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THE USE OF CLUSTER ANALYSIS IN THE RESEARCH ON SHOPPING PREFERENCES REGARDING REGIONAL PRODUCTS FROM LUBELSKIE VOIVODESHIP

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Abstract. An increasing awareness of consumers is reflected in a growing demand for products which are manufactured in a particular way, with unique ingredients, or which are of a particular origin. The analysis of consumers' preferences makes it possible to define factors which determine the purchase of regional products. The aim of the work was to identify factors which determine the purchase of regional products from Lubelskie Voivodeship on the basis of cluster analysis using Ward's hierarchical agglomerative clustering method. The research was carried out in 2016 and included 383 individuals. Statistical analysis of results was conducted on the basis of frequency analysis and cluster analysis. According to the respondents, the most frequently purchased regional products included bakery products (47%), dairy products (35.3%), meat (33.3%), and alcoholic beverages (29.4%). Over 53% of the respondents claimed that the prices of regional products are too high, every third person (29.6%) concluded that they are reasonable, while slightly over 3% of the respondents said they are low. Television and the Internet as well as close relatives and friends appeared to be the best forms of reaching the client with information concerning regional products when bringing them out on the market. However, the most common places where regional products were purchased were food fairs and festivals. Every second respondent purchased regional products at least once a month. Additionally, it was revealed that the consumers' income was not a decisive factor when purchasing regional products. Despite financial stability, individuals who could be defined as "rich" in Polish conditions purchased regional products relatively rarely.

Keywords: cluster analysis, regional products, consumer behaviours

INTRODUCTION

As consumers become increasingly interested in regional products, they strongly believe such products are manufactured in a specific region, usually based on raw material originating from that region, and are of higher quality compared to their industrially-made counterparts. They look for products which, in addition to nutritional properties, offer other characteristics such as taste. The specific taste and aroma, unparalleled consistency or color are only a few of the factors which make such products a unique offering (Pomianowski, 2009).

Regional products are high-quality goods intended to be sold at a higher price to customers with higher incomes. Also, just as "traditional cuisine", they create a major incentive for tourists and become an indispensable part of many trips (Cohen and Avieli, 2004; Henderson, 2009).

The consumers' individual preferences regarding selection of regional products usually depend on their taste and habits, and are also conditioned by the satisfaction provided by, or even the usability of, such products. The analysis of consumer preferences allows to

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determine the determinants of regional product purchasing (Szymańska and Dziedzic, 2005; Tłuczak, 2014).

Lubelskie voivodeship, as a typical agricultural region, boasts regional products whose taste and traditional manufacturing methods are highly enjoyed both by local consumers and by the visiting tourists. They also play an important role in promoting the region and make it an attractive destination (Bekier-Jaworska and Bochenek, 2014).

The objective of this paper is to identify the determinants of purchasing regional products from Lubelskie voivodeship based on cluster analysis using Ward's hierarchical agglomerative clustering method.

MATERIAL AND METHODS

The survey was answered by 383 persons (196 women and 187 men) in April and May 2016. The interviewees were selected randomly on the streets of the voivodeship capital (Lublin) and three district (*poviat*) capitals (Biała Podlaska, Radzyń Podlaski, Międzyrzec Podlaski).

The questionnaire included socio-demographic questions and questions directly related to the topic under analysis. In all categories of socio-demographic variables, percentages were calculated separately for male and female interviewees. Gender-based differences were assessed with the χ^2 test as G function (Sokal and Rohlf, 1969) (Table 1).

Cluster analysis was used to answer the question on the criteria considered when purchasing regional products. The Ward's hierarchical agglomerative clustering method was employed to classify the categories of variables under analysis. For clustering purposes, Euclidean distance was adopted as a measure of distance. The number of clusters was determined based on the agglomerative clustering diagram showing linkage distances with regard to linkage stages. The flattening seen on the diagram (longer vertical line) is the point with the biggest distances between clusters. This point marks the end of the clustering stage and determines the number of clusters. The Euclidean linkage distances are plotted on a logarithmic scale.

The statistical analysis performed with the use of Statistica v. 12 PL was preceded by assigning the following symbols to specific categories of variables:

- age: L1 – up to 25 years old, L2 – from 26 to 45 years old, L3 – above 46 years old;
- education: W1 – upper-secondary school, W2 – bachelor's degree, W3 – master's degree;
- place of living: MZ1 – village, MZ2 – city with a population of up to 50,000, MZ3 – city with a population ranging from 51,000 to 200,000, MZ4 – city with a population above 200,000;
- number of persons in the household: LO1 – 1 person, LO2 – 2 to 3 persons, LO3 – 4 to 6 persons, LO4 – above 6 persons;
- average net monthly income: MD1 – below PLN 1,000, MD2 – PLN 1,000–2,000, MD3 – above PLN 2,000;
- regional food prices: C1 – too high, C2 – high, C3 – reasonable, C4 – low, C5 – very low;
- frequency of purchasing regional products: CZ1 – at least once a week, CZ2 – at least once a month, CZ3 – once during each half year, CZ4 – less frequently;
- circumstances of purchasing regional products: OZ1 – everyday, no special occasion, OZ2 – for special holidays, OZ3 – during festivals;
- source of information on regional products: ZPI1 – radio, ZPI2 – TV, ZPI3 – press, ZPI4 – Internet, ZPI5 – books, ZPI6 – relatives, friends, ZPI7 – festivals, fairs.

