

RE-VALUE OF MUNICIPAL WASTE – GARBOLGY IN TRADE SECTOR

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Purpose: The municipal waste has a value as a product on the primary and secondary market. It is an instrument building a pro-social image strategy by creating the conditions of social well-being in a strategic time perspective, especially thanks to the applied processes of biological-mechanical processing and the closed-circuit economy. Waste is a carrier of information useful in the marketing research process, in retrospective and current perspective, concerning consumption and purchasing behaviour of the society, too. The waste value is built in a system of relations between the market entities, the secondary market, business entities, and the involvement of innovative process technologies. Therefore, the aim of the article is to demonstrate the marketing value of municipal waste, built in by the way of garbology research, thanks to the involvement of many entities and modern technologies, especially for trade sector and their cooperants.

Design/methodology/approach: In the article, conceptual and qualitative research methods of empirical research (case study) are mainly used.

Findings: The results of the research show that effective waste management, that carries marketing signs, and the subject of research - municipal waste, have a marketing value and that is certainly a tool of strategic marketing with high involvement of modern technologies.

Research implications: The research on the issues of marketing of the municipal waste opens up a wide field of possibilities, that are not sufficiently used, especially in the relations of primary and secondary market entities, firms of the sectors under review.

Originality/value: This is a new theoretical and practical approach to implementation of the re-value of municipal waste concept in the trade sector. It presents the "re-use" sub-concept and "effective use" in trade sector, which is a method of implementation of the closed-circuit economy concept.

Keywords: waste management sector, trade sector, multi-value marketing, garbology, re-value.

Category of the paper: case study.

1. Introduction

Enterprises of the municipal waste management sector mainly build value in the processes of collection and effective management of the waste stream, while engaging innovative technological solutions. Technological tools enable smart management of municipal waste through efficient sorting into stream fractions. This, in turn, allows for separation of material for recycling and reuse, management of fractions obtained from mechanical-biological treatment of waste, and mainly minimizing the amount of unproductively stored ballast. Knowledge about chemical composition of the waste that goes to the waste stream tightens control over the process of precise selection. Knowledge and organizational competences as well as skilful application of innovative technologies in the processes of municipal waste separation and processing constitute one of the operational sub-areas of management in surveyed entities, in terms of processes, and is an expression of their *social responsibility and strategic actions* (Sztangret, and Sobociński, 2017, pp. 135-148)¹.

Commercial use of information, automatically registered by the readers of separators of individual municipal waste fractions, has been the least appreciated operational sub-area of the surveyed companies so far. The information contained in or on the waste constituting the stream obtained by the enterprise of the studied sector, used in an efficient way, can improve the selection process on the level of extracting the material for processing or sale. Furthermore it can also provide knowledge about purchasing and consumption behaviours of waste stream producers/suppliers. Therefore, waste has a marketing value that is also useful in market research, which is another interesting management sub-area in the company, in functional terms (Sztangret, 2016, pp. 29-44). **This area seems to be especially interesting from the perspective of cooperation with trade entities for whom information obtained from waste constitutes the basis of the supply decision system, and on the other hand it can represent a value for suppliers, while optimizing streams of delivered goods.**

Furthermore, the diffusion of information and knowledge that accompanies the flow of waste stream promotes building and maintenance of *integral relations*. Municipal waste supplier becomes a prosumer and co-creator in the process of eco-value creation and an offer for the secondary market by the enterprise in the waste management sector (Sztangret, 2016). This happens on the one hand through conscious selection, and on the other through producing a waste stream that brings knowledge about it. This constitutes another implemented operational sub-area in subjective approach, with the features of an *innovative marketing concept*, that combines eco-knowledge management and its commercial use. Garbology is

¹ More on this subject in the paper: *Ekoinnowacyjne modele biznesu na przykładzie wybranych regionalnych Instalacji Przetwarzania Odpadów Komunalnych (RIPOK) [Eco-innovative business models in selected Regional Municipal Waste Treatment Facilities (RIPOK)]*.

therefore the main research concept of this study, and its specification will concern its usefulness in the relation between the municipal waste sector and the trade sector.

