Evaluation of Slovak customers' attitudes to foodstuffs designated by protected geographical indication involving multivariate statistics

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Summary

The perception of Slovak consumers to foods designated by protected geographical indication (PGI) of Slovak and European production available in retails of Slovak Republic was investigated involving the methods of descriptive and multivariate statistics. The attitudes and preferences of different consumers, varying their age, gender, education, profession and other socio-demographic background were evaluated. From general point of view, a majority of respondents groups (78.4%) prefered to buy PGI foods mostly because of their above-average quality and more than 70% respondents were informed about the EU foods protection system. On the other hand, almost 50% of them did not know indication of the PGI foods. Most of the respondents perceive PGI foods as authentic and original products corresponding well with specific quality aspects and way of their production. Results of cluster analysis indicated clear differentiation of respondent groups into three main clusters and two sub-clusters, revealing that the preferences of respondents differed significantly not only by gender, education and employment status, but the meaningful extra positions were found for managers and respondents with medicinal professions. Principal component analysis confirmed that socio-demographic and socio-economic status of Slovak consumers significantly influences their preferences, attitudes and purchase behaviour.

Keywords

perception; food quality; protected geographical indication; market research; socio-demographic aspects; consumer behaviour; multivariate statistics

Foods designated by protected geographical indication (PGI) represent a substantial part of every single European Union member states' cultural heritage. Moreover, their production and sale represent meaningful economic inputs and outcomes for many regions. In order to retain many local culinary specialties, European countries established a system of original foods registration, giving thus a valuable framework for local producers enabling them to produce high quality regional commodities.

However, as lifestyles change, the perception of consumers to many original foods undergoes a significant modification. The acceptability of foods by consumers is highly dependent on their emotional status that is in turn influenced dominantly by their economic, social and cultural situation. Consumers' demands on the type of food they buy, their attributes and quality expectations are of growing tendency, nowadays. To fulfil the consumers' subjective needs in areas such as ethics, health, animal welfare, natural elaboration, environmentally friendly production, local origin etc., the specific markets of local specialities and/or high quality products are developed [1, 2].

Numerous different national public bodies, organizations and academic institutions deal with the problem of consumer behaviour, focusing on their expectations and perceptions in the different sectors of the food market [3–8]. Research performed in 2003–2006 in 15 EU countries on how consumers perceive, understand, like and use nutrition information on food labels was also presented by GRUNERT and WILLS [2]. The results of this study were summarized using a standard format guided by a model of consumer information processing, and subsequently processed using the MAXqda software (Verbi software, Marburg, Ger-

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many) in order to identify key findings and common themes across the studies. Results obtained were fully consistent with those earlier presented by COWBURN and STOCKLEY covering the research in this field up to 2002, but provided new insights into consumers' preferences and understanding of the simplified front of pack signposting formats [9]. The study recently published by KLEEF et al. [10] was aimed at consumers' appreciation of front-of-pack labelling of the caloric content of food products and their specific preferences for alternative execution formats of such a type of information in Europe. As clearly follows from the abovementioned studies, there is an urgent need for additional research focused on the consumers' use of nutritional information presented on food labels.

The relationship between the consumers' attitudes, knowledge and behaviour regarding the food safety aspects was evaluated by WILCOCK et al. [11]. The authors indicated that different attitudes did not necessarily lead to behaviours that increase the safety of food consumed and concluded that there exists the need for professional assistance for consumers regarding the food safety issues. In this context, HOHL and GASKELL presented a comparative study of public perceptions of food risk across 25 European member states, assuming that people in a majority of European countries express similar levels of concern about this topic. In addition, multilevel modelling showed that cross-national differences in individual respondents' intensity of worries are in part attributable to shared "country effects" and generalize risk sensitivity about a range of personal risks. When studying the structure of food risk concerns, principal components analysis pointed on three main dimensions of this problem, namely, on adulteration and contamination, health effects and production hygiene issues [12].

There is a lack of information on market research oriented to foodstuffs with protected geographical indications. Up to present, only one single report of market research of protection of food names on a geographic or traditional recipe basis was published [13]. In the study, respondents were asked how familiar they were with the following three designations: protected designation of origin (PDO), protected geographical indication (PGI) and traditional specialty guaranteed (TSG). The majority of respondents appeared to be familiar with at least one of these terms.

VANHONACKER et al. provided a consumer-driven definition of traditional food products and investigated the image European consumers have about this food product category [14]. The effect of geographical origin, size of locality and/or preciseness of its definition on consumers' expectations was studied by STEFANI et al. [15]. Results obtained clearly demonstrated that the narrower and more precisely defined the area of origin, the higher the quality expectation of consumers, thus supporting the role of origin as one of the quality aspects. In addition, direct relationship between the food product origin and willingness of consumer to buy it was found.

As processing market research data represents a multidimensional problem, the use and application of multivariate statistics is of growing importance in this field. Recently, principal component analysis (PCA) and hierarchical cluster analysis (HCA) were successfully applied to the evaluation of data on food safety knowledge and practices, collected via the individual face-to-face questionnaires with domestic food producers [16]. Results of cluster analysis of the 2006 survey of Canadians' demands on food products supporting health and wellness were presented by HERATH et al. [17]. HOHL and GASKELL presented a comparative study of public perceptions of food risk across 25 European member states using the PCA multivariate statistics [12]. Multivariate statistics was effectively applied on market research data also by other authors, investigating various aspects of this area [18–21].

In this contribution, the results of market research focussed on the Slovak consumers' perception of foodstuffs of Slovak or European origin designated by protected geographical indication are presented. It should be noted here that when speaking about EU products, those made in Slovakia are included, but the term "European" is related just to the products imported to the Slovak Republic.

Involving multivariate statistical methods, i.e. PCA and HCA, the exact comparison of customers' attitudes was performed, taking into consideration the age, gender, education, profession and other socio-demographic background of consumers. The qualitative evaluation of data presented here represents a complement to quantitative evaluation previously published by SUPEKOVÁ et al. [22].

MATERIALS AND METHODS

A group of 600 respondents, divided into 40 target groups selected according to socio-demographic and economic status, were interviewed about factors influencing their behaviour towards the purchase of food products of above-average quality. Data were collected using a questionnaire

survey. Each questionnaire consisted of 8 questions, possessing a total count of 30 feasible answers oriented to the preferences of respondents towards quality aspects, knowledge on the system of their geographical indications and designations of origin protection.

The questions were aimed to:

1. preferences towards EU foodstuffs (questions 1a–1c);
2. qualitative aspects of preferred foodstuffs (questions 2a–2f);
3. knowledge on EU system of food origin protection (questions 3a–3c);
4. knowledge on indications used for foodstuffs origin designation (questions 4a–4c);
5. accessibility of foodstuffs with designation of origin in a local market (questions 5a–5c);
6. the meaning of the term "original" foodstuffs (questions 6a–6e);
7. the image of original foodstuffs (questions 7a–7d);
8. the relationship of geographical designations and quality (questions 8a–8c).

Questions on socio-demographic information were also included in the questionnaire, enabling the classification of respondents. The following parameters were of interest: gender, age, educational level, social class, employment status etc. Further details on the survey arrangement and way of data collection may be found in [22].

Obtained data were processed and evaluated using Unistat software (Unistat, London, United Kingdom), involving pattern recognition techniques, i.e. the cluster analysis (CA), a classification method used to arrange a set of cases into clusters, and PCA, a widely used multivariate analytical statistical technique to reduce dimensionality of the data by linear combinations of original dependent variables to a smaller set of new uncorrelated variables (principal components) [23]. Groups of respondents were compared according to their answers' similarities or differences, expressed as percentage preferences.

RESULTS AND DISCUSSION

In our previous work, partial results of market research focused on the analysis of the specific attitudes of individual consumer types based on the differences between genders were presented [22]. In this study, Slovak consumer attitudes, preferences and behaviour in the consumption of geographically protected foods of domestic and foreign origin were analysed.

As clearly depicted on Fig. 1, very large variability of preferences among the respondents groups to the answers of the questionnaire was achieved. Most significant differences were found in consumers' opinion and knowledge on food safety and geographical origin protection. A ma-

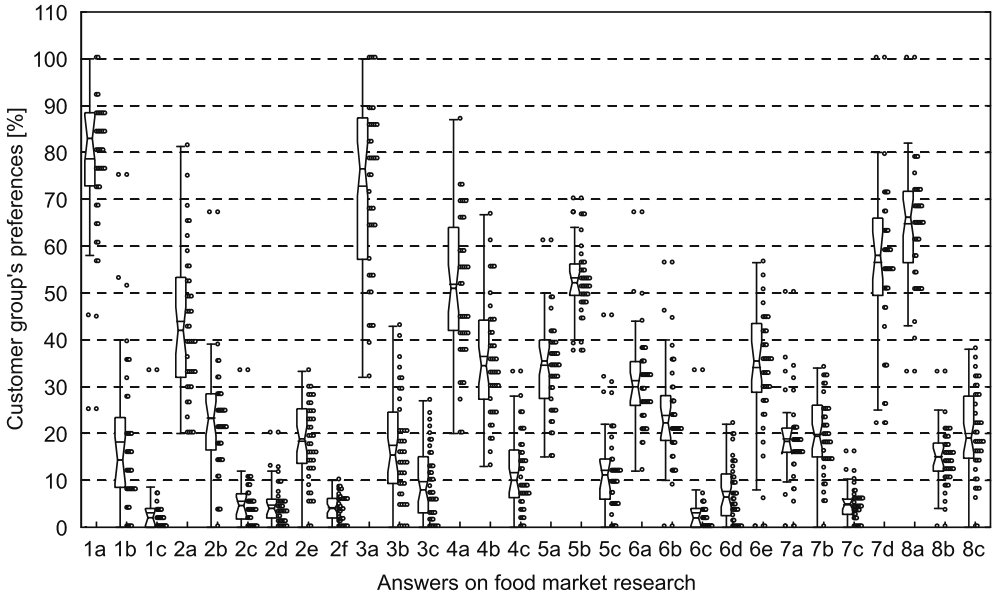

Fig. 1. Box/Whisker and dot plot of customers' preferences on food market, based on the answers of questionnaire.
General questions are to be found in text.

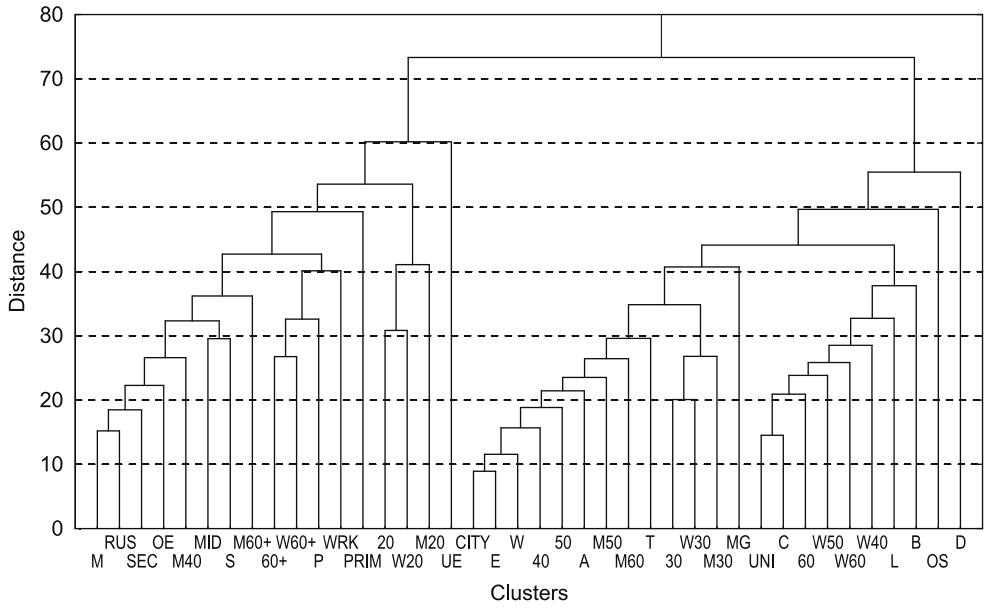

Fig. 2. Cluster analysis of respondents groups based on their preferences in answers.
Respondents: W – women, M – men, 20–60 – age, CITY – urban population, RUS – rustic population, D – doctor, L – lawyer, T – teacher, P – pensioner, C – civil servant, E – employed, UE – unemployed, B – businessman, MG – manager, A – administration, S – student, W – workman, PRIM – primary school, S – secondary, MID – middle junior high school, UNI – university, OS – other schools.

jority of respondents groups (78.4%) prefer to buy foods made in EU (including those of Slovak production) mostly because of their above-average quality. The brief analysis of answers on the questions concerning the origin of products, their quality, safety and the relationship between the designated origin and quality (questions 1, 2, and 8) just according to the professions of respondents showed that the preferences of groups of retired respondents, managers, medicine doctors or lawyers to buy products originating in EU exceeded 80%, whereas the unemployed people group score reached only 25%. The preferences of EU products from their qualitative aspects point of view (without respect to whether they are of designated origin or not) are important only for less than 6% of respondents in groups of labourers, and even 0% in a group of doctors. In contrast, when the relations between the designated origin and quality aspects were monitored, 100% of the group of doctors believe that designated equals/means quality. In addition, more than 70% respondents know that EU protects production of original foods by law, but approx. 50% do not know the indication of PGI. Majority of the respondents perceives original foods such as product with well-known, historically verified quality, and made by authentic recipes and procedures.

In view of the fact that the market research covered a large number of respondents of different socio-economic and socio-demographic status, it should be noted here that the above-presented results do not reflect the global opinion of the respondents groups, it is just an illustration of the density of answers.

In order to obtain a complex view of the entire consumers groups according to their opinions and answers to the all interviewed questions at once, taking into account their different status, pattern recognition analysis of questionnaire data was performed, involving the cluster and principal component analysis. These two procedures allowed the comparison of the entire groups and the respondents' answers similarities/differences all-in-one *en bloc*.

Results of cluster analysis are presented in Fig. 2 in the form of dendrogram. For its construction, a method of average within groups and Euclidean distance measure was used. Using this approach, different segments of consumers were assessed and divided to three main large clusters and two extra positioned stand-alone groups. The first cluster is represented mainly by males (M), both old or very young aged respondents, with basic or middle education level and originating from countryside regions (Fig. 2, RUS). The second cluster consists of mainly female respondents (W), employed (E), with higher education (university degree) and originating mostly from urban regions (Fig. 2, CITY). In the third cluster, groups of respondents such as

older females and intellectual professions can be found. Extra positions in the cluster graph belong to managers (MG), non-educated consumers (OS) as well as to consumers with medicinal profession (D). On the top of the dendrogram (at a distance of 60), an extra group of respondents in unemployed status (UE) is found. It should be noted here, that although the last mentioned clusters are in extra positions, in comparison to the main three ones, the groups of respondents categorized into them do not reveal the same options/answers, but differ significantly one to each other and also to the groups categorized into main clusters.

A better differentiation of individual groups according to their preferences is possible by PCA. Due to large numbers of consumer types, the processed data were divided and studied in two individual subsets: in the first one, the opinions of respondents were classified according to their age, gender and place of residence; and in the second, their education and profession were taken as the criteria.

PCA of the first subset (Fig. 3) shows meaningful differences in the consumers' attitudes, mostly influenced by the age of the respondents. Very different opinions were found between groups of twenty, thirty and more than sixty years old consumers, but relatively very similar were 40–60 years old respondents' attitudes. The differences between genders or place of residence were not so significant although these groups were in subtending positions. The differences found among groups were caused mainly by the variance in answers to questions concerning the knowledge on geographical protection of foods and designation of their origin.

As demonstrated in Fig. 4, PCA of the remaining data set facilitated an unambiguous differentiation of respondents groups based on their education and profession. As follows from the eigenvalues (data not presented), the variability of the system was influenced mostly by the differences in preferences of respondents with/or without primary education (PRIM, OS) as well as of one selective group of respondents with medical education (D). These groups of consumers differed from the others in their attitudes to traditional foods and exhibited different criteria in food purchase decision making. In the majority of cases, education level correlated well with the different professions of respondents, since the differences in the intellectual bases were evident, as well.

PCA of both data sets clearly demonstrated the significant impact of socio-demographic and socio-economic variables on consumers' preferences, attitudes and behaviour in the food market sector. These aspects are in close connection to the preferences of foods with higher added values arisen either from protection of their geographical origin or traditional manufacturing process.

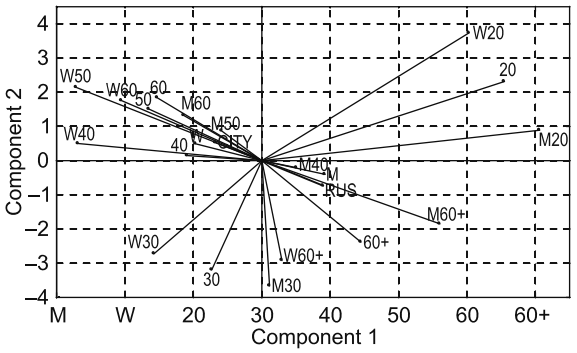

Fig. 3. Principal components analysis of respondents groups according to their sociological background (gender, age, place of residence).
Respondents: W – women, M – men, age: 20–60, residence: CITY – urban, RUS – rustic.

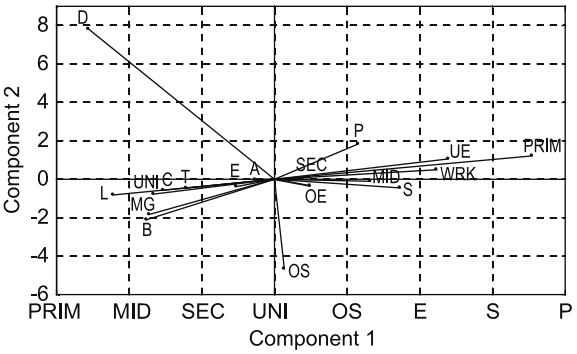

Fig. 4. Principal components analysis of respondents groups according to their educational and professional background.
Respondents: D – medical, L – lawyer, T – teacher, P – pensioner, C – civil servant, E – employed, UE – unemployed, B – businessman, M – manager, A – administration, S – student, W – workman, PRIM – primary school, S – secondary, MID – middle junior high school, UNI – university, OS – other schools.

CONCLUSION

Multivariate statistics applied to food market research data exhibited very significant differences between demographic groups, taking into consideration the attitude and preferences of foodstuffs with high added value, which is characteristic for foods with a PGI label. This approach has been found to be an effective and relevant tool to study the relationships between the factors im-

portant for future development of food marketing strategies. In view of significant differences found for some specific socio-economic groups, special attention should be paid to provide them with comprehensive information on qualitative aspects of foods, adequate to their level of education or knowledge basis, respectively.

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REFERENCES

1. Sylvander, B. – Melet, I.: Marchés des produits de qualité spécifique et conventions de qualité spécifique dans quatre pays de la CEE. INRA-MAP-MESR, Serie P, 1992, No. 92–02, pp. 167.
2. Grunert, K. G. –Wills, J. M.: A review of European research on consumer response to nutrition information on food labels. Journal of Public Health, *15*, 2007, pp. 385–399.
3. Grunert, K. G.: Current issues in the understanding of consumer food choice. Trends in Food Science and Technology, *13*, 2002, pp. 275–285.
4. Grunert, K. G. – Bredahl, L. – Brunsø, K.: Consumer perception of meat quality and implications for product development in the meat sector: A review. Meat Science, *66*, 2004, pp. 259–272.
5. Becker, T.: Consumer perceptions of fresh meat quality: A framework for analysis. British Food Journal, *102*, 2000, pp. 158–176.
6. Functional food, drinks & ingredients: Consumer attitudes & trends. London : Datamonitor, 2008. 97 pp.
7. Evans, M. – Patterson, M. – O'Malley, L.: The direct marketing-direct consumer gap: qualitative insights. Qualitative Market Research: An International Journal, *4*, 2001, pp. 17–24.
8. Krystallis, A. – Chryssochoidis, G. – Scholderer, J.: Consumer-perceived quality in 'traditional' food chains: The case of the Greek meat supply chain. Appetite, *48*, 2007, pp. 54–68.
9. Cowburn, G. – Stockley, L.: Consumer understanding and use of nutrition labeling: a systematic review. Public Health Nutrition, *8,* 2005, pp. 21–28.
10. Van Kleef, E. – Van Trijp, H. – Paeps, F. – Fernández-Celemín, L.: Consumer preferences for front-of-pack calories labelling. Public Health Nutrition*, 11,* 2008, pp. 203–213.
11. Wilcock, A. – Pun, M. – Khanona, J. – Aung, M.: Consumer attitudes, knowledge and behaviour: a review of food safety issues. Trends in Food Science and Technology, *15*, 2004, pp. 56–66.
12. Hohl, K. – Gaskell, G.: European public perceptions of food risk: cross-national and methodological comparisons. Risk Analysis, *28*, 2008, pp. 311–324.
13. Defra : Market research report : Protected food names scheme. Wolverhampton : ADAS Market and Policy Research Group. 2003. 30 pp.
14. Vanhonacker, F. – Lengard, V. – Guerrero, L. – Scalvedi, L. – Raude, J. – Zakowska, S. – Hersleth, M. – Verbeke, W.: Europeans and traditional foods: Definition and image from the consumers' perspective. In: 12th Congress of the European Association of Agricultural Economists, August 26–29, 2008, Ghent, Belgium. Paper with number 43542. The Hague : European Association of Agricultural Economists, 2008, pp. 1–3.
15. Stefani, G. – Romano, D. – Cavicchi, A.: Consumer expectations, liking and willingness to pay for specialty foods: Do sensory characteristics tell the whole story? Food Quality and Preference, *17*, 2006, pp. 53–62.
16. Kennedy, J. – Jackson, V. – Cowan, – Blair, I. – McDowell, D. – Bolton, D.: Consumer food safety knowledge: Segmentation of Irish home food preparers based on food safety knowledge and practice. British Food Journal, *107*, 2005, pp. 441–452.
17. Herath, D. – Cranfielda, J. – Hensona, S.: Who consumes functional foods and nutraceuticals in Canada? Results of cluster analysis of the 2006 survey of Canadians' demand for food products supporting health and wellness. Appetite, *51*, 2008, pp. 256–265.
18. MacFie, H. J. H. – Thomson, D. M. H.: Measurement of food preferences. London : Blackie Academic and Professional, 1994. 301 pp. ISBN 0834216795.
19. Vigneau, E. – Qannari, E. M. – Punter P. H. – Knoops, S.: Segmentation of a panel of consumers using clustering of variables around latent directions of preference. Food Quality and Preference, *12,* 2001, pp. 359–363.
20. Vigneau, E. – Qannari, E. M.: Segmentation of consumers taking account of external data. A clustering of variables approach. Food Quality and Preference, *13*, 2002, pp. 515–521.
21. Ries, N. M. –Shelley, J. J.: Food, health and biotechnology : