is the competitiveness of brands (Grębowiec, 2017). Looking at the packaging, the buyer decides whether to purchase the product or not.

Symbiotic Culture Of Bacteria and Yeast (SCOBY) is a form of organic packaging, which takes two weeks to grow and grows like an onion, that is by a process of layering. There are no special requirements for cultivation. It does not need either light, or sterile conditions, or even any advanced technology. The "film" is created from a fermented tea, or kombucha, fed with agricultural waste. After use, the packaging can be thrown on the compost, or simply eaten. This young Polish woman's invention may completely revolutionize the packaging market, especially after the recent decision taken by the European Commission that certain disposable plastics will have to disappear from EU countries by 2021: cutlery, plates, straws and cotton bud sticks. By 2025, Member States will be obliged to restrict products to which there is no alternative. These include containers for sandwiches, fruit, vegetables, desserts or ice cream (https://www.rp.pl/Biznes/310259933-Koniec-smieci-z-plastiku-Polka-wymyslila-jadalne-opakowania.html).

Over the past two decades, a mode of consumption referred as sustainable consumption has been growing in strength and significance both worldwide and in Poland. It is a response on the part of consumers to global ecological and social problems. Sustainable consumption is sometimes also related to consumer mobilization and a show of the power to act that consumers have when faced with producers which are dishonest and exploit their employees. It is then linked to consumerism. Consumer orientation on issues of ecology and intergenerational responsibility is a phenomenon which is being studied in many fields of science, such as sociology, economics, law, psychology, philosophy, etc. (Neale, 2015). Sustainable consumption may be defined as a holistic approach which aims to eliminate the impact on the environment of global consumption of societies and production systems that engages individuals who are consciously seeking to minimize the negative impact of the phenomenon of consumption. This may be achieved through rational utilisation of production factors and reduction of waste generated in the post-production and post-consumption phases (Zalega, 2015).

4. Results of research

Surveys were conducted with students at the University of Agriculture in Cracow. 70,4% of those who took part in the survey, carried out by e-mail, were women and 29,6% were men. Students surveyed studying Management accounted for 89.9%, and those studying Spatial Management accounted for 10.1%. The largest group of respondents were people aged 18 to 21 – 78.6% of respondents, with people aged 22 to 25 accounting for 19.4%, and those aged over 30 – 2%. Based on the results of the survey, there were no people in the age group of 26 to 29 years of age.

Those surveyed were asked to assess each of the five features of packaging when choosing products on the Likert scale. They were asked to express an opinion on the following features of packaging: the colors of the packaging, the method of opening the packaging, the size of the packaging, the material from which the packaging is made and the recyclability of the packaging of the food product Figure 1.

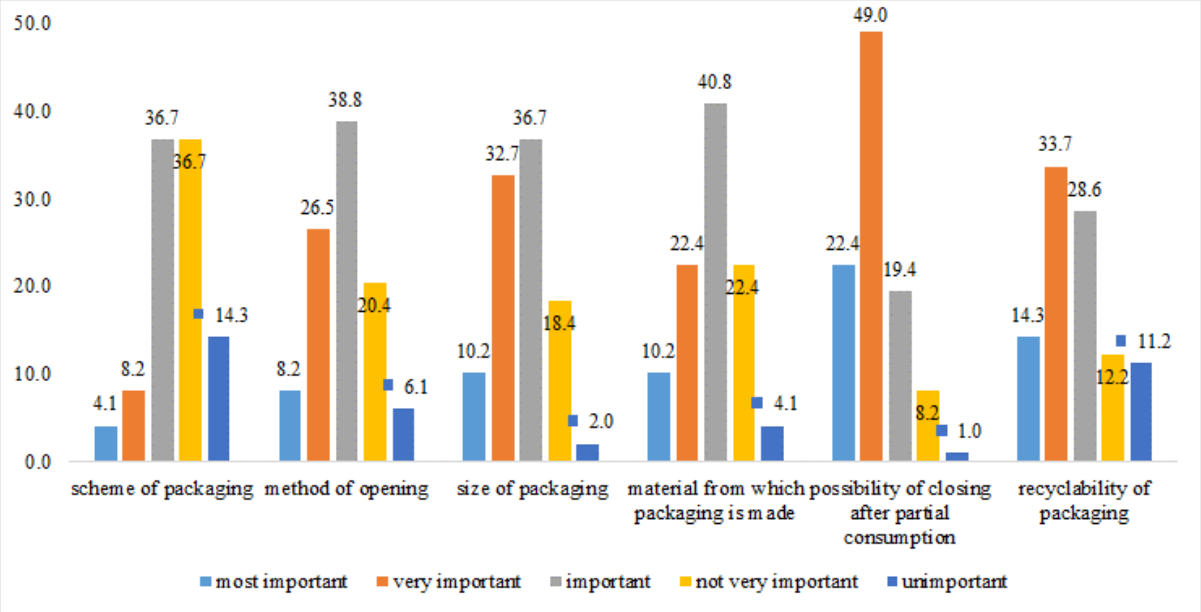

Figure 1. Opinion of respondents on what elements of packaging they pay attention to when buying food products.