All the above-mentioned activities are implemented in the discussed sectors more or less consciously to achieve the effect of a closed-circuit economy.

In connection with the above, **the purpose of the article** is to demonstrate the value of municipal waste, as a carrier of knowledge and information about buying and consumption behaviours, and its usefulness for decisions made by stream creators, including purchasing. Individual parts of the study concern the definition of the category of garbology, the subject of garbology research, the usefulness of such research for corporations and the improvement of research through cooperation.

2. Garbology research - identification of the research category

In recent years, an increase in the importance of socially responsible activities, combining a business approach with pro-environmental aspect that affects the company's environmental impact, i.e. emissions, pollution, impact on biodiversity, as well as preventive actions (e.g. recycling) and repair has been observed (Bek-Gail, and Rymkiewicz, 2015). These activities contribute to building a society that is conscious and responsible for consumption (Seretny, 2016). Hence, from the point of view of the needs of contemporary companies, garbology research is an extremely useful and thus helpful source of information on consumption and purchasing habits (both actual and potential) of each company's clients.

Professor William Rathje, a researcher from the University of Arizona is recognized as the world precursor of garbology studies (Reno, 2014). He was the first to focus his attention on landfills in 1987 to find out what they contain and how materials behave in them (Schiffer, and Riecker, 2015). This project significantly contributed to the development of garbology research in the context of new needs emerging in the environment of many companies (economic, social, marketing, logistics, etc.).

Research conducted by W. Rathje provided important knowledge about collected garbage (waste) and its value as well as possibilities in the sphere of creation of market demand² (Rathje, et. al., 1992; Rathje, 2011). Their results contribute to the development of a sustainable and responsible market economy, from which extremely current postulates related to the need of processing, recovering and disposing consumer and production waste emerge (Reno, 2014; Schiffer, 2015). As a consequence of the observations and results of long-term research

² In 1990, W. Rathje received the award for public recognition of science and technology granted by the American Association for Scientific Progress, which cited "his innovative contribution to public understanding of science and its social influence by demonstrating with his creative project "Garbage Project" that scientific method can document problems and identify solutions."

W. Rathje draws attention to the urgent need to care for the nature and the environment, in order to leave clean earth, water and air for future generations. This is closely related to rational management of waste, which is generated by consumers on the one hand and on the other hand by big corporations.

W. Pessel, a young researcher from the University of Warsaw is the precursor of garbology research in Poland. Similarly to W. Rathje, he made a daring attempt to study garbage dumps (local landfills) to explore everyday life of Warsaw residents and occurring social changes (Pessel, 2008; Pessel, 2010). Information collected in this way expanded the current knowledge about economy, market preferences of the society and culture. The increase in the promotion of the idea of corporate social responsibility in Poland, which is associated with respect for the natural environment and social development (Reformat, Reformat, 2017), means that more and more Polish scientists notice the need for garbology research (e.g. Wierzbicka-Mazur, and Kunasz, 2013; Sztangret, and Sobociński, 2017; Grzymała et. al., 2015). This knowledge contributes to the development of a responsible economy, and researchers create better prospects for health and development for future generations while sharing the acquired knowledge and experience with companies.

The problem of waste coming from social consumption is now a key area of research on food waste, not only in Poland, but also in other developing countries. The results of analyses conducted by N.B.D Thi, G. Kumar and Chiu-Yue Lin (2015) clearly show that problems related to food product waste are now considered the main threat to sustainable development and management systems in developing countries. At the same time, F. Giroto, L. Alibardi, R. Cossu (2015) show a growing number of studies related to food waste that contribute to the recovery of energy, clean water, elimination of harmful raw materials in products, the introduction of organic products, etc.

As Pessel (2010) states, there is no doubt that what every consumer disposes of and where they do it, proves their culture, acquired habits and customs. This is confirmed by the results of qualitative research also performed by other researchers, including D. Evans (2014), M. Watson & A. Meag (2013). Hence, the issue of consumption and purchasing habits of customers in garbage research indicates an extremely important corporate usefulness for the needs of responsible and sustainable trade development.