RESULTS OF THE STUDY

According to Table 1 data, most of the interviewees were graduates of upper-secondary schools (47.3%) below 25 years old (70.7%), predominantly living in cities with a population above 200,000 (43.9%). They usually lived in households with 2 to 3 members (39.1%) with an average monthly net income per one family member ranging from PLN 1,000 to 2,000 (38.4%). Significant differences ($p < 0,05$) existed between categories of variables designating the education, place of living and number of persons sharing the household with respect to male and female interviewees.

Figure shows the results for the most frequently purchased groups of regional products (Fig. 1). As indicated by the respondents, these included bakery products (47%) followed by dairy products (35.3%), meat products (33.3%) and alcoholic beverages (29.4%). Ready-made dishes (15.7%) and oil and fats (5.7%) received less attention.

The respondents were perfectly aware of the broad range of regional products of the Lubelskie voivodeship (Fig. 2). The Lublin onion cake (*cebularz lubelski*,

Table 1. Description of the examined population
Tabela 1. Opis badanej populacji

Socio-economic features Cechy socjoekonomiczne	Categories Kategorie	Total n = 383 Ogółem n = 383		Females n = 196 Kobiety n = 196		Males n = 187 Mężczyźni n = 187		G function Funkcja G
		N	%	n	%	n	%	
Age Wiek	below 25 years poniżej 25 lat	271	70,7	146	74,3	125	66,7	2,75#
	25–45 years 25–45 lat	84	22,0	37	18,9	47	25,0	
	over 46 years powyżej 46 lat	28	7,3	13	6,8	15	8,3	
Education Wykształcenie	upper-secondary school średnie	181	47,3	111	56,8	70	37,5	14,65*
	bachelor's degree licencjat	131	34,2	53	27,0	78	41,7	
	master's degree wyższe	71	18,5	32	16,2	39	20,8	
Place of living Miejsce zamieszkania	village wieś	95	24,8	48	24,3	47	25,0	8,97*
	town up to 50000 inhabitants miasto do 50 tys.	57	14,9	34	17,6	23	12,5	
	city of 51000–200000 inhabitants miasto 51–200 tys.	63	16,4	40	20,3	23	12,5	
	city over 200000 inhabitants miasto powyżej 200 tys.	168	43,9	74	37,8	94	50,0	
Number of persons in a household Liczba osób zamieszkujących w gospodarstwie domowym	1 person 1 osoba	57	14,9	26	13,5	31	16,7	9,76*
	2–3 persons 2–3 osoby	150	39,1	72	36,5	78	41,7	
	4–6 persons 4–6 osób	140	36,6	85	43,2	55	29,2	
	more than 6 persons powyżej 6 osób	36	9,4	13	6,8	23	12,5	
Average monthly net income per one family member Przeciętne miesięczne dochody netto na członka rodziny	below 1000 PLN poniżej 1000 zł	163	42,6	77	39,2	86	45,9	4,24#
	1000–2000 PLN 1000–2000 zł	147	38,4	85	43,2	62	33,3	
	over 2000 PLN powyżej 2000 zł	73	19,0	34	17,6	39	20,8	

*Statistically significant differences at the level $p < 0.05$ between the categories of sociodemographic variables describing the population of females and males; #statistically insignificant differences (χ^2 test as G function).
Source: own calculations on the basis of research results.
*Różnice istotne statystycznie na poziomie $p < 0,05$ pomiędzy kategoriami zmiennych socjodemograficznych opisujących populację kobiet i mężczyzn; #różnice nieistotne statystycznie (test χ^2 w postaci funkcji G).
Źródło: obliczenia własne na podstawie wyników badań.