Source: own elaboration, 2021.

The color of the packaging may emphasize positive features of the product, e.g. delicacy, novelty, cleanliness or freshness. Colors evoke emotions and feelings that are transferred from the packaging to the product. Different shades of color can give the product many other properties by giving an impression of coolness, luxury, strength or femininity (Jerzyk, 2007).

The percentage of respondents who indicated that, when purchasing food products, the color scheme of the packaging was an important or a not very important purchasing feature was 36.7% in each case. This feature received the highest weight (5 on the Likert scale) from only 4.1% of respondents. The method of opening the packaging of food products was important (weight of 3 on the Likert scale) for 38.8% of respondents. This feature was considered to be very important (4 on the Likert scale) by 26.5% of respondents. The method of opening the packaging of food products was considered to be unimportant (weight of 1 on the Likert scale) by 6.1% of respondents.

The next feature which the respondents were asked to assess was the size of the packaging of the food product. Currently, it is no problem to buy products in large packages, in other words products in family packs, or in small quantities, for example products for singles, or to be taken on trips, such as "travel" cosmetics, i.e. cosmetics in miniature packaging (https://urodaizdrowie.pl/czy-i-ty-zwracasz-uwage-na-opakowanie). 36.7% of those surveyed considered the size of packaging to be an important feature, with a weight of 3 on the Likert scale, while 32.7% of those surveyed considered it to be very important. The material from which the packaging is made proved to be an important feature for 40.8% of respondents, when deciding whether or not to purchase the food product. For 22.4% of those surveyed the feature discussed, namely the material from which the packaging is made, proved to be very important (weight of 4 on the Likert scale) and not very important (weight of 2 on the Likert

scale). The possibility of closing the packaging after partial consumption proved to be a very important feature for those surveyed (weight of 5). 49% of those surveyed pointed to that feature and its weight. The recyclability of the packaging also proved to be a very important feature for 33.7% of respondents.

After the collapse of the centralized command economy in Poland, when the opinion of the buyer started to count for something, the concept of "quality" was given a second lease of life. Customers started to pay attention to what products they were buying, including food products, and the end of censorship and access to a variety of products gave customers "freedom" of choice.

The continuous development of industry and growing customer requirements led to current customer behavior on the market. Having a variety of products to choose from, the increasingly conscious customer goes for those of better quality, i.e. those with less salt, preservatives and other substances that have a negative impact on health.

Less processed products are popular with consumers (Piotrowska, 2014). Packaging is an external layer of the product which is intended to protect it, facilitate its transport, storage and sale, and which should have an impact on the buyer's imagination when shopping. The type of material from which the packaging is made has a significant impact on consumers' choices. This is particularly visible in the choices made by women (Dejnaka, 2011). The material from which the packaging is made also proves to be helpful in the product being perceived appropriately by the buyer. The customer's opinion is often decision when choosing the plastic from which the packaging is made. Consumers usually prefer packaging made of traditional materials, but they also like new textures or a combination of different materials (Nowogródzka, Pieniak-Lendzion, Nyszk, 2014). In the surveys, respondents were asked to express their opinion on the impact of packaging on the quality of the food product – Figure 2.