3. The marketing information as a value of municipal waste

It must be stated that archaeology defined as “scientific research of material remains such as fossil relics, artefacts, and monuments of past human life and activities of man, i.e. the history of Mankind”, constitutes historical foundations for marketing approach to garbology. Identifying, observing and analysing material culture of contemporary population through

research of material remains of existence allows at least for making some assumptions concerning behaviours of specific civilisation.

Such forms of gaining information are included in the so-called open-source intelligence, i.e. collected from publicly available resources (*OSINIT*). It is a kind of economic intelligence consisting in gathering information from publicly available resources. Intelligence agents only use public methods of gaining information, most often also in ethical way (Stromczyński, and Waszkiewicz, 2014). Public sources include among others:

- public life expressed by the structure and amount of waste, i.e. wastebasket trash content or more broadly the composition of waste on landfill in this case,
- analysis of products/waste through *reverse engineering* performed to achieve some functionality, i.e. for the needs of determination of usable information from the point of view of processing, recycling and conducted marketing research.

Information available from the “analysis of wastebasket trash content” (Rybczyński, 1992) concerns buying and consumption-related habits of households that can be subject to comparative analysis according to various categories of entities (natural person, business entities and institutions, from inhabited and the so-called uninhabited or industrial areas), geographical situation (international, regional, local), categories of territorial units (city, village) or time with distinguished “special periods” (e.g. festivals, holidays, etc.).

Wastebasket trash content analysis can concern the areas that are essential from the point of view of marketing research, which in practice has been confirmed in lots of such conducted studies (Baguchinsky, 2017; Rathje, and Murphy, 2001; Kowalski, and Szczelina, 2016). The areas include:

- structures of goods purchased and consumed in a household by residents of a building, housing estate, district, enterprises or their groups in a specific zone³,
- eco-habits, reflected in buying behaviours concerning products in disposable packaging, and willingness to segregate rubbish⁴,
- amount of consumed/used good of a specific category in a specific time unit, and size of a single purchase expressed for example by the packaging size,

³ Analysis of wastebasket trash content in Spanish households showed that women do not use bottled food for babies and the way in which they prepare food for kids is typical of all women in this part of Europe (Rathje, Murphy, 2001).

⁴ Within the Month of Earth in Duke (Duke Recycles) on 19th April 2017, student volunteers from Association for Eco-development and Environmental Covenant conducted garbology analysis concerning the rate of waste coming to landfill that is recycled. Every year a different building is analysed. This time the wastebasket trash content from the Link Library in Perkins was analysed. The willingness of students to recycle waste was the subject of analysis. All garbage produced on one day in The Link was collected and delivered to analytical centre. After prior sorting of garbage, volunteers discovered that out of the total 60.5 pound of waste from The Link 26 pounds (43%) could have been recycled. According to research material 10.5 pound of paper and 15.5 pound of drink containers were diagnosed.

- intensity of consumption expressed by the time needed to make the wastebasket full, and frequency of emptying the bin⁵,
- social level of household,
- information about consumption habits concerning consumption of highly-processed products or natural products/raw materials⁶,
- information about habits related to local, domestic or foreign product preferences with focus on specific country of origin,
- level of wastage of purchased products: food⁷, household and radio and television appliances, electronic equipment,
- waste structure with division into recyclable, possible to be re-used and reducible waste, and rest waste, i.e. civilizational eco-culture waste and effectiveness of eco-knowledge management.

Garbology marketing research can concern both the past and present time, with reference to consumer behaviours and the subject of analyses (waste). Therefore, four garbology marketing strategies can be distinguished (table 1).

⁵ Canadians during their lifetime produce 600 times more waste than their body weight; a person of 68 kilograms leaves 40 825 kilograms waste which brings the country the cost of its disposal of over \$ 1.5 billion.

⁶ Americans generate more waste than any other people all over the world: over 7 pounds per person daily. Around 69 percent of the waste go to landfill immediately; they are containers and packaging from highly-processed food. They could all be recycled (Humes 2012).