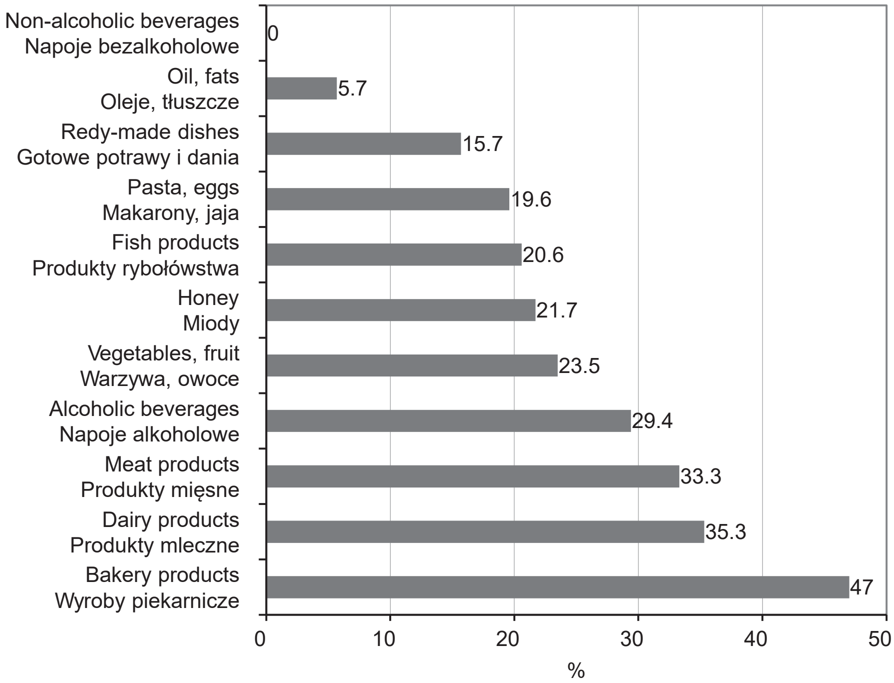

Fig. 1. Most frequently purchased groups of regional products according to the respondents. Explanation: Respondents were able to choose more than one response; thus, percentages do not add to 100
Source: own elaboration on the basis of research results.
Rys. 1. Najczęściej kupowane grupy produktów regionalnych w opinii respondentów. Objaśnienie: Respondenci mogli wybrać więcej niż jedną odpowiedź, dlatego odsetki odpowiedzi nie sumują się do 100%
Źródło: opracowanie własne na podstawie wyników badań.

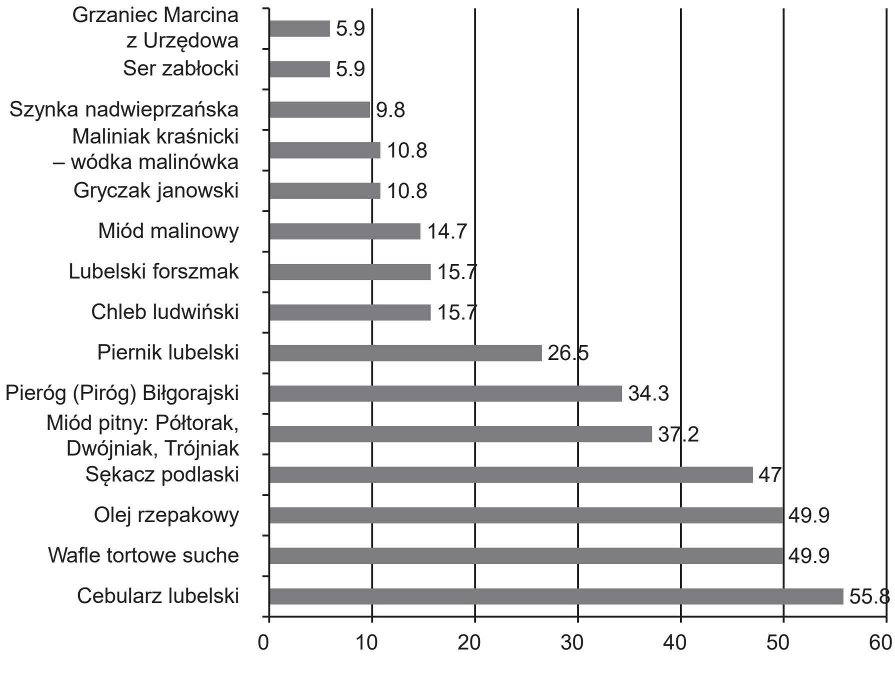

Fig. 2. The knowledge of regional products from Lubelskie Voivodeship according to the respondents (%). Explanation: Respondents were able to choose more than one response; thus, percentages do not add to 100
Source: own elaboration on the basis of research results.
Rys. 2. Znajomość produktów regionalnych woj. lubelskiego w opinii respondentów (%). Objaśnienie: Respondenci mogli wybrać więcej niż jedną odpowiedź, dlatego odsetki odpowiedzi nie sumują się do 100%
Źródło: opracowanie własne na podstawie wyników badań.

55.8%) was the product most commonly associated with this region, with similar percentages recorded for plain wafers (*wafle tortowe suche*, 49.9%), rapeseed oil (49.9%) and Podlasie baumkuchen (*sękacz podlaski*, 47%). Equally popular, alcoholic beverages (mead: *Półtorak*, *Dwójniak*, *Trójniak*) and bakery products represented by the Biłgoraj dumpling (*Pieróg [Piróg] Biłgorajski*) were associated with the Lubelskie voivodeship by more than 37.2% and 34.3% of respondents, respectively.

Friends and relatives were the source of information on regional products for more than a half (54.1%) of respondents (Fig. 3). Another group acquired this information from TV (36.7%) and Internet (41.8%). One in four (24.5%) and one in eight (13.3%) of respondents relied on information from the press and radio, respectively.

More than a half of interviewees (53.1%) consider the prices of regional products available on the market to be high. One in three people finds the prices of such products to be reasonable (29.6%) while 3.1% of respondents believe the prices are low (Fig. 4).

According to respondents, regional products were mostly purchased during festivals (Fig. 5). This was the opinion expressed by approximately 43.9% of interviewees. Another group (30.6%) purchases regional products with no special occasion, on an everyday basis, while one in four people (25.5%) declares to purchase such products for special holidays.

Most of the interviewees (56.2%) purchased regional products at least once a month (Fig. 6). Another group (18.4%) was able to make such purchases more frequently, i.e. at least once a week, while 25.5% of interviewees purchased regional products once during each half year or less frequently.