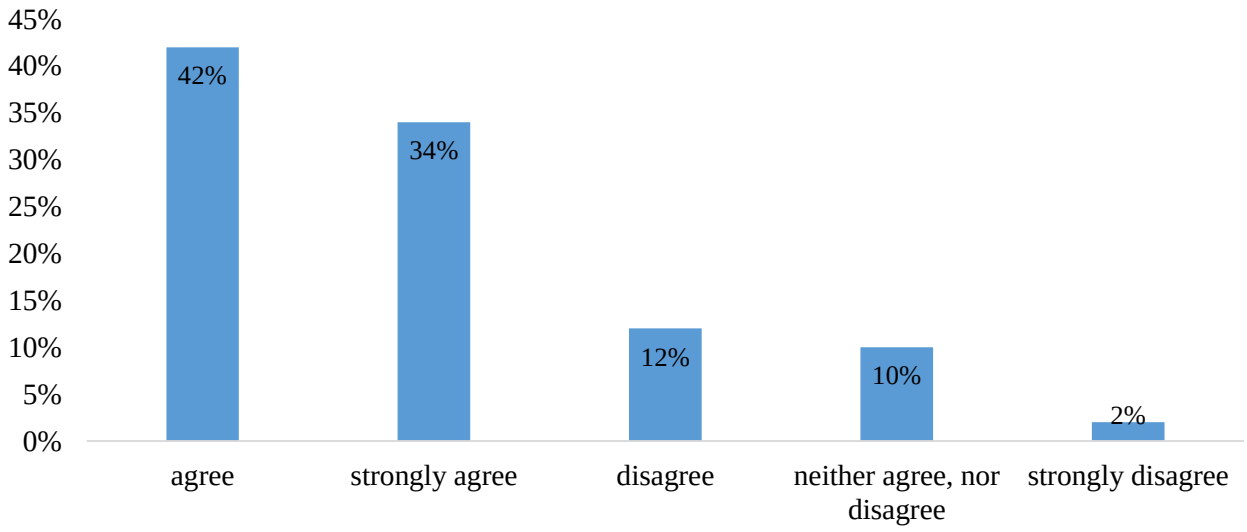

Figure 2. Opinion of respondents as to whether what the packaging of food products is made of has an impact on the quality of the product.

Source: own elaboration, 2021.

76% of respondents were of the view that the material from which the packaging does have an impact on the quality of the food product (34% strongly agree and 42% agree). Only 2% of respondents were clearly of the view that the raw material of which the packaging is made does not have an impact on the quality of its contents. The results of the surveys conducted show that men (79.3% of responses, total of all "strongly agree" and "agree" responses) were more frequently aware that the plastic from which the packaging is made has an impact on the quality of the product it contains – Table 2.

Table 2.
Structure of answers to the question "In your opinion, does what the packaging of food products is made of have an impact on the quality of the food product? by gender

Description	women	men	grand total
no	11.6%	13.8%	12.2%
neither agree, nor disagree	13.0%	3.4%	10.2%
agree	40.6%	44.8%	41.8%
strongly disagree	1.4%	3.4%	2.0%
strongly agree	33.3%	34.5%	33.7%
grand total	100.0%	100.0%	100.0%

Source: own elaboration, 2021.

The surveys showed that for women who took part in the study, 73.9% (total of all "strongly agree" and "agree" responses) were aware that the quality of the packaging has an impact on the quality of the product it contains.

The published results of surveys conducted by Królczyk et al., 2015 show that consumers "are aware that the most important function of packaging is to protect food products against harmful factors that could affect it" (Królczyk et al., 2015). Packaging fulfills many functions. Respondents were asked to indicate which function that the packaging of the food product has to perform is the most important. According to the respondents, the most important function is the usability of packaging – 39% of responses. 15% of respondents pointed to the ecological and aesthetic function – Figure 3.

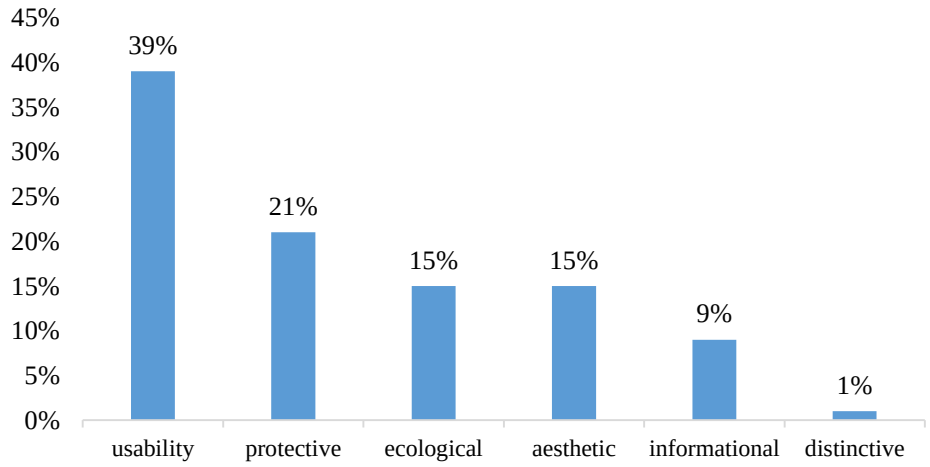

Figure 3. Opinion of respondents concerning the most important function performed by packaging of food products.
Source: own elaboration, 2021.