⁷ In one of the studies Rathje discovered the first principle of food wastage, i.e. the more repeatable the diet consumed day after day, the smaller the amount of food waste every day.

According to further observations in this sphere, food such as pizza and chips that are not typical daily food are most wasted. Rathje also noticed that specialised bakery products such as rolls, croissants and cakes are wasted in 30-60% of analysed households. The study was conducted in Spanish households at the end of 1990s at breakfast, lunch and dinner time. The analysis of waste of 61 American households, conducted in 7-stage cycle showed that it included mainly bakery products and cereals (28 percent) fresh plant-tissue waste (24 percent), high-proteins vegetables (12 percent), meat parts, poultry and seafood (8 percent), fruit waste (8 percent), cheese or other dairy products (6 percent) and fats and oils (5 percent). Researchers formulated another principle concerning food wastage on the basis of observation of amount and type of meat and sugar waste. Data about beef waste was collected for fifteen months, from spring 1973 to spring 1974. In the months after the period of beef deficiency in stores, the rate of beef waste (cooked and raw, but with no fat or bones) was around 3 percent of the whole purchased beef, whereas in the months of deficiency, the waste rate was around 9 percent. In other words, people threw away three times more beef in the period of its deficiency in stores than in the period of its regular supply. Such a situation was the result of reaction to crisis where too much beef purchased in a shop was not appropriately stored and processed. A similar phenomenon was observed in 1975 in the case of sugar. Purchased in big amount during the crisis, low-processed, foreign sugar was found in big amount in household waste in the form of crystalized pieces (Rathje, Murphy 2001).

Table 1.
Strategies of marketing garbology

		Material subject/subject of analyses	
		<i>from the past</i>	<i>current</i>
Buying and consumption	<i>in the past</i>	Prehistorical, historical and classical garbology (option 1)	Retrospective Ethno-garbology (option 2)
	<i>current</i>	Strategic garbology – of long-term changes in consumer behaviours (option 3)	Contemporary garbology demographically and economically, socially and psychologically determined (option 4)

Source: own case study.

4. Model of garbology marketing strategy on the example of trade

The entities of the trade sector constitute an example of the implementation of the model of the garbology marketing strategy, according to option 4 (table 1). They have access to the benefits comprised in the systemic value of municipal waste, built on the basis of at least several-part concept of implementation of closed waste management. The entities of the trade sector perform the role of a co-creator of waste stream and prosumer in the process of shaping of the product for the secondary market of the waste management sector, through RIKOK (Regional Municipal Waste Treatment Plants) and PSZOKS (Selective Waste Collection Points).

The same role is performed by trade in relationships with the entities of the sector of marketing research services, with the use of the tools of recording information about resources and inventory, stored in databases, and readable from packaging, thanks to optoelectronic readers. The trade sector can implement the mission of social responsibility, and thus the image-building strategy, while becoming involved in the actions of broadly perceived counteracting social exclusion, poverty and hunger, through involvement in the market of price-sensitive customer.

However, as the results of the observation of the trade sector show, only some of the sub-areas of the Model, at least on the Polish market, find their implementation. Retrospective values and opportunities to anticipate purchasing and consumption behaviours on the basis of waste analysis and its re-value have not been recognized yet, which could optimize buying processes.

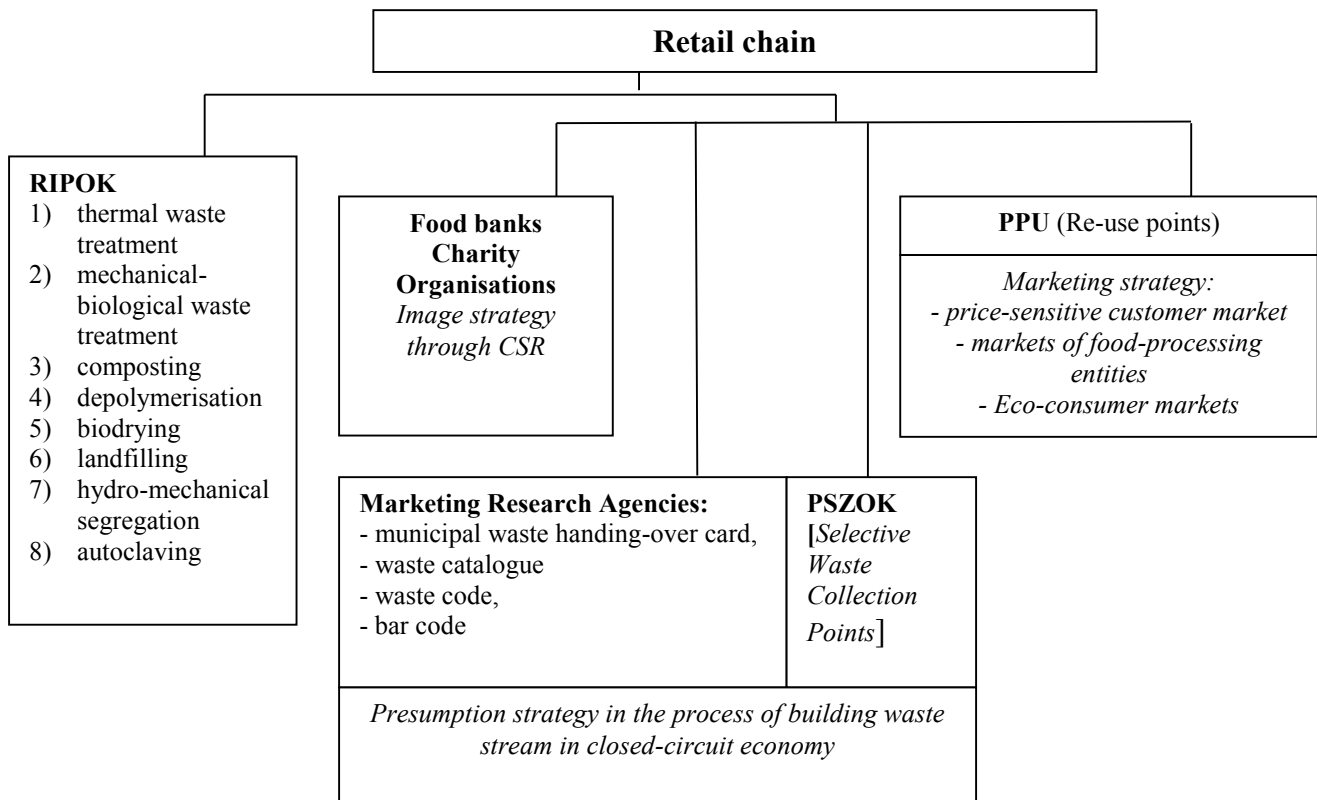


Figure 1. Re-value of municipal waste in the model of garbology marketing strategy option 4. Source: own case study.

5. Effects of garbology research in the trade of food products, on the example of Tesco global retail chain

So far, an important part of garbology research in retail trade consists in searching for the causes of wasting food and valuable natural resources (energy, water, etc.) in the whole supply chain (from the production stage, through distribution and finally consumption). This knowledge constitutes the information base for the development of a responsible trade sector in which all its participants (wholesalers, retailers, clients, etc.) play a significant role. This type of research is conducted by various entities. In their group, we can distinguish public institutions (e.g. research agency CBOS, Food Banks, Nielsen, FAO, etc.), private organizations (e.g., supermarkets, restaurants) and social movements. Their common mission is to struggle with wasting food and to publicize and promote their own eco-postulates.

Global retail chain Tesco is an example of a commercial chain that has been effectively implementing the program of combating food waste in Poland for several years. These activities consist in cooperation with the Federation of Polish Food Banks and transfer of surplus food, limiting food waste in Tesco stores, education and cooperation with suppliers, as well as

educating customers, employees and local communities. Table 2 presents data related to the transfer of food for social purposes by Tesco chain in Poland in the years 2014-2016.

Table 2.

Combating food waste through “transfer” of food by Tesco chain in Poland in 2014-2016

Time	Amount of transferred food	Number of transferred meals (conversion unit 1 meal = 0.420 kg)
2014	562 t	1.3 million
2015	1,240 t	2.9 million
2016	1,625 t	3.8 million
Total	3,429 t	over 8.1 million

Source: Report: Corporate Social Responsibility of Tesco Poland chain, 2014-2017.

The above data show regular growth of involvement of Tesco chain in the process of transferring surplus food directly from stores to social partners, i.e. Food Banks, Caritas Poland, and local charity organizations. Thanks to this more than 3,429 tons of products were delivered to the Food Banks service users, which was enough to prepare over 8 million meals. In the next 2017/18 year, Tesco Poland offered 1,097,610 tons of food for sale, out of which 12,377 tons were not sold to consumers (surplus food). This number includes food that is not safe for consumption by people, donated food suitable for consumption by people, products intended for animal feed and food waste that is recycled – Figure 2.

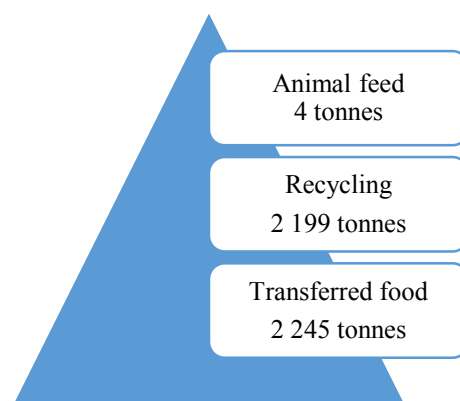


Figure 2. Surplus food of the Tesco Poland chain suitable for consumption in 2017/2018 (in tonnes). Source: own study based on: (www 1).

In comparison to the previous year, the amount of wasted food (surplus minus donations and animal feed) in Poland decreased by 33%. Table 3 presents the distribution of obtained surplus of food by category.

Table 3.

Categories of surplus food in Tesco Poland chain in 2017/2018

Category	Surplus (tonnes)	Percentage value
Transferred donations	2 245	18
Animal feed*	4	0
Recycling	10 129	82

* food unsuitable for consumption by people transferred as animal feed.

Source: Report on wasting food – Tesco Poland, 2018.

At the same time, in 2017/18, Tesco chain reduced the scale of food waste in all its stores in Europe by 30%, while transferring over 10,000 tons of food products to Food Banks and social organizations (www 1). The chain declares that by 2020 all Tesco stores in Europe will be offering surplus food to local charities.

The application of modern technology in the form of the "FoodCloud"⁸ application (www 2) is another model example of the activities of Tesco chain in Poland that are aimed at limiting the scale of food waste. Tesco has already been successfully implementing this solution in the UK and Ireland while instantly informing about the food surplus they have. The application allows to confirm collection of food by charities in real time.

In Poland, the "FoodCloud" application testing has been started by Krakow Food Bank. This solution provides information from 5 Tesco stores in Krakow to charities. The Food Bank receives information on available surpluses of unsold food in the application and can plan the collection directly from the store (www 3). It is a logistical challenge for smaller and local organizations that, while using the application, receive current data on the availability of products. This helps them plan the redistribution of products better. The ambition of the described chain is to expand the scale of operation of the application to the entire country.

It should be added that Tesco is the first commercial network in Central Europe that measures and publishes data concerning the scale of food waste in its stores and distribution networks (www 4). The idea of these actions is based on the "Measure, Target, Act" assumptions of the global WRAP organization. The essence of these elements are explained in fig. 3

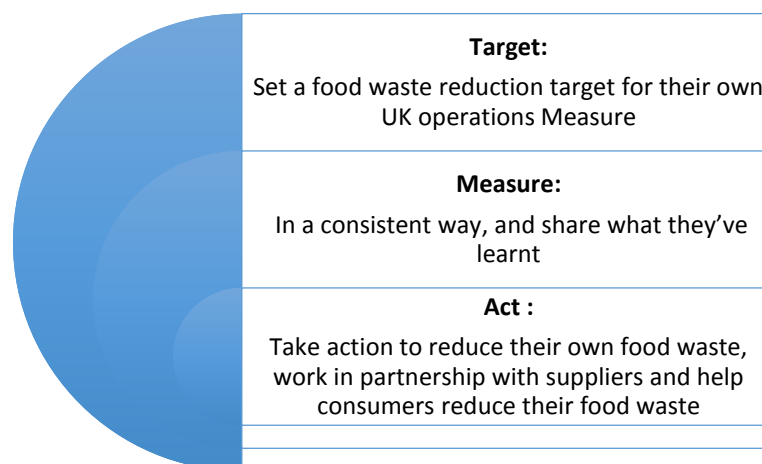


Figure 3. The essence of the elements forming the "Measure, Target, Act". Source: own case study based on (Swannell, 2018, p. 8).

Thanks to the above algorithm of activities performed by means of garbage research, Tesco chain currently plays a significant role in the global combat with food waste, while supporting the achievement of the UN's sustainable development goals (SDG) aimed at

⁸ The "FoodCloud" application was created by the "FoodCloud" organization, founded in 2012 in Dublin. It has saved 18 200 tons of food from being wasted since it was started. It is equivalent to 40 million wholesome meals.

reduction of the scale of global food waste by half by 2030. The studied chain also calls on its suppliers to manage, measure and conduct responsible treatment of food waste. This applies both to own label suppliers and leading suppliers of products.

At the same time, the described chain aims to raise awareness of the problem of food waste among the society by organizing annual conferences on not wasting food products, and to discuss the ways to reduce waste with non-governmental organizations, representatives of local governments and companies from the entire food supply chain.

Table 4.

Categories of surplus food in Tesco UK chain in 2016-2018

Analysed size	2016/2017	2017/2018
Total UK food sales	9 957 374 tonnes	10 023 559 tonnes
Total food waste	46 684 tonnes	53 126 tonnes
Waste as % of food sales	0,5%	0,5%
Donations	5 700 tonnes	7 975 tonnes

Source: UK Food Waste Data (2017/2018).

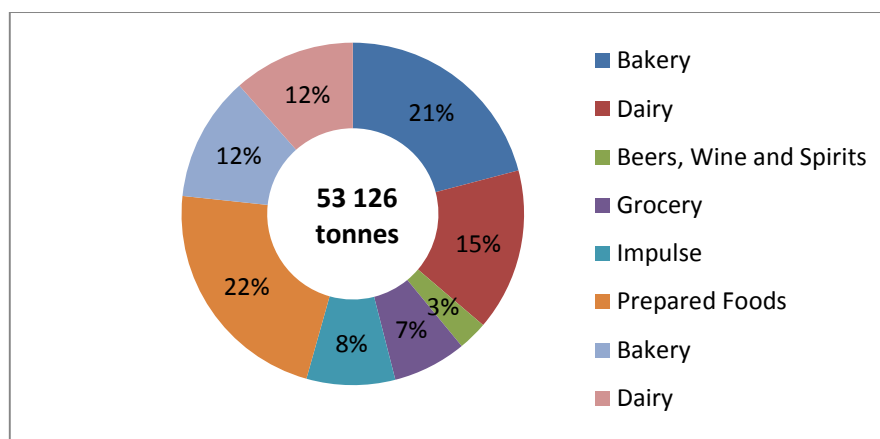


Figure 4. Food waste by category – Tesco UK 2017/2018 (in %). Source: UK Food Waste Data (2017/2018).

Data presented in the table above show that in the period 2017/18, the sales of food offered by Tesco chain in the United Kingdom increased, which confirms its effective development in this country. It is important that the amount of waste has not increased at the same time. It remained at the same level as the year before when lower sales (0.5%) were observed. This situation is a good prognosis for further actions of Tesco chain in the sphere of limiting wasted food on the British market. In general, the chain sold to customers a total of 10,023,549 tons of food, which generated losses presented in Figure 5.

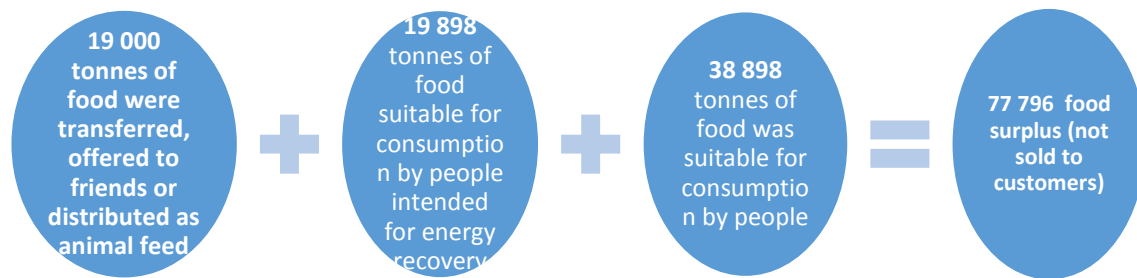


Figure 5. Food losses generated by Tesco chain in the United Kingdom in 2017/2018. Source: own study based on UK Food Waste Data (2017/18).

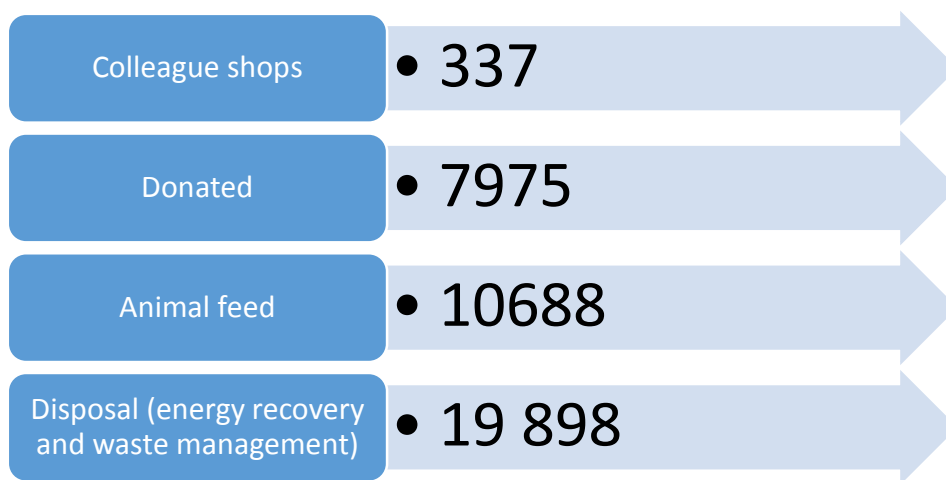


Figure 6. Food surplus save for human consumption (tonnes) in Tesco UK – 2017/2018. Source: own study based on UK Food Waste Data (2017/2018).

The presented data show that in the United Kingdom, at least in comparison with actions on Polish market, Tesco chain uses a broader spectrum of activities to eliminate wasting unsold food that is still suitable for consumption. This chain remains the only British retailer that publishes detailed data on food waste provided by third parties, while encouraging other retailers to take similar actions.

Conclusions

To sum up, it should be emphasized that municipal waste has an undeniable value as a carrier of knowledge and information about purchasing and consumption behaviours, and usefulness for decisions made by waste stream creators, including the buying ones. The issue of garbage research is becoming an increasingly more important global challenge and an element of the strategy of large retail chains in recent years. This confirms the growing

involvement of retail entities in the process of combating waste of food both in their business environment and among customers, which is confirmed by the practice of the commercial chain presented in the paper. However, as the observations of the sector show, the area of counteracting waste is the only practically used way to implement the re-value of municipal waste concept in the trade sector.

The examples of Tesco's activities presented in the paper are socially responsible undertakings resulting from the awareness of the type and size of wasted food on the one hand, and on the other hand they are part of the "re-use" sub-concept. In this case it represents "effective use", which is a method of implementation of the closed-circuit economy concept.

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