For 57.1% of interviewees, the reason for purchasing regional products was the intent to taste the culinary specialties of other regions (Fig. 7). Other groups of respondents (41.8% and 26.5%, respectively) purchased

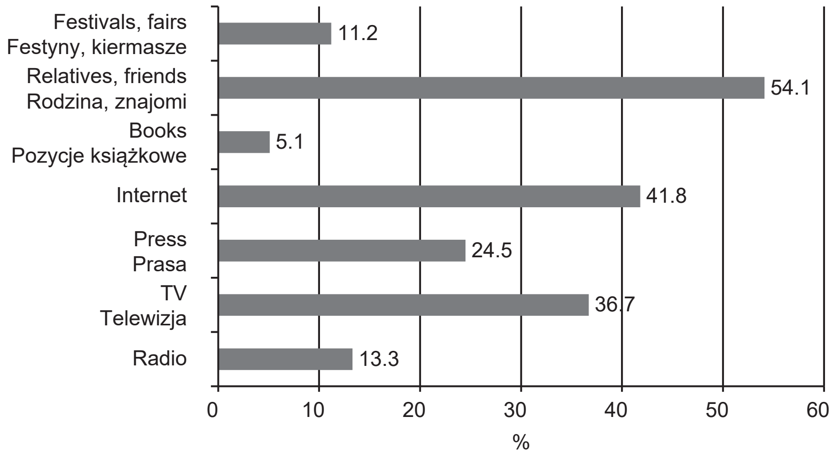

Fig. 3. The source of information on regional products from Lubelskie voivodeship according to the respondents (%). Explanation: Respondents were able to choose more than one response; thus, percentages do not add to 100
Source: own elaboration on the basis of research results.
Rys. 3. Źródło informacji o produktach regionalnych woj. lubelskiego w opinii respondentów (%). Objaśnienie: Respondenci mogli wybrać więcej niż jedną odpowiedź, dlatego odsetki odpowiedzi nie sumują się do 100%
Źródło: opracowanie własne na podstawie wyników badań.

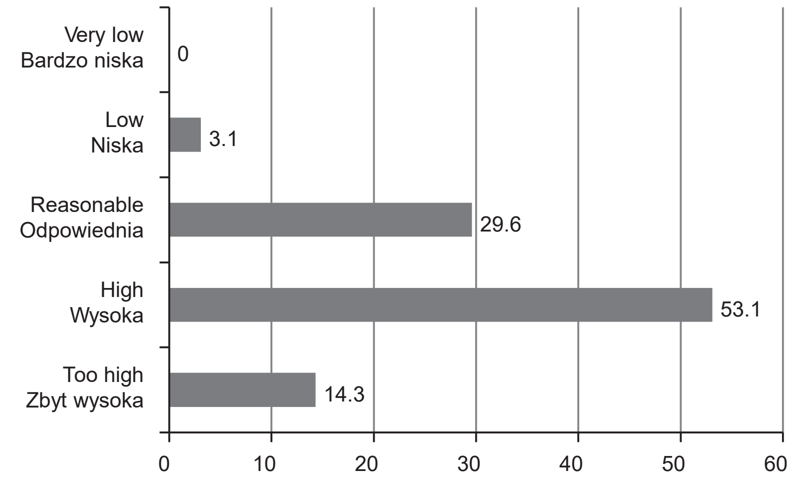

Fig. 4. Prices of regional products according to the respondents (%)
Source: own elaboration on the basis of research results.
Rys. 4. Wysokość cen produktów regionalnych w opinii respondentów (%)
Źródło: opracowanie własne na podstawie wyników badań.

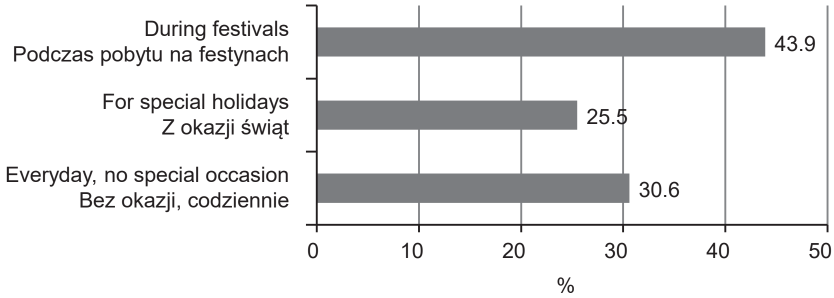

Fig. 5. Circumstances in which regional products are purchased according to the respondents (%)
Source: own elaboration on the basis of research results.
Rys. 5. Okoliczności zakupu produktów regionalnych w opinii respondentów (%)
Źródło: opracowanie własne na podstawie wyników badań.