Another function that packaging should perform, according to the respondents, is a protective function. 21% of respondents pointed to this as being important. For 9% of respondents, packaging should perform an informational or educational function, thanks to which a potential buyer can obtain information, for example, about the composition of the product, as well as its nutritional value, calories, expiry date or country of origin – Figure 3.

It is worth noting that the function of usability of the packaging of the food product was more important for men participating in the study (51.7% of responses) than for the women surveyed – Table 3.

Table 3.
Structure of answers to the question "Which function of packaging is, in your opinion, the most important in the case of food products"? by gender

Description	Men	Women	Grand total
ecological	17.4%	13.8%	16.3%
aesthetic	1.4%	0.0%	1.0%
informational	10.1%	6.9%	9.2%
protective	29.0%	24.1%	27.6%
usability	40.6%	51.7%	43.9%
distinctive	1.4%	3.4%	2.0%
Grand total	100.0%	100.0%	100.0%

Source: own elaboration, 2021.

40.6% of women respondents considered this function to be the most important out of the others mentioned. For female respondents, the protective function was also important, being picked out 29% of the surveyed group of women. Men who responded to the survey in general did not point to the aesthetic function as being worthy of their attention. Among the women surveyed, this function was important for only 1% of respondents – Table 3.

67.3% of respondents considered that, in order to convince buyers that innovative packaging solutions are better than plastic bags and are less harmful to the environment, it would be necessary to take action to raise awareness of customers that such packaging solutions exist and to start a marketing campaign. More common use of active and intelligent packaging could, in the opinion of 71.4% of respondents, result in a reduction in food losses and food and packaging waste – Figure 4.

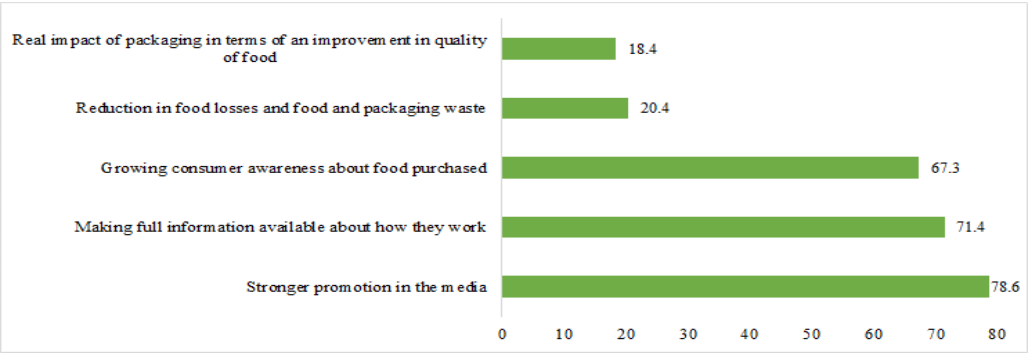

Figure 4. In your view, which factors could have an impact on the commercial success of innovative packaging solutions? Please select a maximum of 3 answers.

Source: own elaboration, 2021.

Respondents considered that the use of this type of packaging would help to improve the quality of food stored in such packaging – 78.6% of responses.

The results of a survey published by Popowicz and Lesiów, 2014 showed knowledge about active packaging was relatively high; 39% of the studied population had already heard about such packaging. However, there appears to be a clear need to promote packaging of food in a contemporary novel packaging technology. For this reason, the deployment of active packaging in Poland should be supported by a highly active marketing promotion campaign in the mass media (Popowicz, Lesiów, 2014). According to surveys conducted by Barska and Wyrwa, 2016, the introduction of active packaging by producers would have a positive impact on the image both of the company and of the packaged product, in the opinion of 83% of those surveyed (Barska, Wyrwa, 2016). A study conducted by Jeznach, Bilska, 2017 showed the knowledge of consumers surveyed on the subject of active food packaging to be limited. "Although the active package has an attractive appearance and serves its purpose, respondents are not interested in it at the moment of purchasing products" (Jeznach, Bilska et al., 2017). Surveys conducted of students at the University of Agriculture in Cracow confirm the results of previous studies in that young consumers' knowledge of active and intelligent packaging did not turn out to be good. As much as 73% of respondents did not know about this type of packaging. Only one person in five was found to know about this type of packaging. Only one person in four in the group surveyed knew about active packaging, and as much as 75% did not have any idea about it – Figure 5.

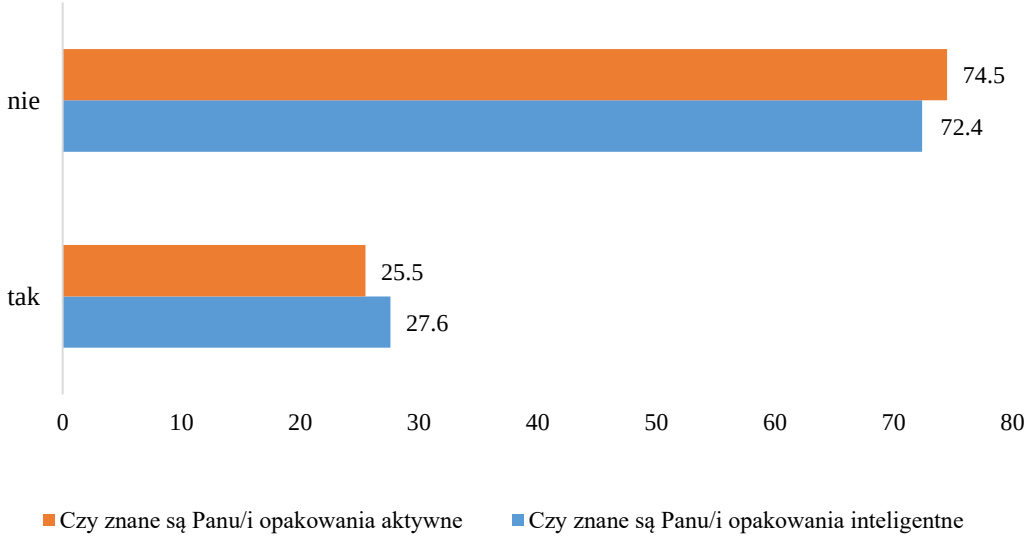

Figure 5. Knowledge of active and intelligent packaging studied.

Source: own elaboration, 2021.

Both female and male students at the University of Agriculture in Kraków did not know about active and intelligent packaging in over 70% of cases – Table 4. Such responses may be due to the fact that, as shown by the results of studies conducted by Fietz and Lesiów, 2017, a clear majority of respondents (62%) consider that the food packaging currently in use

guarantees its quality to a sufficient degree. The surveys were conducted with pupils from years one, two and three attending technical college with an economic, commercial and logistics profile at Upper Secondary School No. 2 in Oława (*Zespól Szkół Ponadgimnazjalnych nr 2 w Oławie)* and pupils having already graduated from the school, as well as with students and graduates from the University of Economics in Wrocław and the University of Life Sciences in Wrocław (Fietz, Lesiów, 2017).

Table 4.
Structure of responses to the question Are you familiar with active and intelligent packaging? by gender (%)

Description	intelligent packaging		grand total as a %	active packaging		grand total as a %
	F	M		F	M	
no	72.5	72.4	72.4	75.4	72.4	74.5
yes	27.5	27.6	27.6	24.6	27.6	25.5
grand total	100.0	100.0	100.0	100.0	100.0	100.0

Source: own elaboration, 2021.

Women are still to a greater degree responsible for household purchases (Kos-Łabędowicz, 2014). It is women pay more attention to what they put in their shopping basket. The attitude of the women surveyed – female students – gives grounds for pessimism. The least well-known type of packaging among the group of women surveyed proved to be active packaging. As much as 75.4% of those women indicated that they did not know about this type of packaging. The results of the survey presented above show that young people, in this case students, are not yet sufficiently aware of the practical impact on the environment. This is why it is important to provide them with education in this area.

Respondents were asked to assign a weight to selected information which should be provided on food product packaging. They had to assign each element mentioned a weight of 1 to 5 on the Likert scale.

The European Union has published a list of activities which may help to limit food losses. One of them is checking the expiry date of the product. Products with a shorter shelf life should be purchased shortly before use, or else longer-lasting alternatives to them should be chosen. It is worth remembering the importance of information on the packaging: the "Use by" message – shown on perishable products, indicates the date after which the product is no longer suitable for eating (e.g. meat, fish). Whereas "Best before" indicates the date until which a given product will retain all its taste qualities, though it will still remain edible after that date (Piotrowska-Puchała, Puchała, 2021). The results obtained showed that it is this information that should be found on packaging with 69.4% responses indicating the best before/use by date. It obtained the highest weight of 5, which means that the respondents most frequently pay attention to that information - Figure 6. The respondents also gave a weight of 5 to the product ingredients. The study only contains responses with a weight of 3 – indifferent, 4 – I pay attention to it but not always, and 5 I always pay the most attention to it.

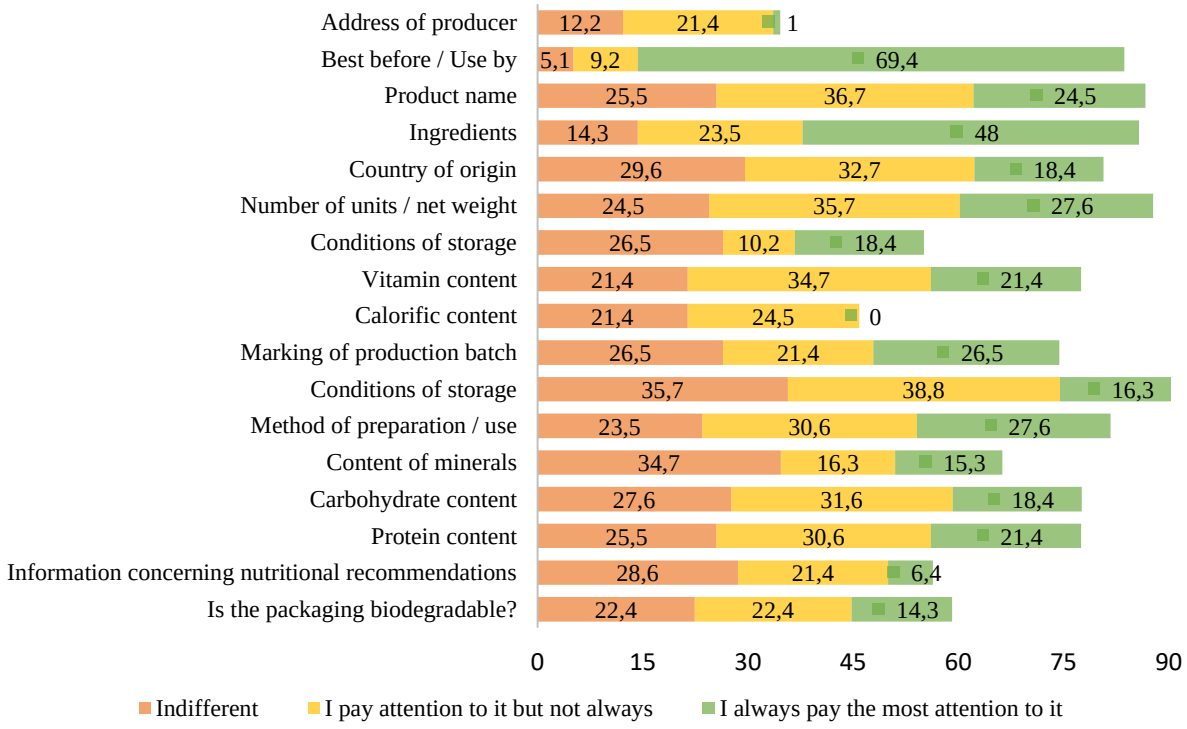

Figure 6. Opinion of respondents on weighting of information provided on food packaging.

Source: own elaboration, 2021.

For the respondents information about the ingredients that the food product which they want to buy contains was also important with 48% of responses. Other information which was also assigned a weight of 5 by the respondents was the number of units/net weight and method of preparation/use with 27.6% of responses each. The nutritional value of the product was the most important information (weight of 5) for 26.5% of respondents. In the opinion of respondents, the most important information which should be found on packaging includes the conditions of storage of the food product (38.8%). Correct storage of the product contributes to sustainable consumption. Information to which the respondents assigned a weight of 4 included the product name with 36.7% responses. The number of units/net weight was information indicated by 35.7% of respondents, with information about the calorific content of the product obtaining 1% less responses. Information with a weight of 3, in other words to the inclusion of which on packaging the respondents are indifferent, include the conditions of storage with 35.7% of responses and also the content of minerals with 34.7% responses – Figure 7.

For over half of respondents, marking of the production batch and the address of the producer is information to which attention was generally not paid in the survey, with 45.9% and 34.6% of responses.

Respondents from this young generation show that they have theoretical knowledge about the function and role of innovative packaging. However, they do not know what such packaging looks like or what practical applications it may have. It is important to provide more education in this area, not only for the younger generation, but for every consumer regardless of age.

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Summary and conclusions

The busy consumer does not have much time to spend on examining the packaging of the product in minute detail. In such a situation, the main means of conveying information is its color, the method of opening, the material of which it is made, and the possibility of closing the packaging again after partial consumption. People with ecological preferences pay attention to the recyclability of the packaging.

Packaging above all protects food against contact with micro-organisms and other contaminants, which may be harmful to human life and health. Producers are increasingly moving away from ordinary disposable, plastic bags as packaging, and these are being replaced by packaging which can be recycled.