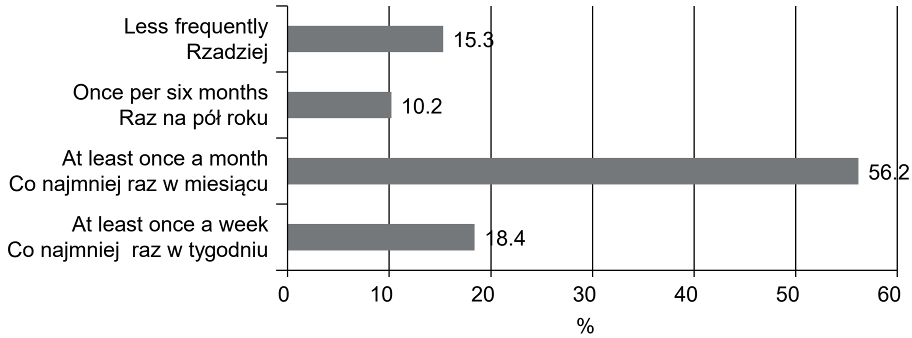

Fig. 6. The frequency of purchasing regional products according to the respondents (%)
Source: own elaboration on the basis of research results.
Rys. 6. Częstotliwość zakupu produktów regionalnych w opinii respondentów (%)
Źródło: opracowanie własne na podstawie wyników badań.

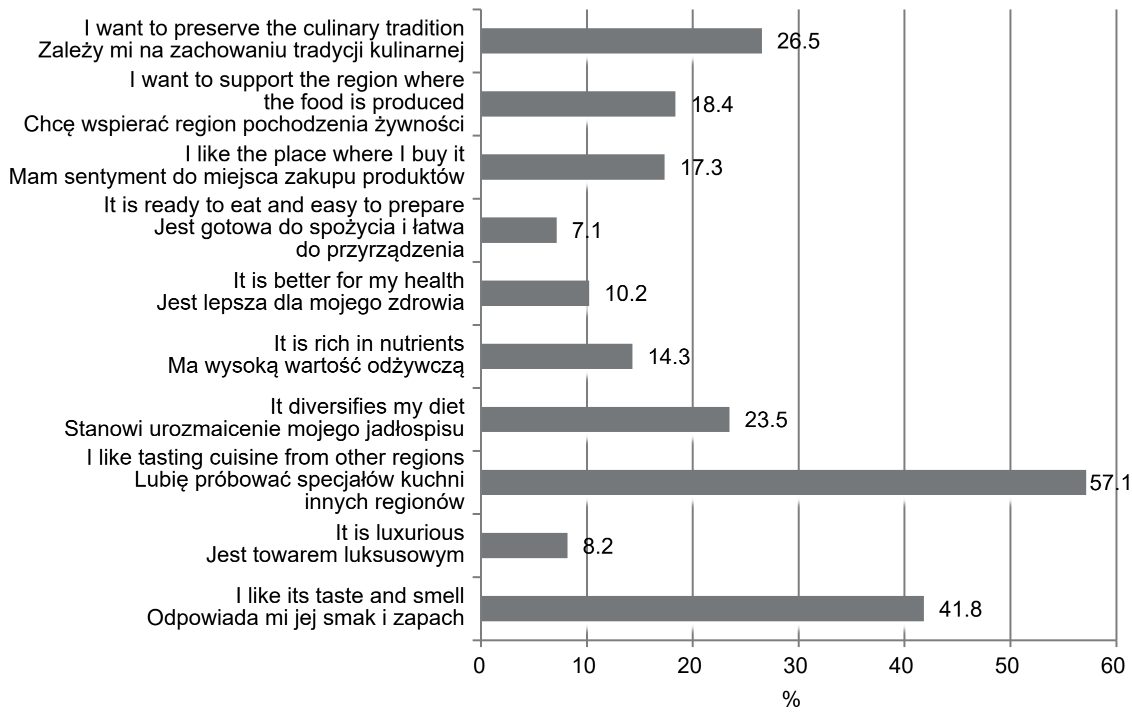

Fig. 7. Reasons for purchasing regional food according to the respondents. Explanation: Respondents were able to choose more than one response; thus, percentages do not add to 100
Source: own elaboration on the basis of research results.
Rys. 7. Motywy zakupu żywności regionalnej w opinii respondentów. Objaśnienie: Respondenci mogli wybrać więcej niż jedną odpowiedź, dlatego odsetki odpowiedzi nie sumują się do 100%
Źródło: opracowanie własne na podstawie wyników badań.

regional products because they enjoyed their taste and odor, and because they wanted to preserve the regional culinary tradition.

The respondents were critical of the availability of regional products on the Polish market (Fig. 8). More than 53% of them believe the availability to be low or definitely too low. According to 46.6% of the interviewees, the availability of regional products is sufficient or high.

The result of clustering the variables with the Ward's method is a dendrogram (Fig. 9). The number of clusters was determined based on the agglomeration line graph (Fig. 10). The beginning of a clearly longer vertical line, as shown on the diagram, corresponding to the linkage distance of 30 was assumed to be the cut-off point.

The analysis was the basis for identifying five clusters that reflect the purchasing patterns of regional products:

Cluster 1 (C4, C5, L3, LO4, ZPI3, ZPI4) includes persons aged 46 and above, living in families composed of 6 or more persons, who purchased regional food based on knowledge acquired from the press and Internet. For these people, prices of regional products were relatively low or very low.

Cluster 2 (C1, CZ1, L2, MD3, MZ2, MZ3, ZPI2, ZPI5, ZPI7, W3) is a group of persons aged 26–45 who hold a master's degree, live in cities with a population of up to 50,000 or in larger ones (up to 200,000), and learn about regional products from the TV and books or during festivals and fairs. With a net income above PLN 2,000, these people purchased regional food at least once a week while claiming that the prices were excessively high.

Cluster 3 (LO2, LO3, MD1, MD2, MZ4, OZ3) was composed of respondents from large cities with a population beyond 200,000, living in households shared by at least two but not more than six persons, with a net monthly income of up to PLN 2,000, who purchased regional products when attending a festival.

Cluster 4 (C3, MZ1, OZ1, OZ2, W2, ZPI6) included holders of a bachelor's degree living in rural areas who learned about regional food from relatives and friends, made their purchases for special holidays and found the prices of regional products to be reasonable.

Cluster 5 (C2, CZ2, L1, W1) covered the graduates of upper-secondary schools aged up to 25 who purchased regional food at least once a month and considered the food prices to be excessively high.

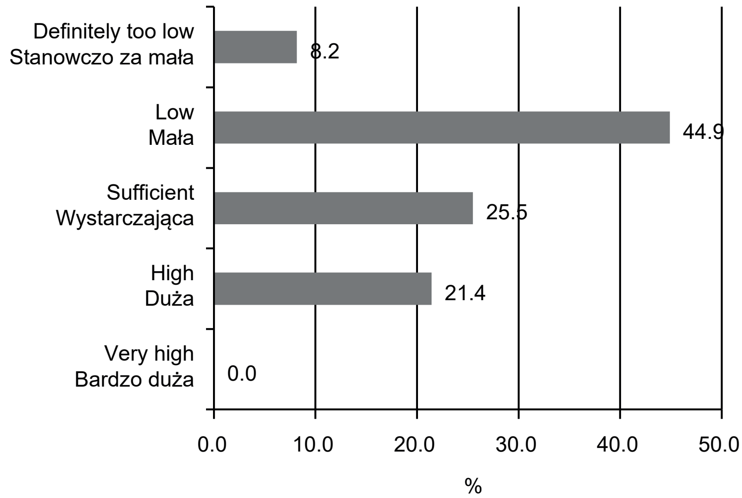

Fig. 8. Availability of regional products on the Polish market according to the respondents (%)
Source: own elaboration on the basis of research results.
Rys. 8. Dostępność produktów regionalnych na polskim rynku w opinii respondentów (%)
Źródło: opracowanie własne na podstawie wyników badań.

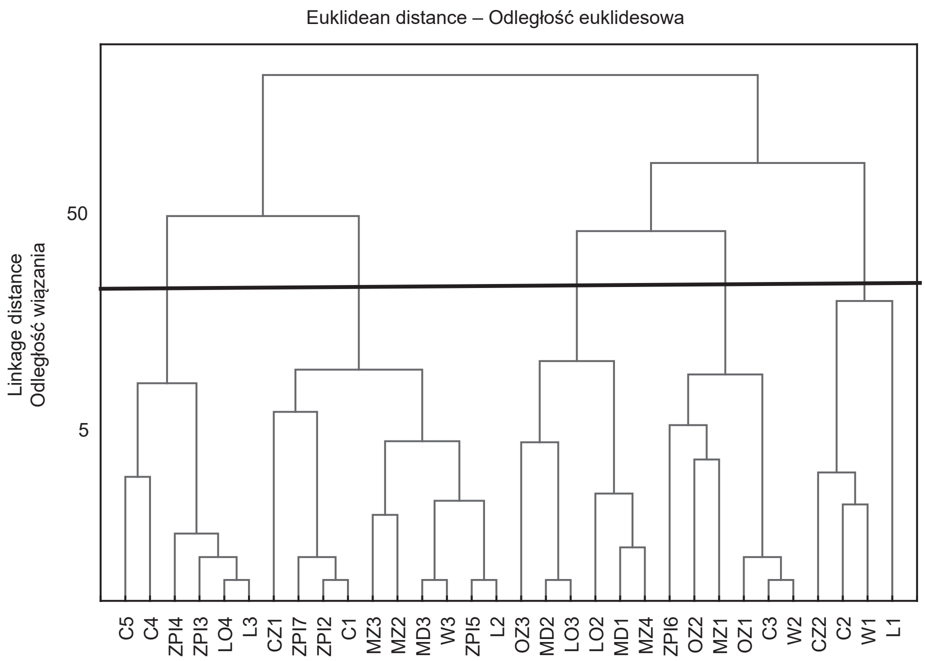

Fig. 9. Dendrogram of a hierarchical classification of the categories of variables developed with Ward's metod
Source: own calculations on the basis of research results.
Rys. 9. Dendrogram klasyfikacji kategorii zmiennych wykonany hierarchiczną aglomeracyjną metodą Warda
Źródło: obliczenia własne na podstawie wyników badań.

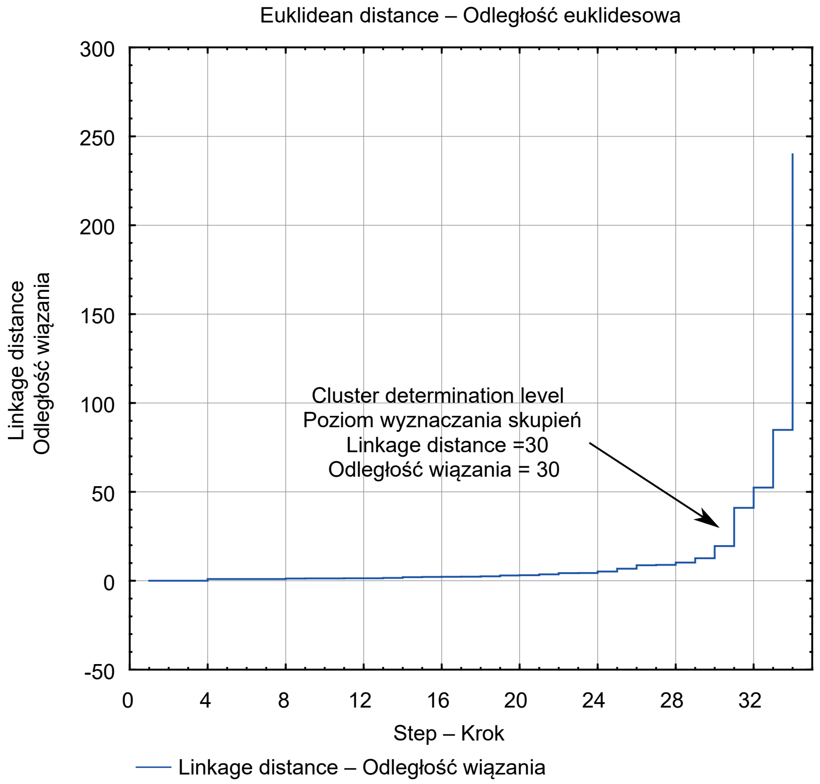

Fig. 10. Agglomerative clustering on the basis of the graph presenting linkage distance with regard to linkage stages
Source: own calculations on the basis of research results.
Rys. 10. Przebieg aglomeracji na podstawie wykresu odległości wiązania względem etapów wiązania
Źródło: obliczenia własne na podstawie wyników badań.

DISCUSSION

The survey of preferences demonstrated that foodstuffs whose regional origin was crucial for the respondents (Fig. 1) were mostly bakery products (47%), dairy products (35.3%) and meat (33.3%). The Lublin onion cake (*cebularz lubelski*, 55.8%), plain wafers (*wafle tortowe suche*, 49.9%), and Podlasie baumkuchen (*sękacz podlaski*, 47%) were the products and dishes most frequently mentioned by the interviewees as regional food specific to the Lubelskie voivodeship (Fig. 2). Alcoholic beverages, including *Półtorak*, *Dwójniak* and *Trójniak* mead (37.2%), were cited equally often.

The above shows that customers usually highlight the regional origin when purchasing foodstuffs from groups where this feature is of most interest to them. Note however that this feature is typically a secondary criterion for the selection of goods (Jąder, 2006). The consumer's interest in the regional origin of products purchased depends mainly on the foodstuff's features which are determinant for its quality and durability. Very often, consumers also pay attention to the price of such products. Product groups identified by the respondents (Fig. 1) were characterized by a low degree of processing and a short use-by date. Thus, freshness was of key importance and may be considered as one of the main selection criteria (Jąder, 2006).

The main reasons for purchasing regional products (Fig. 7) turned out to be the intent to try the culinary specialties of other regions and their pleasant taste and smell, as declared by more than 57% and 41.8% interviewees, respectively. Similar reasons for purchasing regional food were also cited by Pomianowski (2009) and Żakowska-Biemans (2012).

Although regional food is usually welcomed, the consumers see various barriers to purchasing such products. According to Żakowska-Biemans (2102), one of them is the high price level. In this survey, as much as 53.1% of the interviewees found the price of regional products (Fig. 4) to be high or too high (14.3%). The price factor may affect the propensity to purchase such foodstuffs, bearing in mind the trend of rising food prices and the increasing share of food expenses. Żakowska-Biemans (2012) believes that any activities aimed at reducing the price levels of traditional and regional food could harm its image. She also suggests that adequate price strategies are required to be established in order for this category of food to be positioned as a high-quality product with an excellent taste.

The survey also shows that the decisive factor for purchasing regional products is their availability. It turned out to be a very important barrier to the demand for more than 53% of the respondents (Fig. 8). The above conclusions are also confirmed by a 2014 survey among a selected group of young people. According to 27% of the interviewees from the Lubelskie voivodeship, the availability of regional products was low or very low. Half of them, especially urban dwellers, found the purchase of such products to be difficult (Paluch and Stoma, 2014). Similarly, in a study by Chudy and Gierałtowska (2012), all of the interviewees claimed the assortment of regional and traditional products to be insufficient. According to a study by Grębowiec (2010), there is a narrow (or very narrow) choice of traditional and regional food on the market, reflecting the low availability of these products to potential consumers.

The main source of information on regional products were relatives and friends (Fig. 3), as declared by more than half of the interviewees (54.1%). The popularity of regional food may be expected to grow on a continuous basis. The decisive role in the increasing popularity may be played by appropriate promotional activities which, in order to be effective, should be based on a broad advertising campaign. According to the respondents, Web-based advertising proved to be effective because it was identified as the source of information on regional products by 41.8% of them. The sources cited are the same as those listed by Paluch and Stoma (2014). However, these authors note that the urban population acquires information on regional products mainly from friends and relatives and when tasting such food in restaurants and during local fairs. Meanwhile, shop displays and in-store tasting are the usual sources of information on such products for the rural population.

The use of cluster analysis (Fig. 9) allowed to identify a group of people (cluster 1) who purchase regional products once during each half year, acquire the related information from the TV and Internet, and find the prices of regional products to be low of very low; and a group of people (cluster 2) aged 26–45 who hold a master's degree, live on their own in large cities, acquire in-depth knowledge of regional products from books and when attending fairs and festivals. Although financially stable (net income above PLN 2,000), these people found the prices of regional food to be excessively high but purchased it at least once a week.

Price was the main criterion for purchasing regional food in the case of consumers from smaller families (cluster 2), as additionally confirmed in a study by Grzybek (2009). In turn, the description of the consumer group shown in cluster 3 demonstrates that people with low income could afford purchasing regional products only occasionally, if at all. In this case, the results differed from those obtained by Grzybek (2009) who concluded that the price criterion of purchasing regional products was less important to the largest families.

Another conclusion from the Grzybek's study (2009) is that the price of regional products was taken into account mostly by graduates of upper-secondary schools and holders of a master's degree. These customers considered the prices of regional products, usually giving preference to higher ones. Also, they associated higher price levels with good product quality. The dependencies discovered by the author were comparable to those stated in cluster 2.

Similarly, in the case of persons from cluster 4, there was a link between the ability to buy regional products and the potential financial capacities. Usually, these people served regional products for special holidays. However, such food was generally more available to them, even on daily basis, mainly because of the prices they found to be reasonable. Another cause for the interest shown in such products was their availability, especially as persons from cluster 4 lived in rural areas where the supply of regional food could be relatively higher.

CONCLUSIONS

1. Media, mainly TV and Internet, prove to be the best channels for reaching the customer at the stage of regional product marketing. The information on such products usually came from the closest family and friends. Among 170 regional Lublin products entered by the Ministry of Agriculture and Rural Development to the list of traditional products, the best known are the Lublin onion cake (*cebularz lubelski*), Podlasie baumkuchen (*sękacz podlaski*) and Biłgoraj dumpling (*Pieróg [Piróg] Biłgorajski*).

2. Culinary festivals and fairs are the most popular place of purchasing regional products. Every second interviewee purchased such products at least once a month. Meanwhile, more than a half on interviewees had a negative opinion on the availability of such products on the market.

3. The consumers' income was a decisive factor for purchasing regional products. The financial stability of persons who may be considered rich consumers in the Polish context (cluster 2) allows them to purchase regional products at least once a week.

4. To a certain degree, this study was restricted by the size of the sample, and therefore a larger and more diversified group of respondents should be covered by future studies.

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WYKORZYSTANIE ANALIZY SKUPIEŃ W BADANIACH PREFERENCJI ZAKUPOWYCH PRODUKTÓW REGIONALNYCH Z WOJEWÓDZTWA LUBELSKIEGO

Streszczenie. Rosnąca świadomość konsumentów znajduje odzwierciedlenie w zwiększonym popycie na produkty charakteryzujące się szczególnymi metodami wytwarzania, wyjątkowym składem lub określonym pochodzeniem. Analiza preferencji konsumentów pozwala na ustalenie czynników warunkujących zakup produktów regionalnych. Celem pracy była identyfikacja czynników determinujących zakup produktów regionalnych z województwa lubelskiego na podstawie analizy skupień, z wykorzystaniem hierarchicznej aglomeracyjnej metody Warda. W badaniach przeprowadzonych w 2016 roku uczestniczyły 383 osoby. Oceny statystycznej wyników dokonano na podstawie analizy częstości i analizy skupień. Do najczęściej kupowanych produktów regionalnych w opinii respondentów należały wyroby piekarnicze (47%), w dalszej kolejności produkty mleczne (35,3%), mięsne (33,3%) oraz napoje alkoholowe (29,4%). Ponad 53% ankietowanych uznało, że ceny produktów regionalnych dostępnych na rynku są wysokie. Co trzecia osoba twierdziła, że są odpowiednie (29,6%), a nieco ponad 3% respondentów uznało, że ceny są niskie. Najlepszymi kanałami dotarcia do klienta z informacją o produkcie regionalnym na etapie jego wprowadzania na rynek okazały się telewizja i Internet oraz najbliższi krewni i znajomi, natomiast najpowszechniejszym miejscem nabywania produktów regionalnych, których zakup u co drugiego ankietowanego deklarowano co najmniej raz w miesiącu, były festyny i kiermasze kulinarne. Stwierdzono również, że dochody konsumentów nie były decydującym czynnikiem przy zakupie produktów regionalnych. Pomimo stabilności finansowej osoby, które można określić jak na polskie warunki mianem „bogatych" konsumentów, dokonywały zakupu produktów regionalnych relatywnie rzadko.

Słowa kluczowe: analiza skupień, produkty regionalne, zachowania konsumenckie

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