The results obtained from surveys with students of Management and Spatial Management at the University of Agriculture in Cracow indicate, that when doing their shopping, they pay the most attention to the possibility of closing the packaging again after partial consumption. Respondents considered the material from which the packaging is made to be an important feature of food product packaging. The color scheme of the packaging proved to be a feature to which respondents paid attention but which was not very important. The size of the packaging proved to be an unimportant feature.

The respondents are aware that the taste of the product and its shelf life depend on what the food product is packed in. Among those surveyed, men were more aware of this than women. According to the respondents, the most important function of packaging is its usability. Once again, men more frequently pointed to the importance of this function.

Unfortunately, the respondents were not very familiar with active and intelligent packaging. However, they are aware of the fact that packaging has a positive impact on the quality of the food product which is stored in it.

References

1. Barska, A., Wyrwa, J. (2016). Konsument wobec opakowań aktywnych i inteligentnych na rynku produktów spożywczych [Consumer Perception of Active and Intelligent Food Packaging]. *Zagadnienia Ekonomiki Rolnej, 4(349),* 138-161.
2. Bhoovaraghavan, S., Vasudevan, A., Chandran, R. (1996). Resolving the Process vs Product innovation Dilemma: A Consumer Choice Theoretic Approach. *Management Science, Vol. 42, iss. 2,* p. 234.
3. Cyrek, P. (2015). Opakowanie jako źródło informacji o produktach żywnościowych [Packaging as a Source of Information About Food Products]. *Zeszyty Naukowe Uniwersytetu Szczecińskiego, Problemy Zarządzania, Finansów i Marketingu, nr 866,* 9-21.
4. Dainelli, D., Gontard, N., Spyropoulos, D., Zondervan- van den Beuken, E., Tobback, P. (2008). Active and intelligent food packaging: legal aspects and safety concerns. *Trends in Food Science & Technology*, pp. 103-112.
5. Dejnaka, A. (2011). Opakowanie jako narzędzie wpływania na wybory konsumentów. *Zeszyty Naukowe Wyższej Szkoły Bankowej we Wrocławiu, Nr 23*, pp. 131-143.
6. Fajczak-Kowalska, A., Rudowska, P., Ziemiński, P. (2016). Opakowania aktywne i inteligentne w łańcuchu żywnościowym. In: A. Walaszczyk, I. Jałmużna, J. Lewandowski (eds.), Monograph (pp. 33-49). Łódź: Łódź University of Technology, Łódź.
7. Fietz, M., Lesiów, T. (2017). Stan wiedzy kształcącej się młodzieży o opakowaniach aktywnych i inteligentnych [State of Knowledge of Young People on Active and Intelligent Packaging]. *Nauki Inżynierskie i Technologii, 3(26),* pp. 9-27.
8. Gazdecki, M., Goryńska-Goldmann, E. (2019). *The system of interorganizational linkages in agri-markets.* Relationship, Interactions and Networks in Competitive Environments. 35th Annual IMP Conference. Paris: IÉSEG School of Management.
9. Goryńska-Goldmann, E., Gazdecki, M. (2020). Poszukiwanie i percepcja informacji przez konsumentów w świetle idei zrównoważonej konsumpcji — przykład rynków żywnościowych [Searching for and Perception of Information by Consumers in the Light of the Sustainable Consumption Idea - on the Example of Food Markets]. *Marketing Instytucji Naukowych i Badawczych, Vol. 36*.
10. Grębowiec, M. (2017). Uwarunkowania akceptacji innowacyjnych produktów żywnościowych na rynku soków i napojów owocowych [Conditional Acceptance of Innovative Food Products by Consumers on the Example of Fruit Juice Market]. *Handel wewnętrzny, vol. II, nr 3(368),* pp. 287-300.
11. Hales, C.F. (1999). Opakowanie jako instrument marketingu. Warszawa: PWE.
12. http://ec.europa.eu/food/safety/food_waste/library/docs/tips_stop_food_waste_pl.pdf, 17.08.2018.

13. http://www.portalkujawski.pl/polecane/item/12795-typy-opakowan-produktow-spozywczych, 14.11.2020.
14. https://reader.elsevier.com/reader/sd/pii/s221428942030569x?token=da8ef8f24dfe296242dae5af30e209452127dcc815aaf0c4f88279dc18b270f9e50b63388960262a00e1eb94b85d214e.
15. https://urodaizdrowie.pl/czy-i-ty-zwracasz-uwage-na-opakowanie, 06.12.2020.
16. https://www.rp.pl/Biznes/310259933-Koniec-smieci-z-plastiku-Polka-wymyslila-jadalne-opakowania.html, 13.11.2020.
17. https://www.sustainweb.org/pdf/SFG_Consumers.pdf, 13.11.2020.
18. Janjarasskul, T., Suppakul, P. (2017). Active and intelligent packaging: The indication of quality and safety. *Critical Reviews in Food Science and Nutrition, Vol. 58, Iss. 5,* pp. 808-831.
19. Jerzyk, E. (2007). Wykorzystanie opakowania jako kreatora wizerunku produktu i przedsiębiorstwa. *Milenium, 1*, p. 78.
20. Jeznach, M., Bilska, B., Tul-Krzyszczuk, A., Pawlak, A. (2017). Rola opakowań aktywnych w ograniczaniu marnotrawstwa mięsa w gospodarstwach domowych [The role of active packages in restricting waste of meat in households]. *Żywność. Nauka. Technologia. Jakość, 24, 4(113),* pp. 126-136.
21. Kaźmierczak, M. (2017). Innowacyjne opakowania jako inteligentne rozwiązania na przykładzie branży spożywczej [Innovative packages as smart solutions in the food industry]. *Zeszyty Naukowe Akademii Sztuki Wojennej, nr 2(107),* 78-97.
22. Kos-Łabędowicz, J. (2014). Wykorzystanie internetowych źródeł informacji w decyzjach nabywczych konsumentów [Application of Internet-Based Information Sources in Consumer Purchasing Decisions]. *Studia Ekonomiczne, vol. 187,* pp. 191-203.
23. Kotler, Ph. (1999). Marketing. Analiza, planowanie, wdrożenie i kontrola [Marketing Management: Analysis, Planning, Implementation, and Control]. Warszawa: Wydawnictwo Gebethner i Ska.
24. Królczyk, J., Matuszek, D., Bednorz, K. (2015). Atrakcyjność i funkcjonalność użytkowa opakowań a zachowania konsumentów [Attractiveness and functionality of packaging and consumer behavior]. *Postępy Techniki Przetwórstwa Spożywczego, nr 2*, pp. 72-77.
25. Krzepicka, A. (2011). Opakowanie jako wartość dla polskiego klienta [Packaging as Value for a Polish Customer]. *Studia i Materiały Polskiego Stowarzyszenia Zarządzania Wiedzą,* pp. 210-202.
26. Muncke, J., Backhaus, T., Geueke, B., Maffini, M.V., Martin, O.V., Myers, J.P. et al. (2017). Scientific challenges in the risk assessment of food contact materials. *Environmental Health Perspectives, 125(9),* 1-9.
27. Neale, A. (2015). Zrównoważona konsumpcja. Źródła koncepcji i jej zastosowanie. [Sustainable Consumption : Sources of Concept and Implementation]. *Prace Geograficzne, z. 141,* pp.141-158.

28. Nowogródzka, T., Pieniak-Lendzion, K., Nyszk, W. (2014). Wzrost znaczenia opakowań w procesie komunikacji rynkowej przedsiębiorstw [Increasing importance of packaging in the process of communication market enterprises]. *Zeszyty Naukowe Uniwersytetu Przyrodniczo-Humanistycznego w Siedlcach, nr 103. Seria: Administracja i Zarządzanie*, pp. 67-85.
29. Pereira de Abreu, D.A., Cruz, J.M., Losada, P.P. (2012). Active and intelligent packaging for the food industry. *Food Reviews International, vol. 28*(2), pp. 146-187.
30. Piotrowska-Puchała, A., Puchała, J. (2021). *Konsumpcja zrównoważona jako część zrównoważonej gospodarki żywnościowej*. Kraków: Wydawnictwo Uniwersytetu Rolniczego w Krakowie.
31. Piotrowska, A. (2014). Wybrane aspekty zachowań konsumentów na rynku żywności ekologicznej [Selected Aspects of Consumer Behavior in the Organic Food Market]. Stowarzysz*enie Ekonomistów Rolnictwa i Agrobiznesu, Roczniki Naukowe, tom XVI, z. 6,* 393-396.
32. Popowicz, R., Lesiów, T. (2014). Innowacyjne opakowania aktywne w przemyśle żywnościowym [Innovative Active Packaging in the Food Industry]. *Nauki Inżynierskie i Technologie, 2(13),* pp. 34-48.
33. Sharma, S., Jaiswal, A.K., Duffy, B., Jaiswal Swarna (2020). Ferulic acid incorporated active films based on poly (lactide) /poly (butylene adipate-co-terephthalate) blend for food packaging. *Food Packaging and Shelf Life*.
34. Zalega, T. (2015). New Consumer Trends. In: M. Burchard-Dziubińska (ed.), *Towards a Green Economy. From Ideas to Practice*. Łódź: Wydawnictwo Uniwersytetu Łódzkiego.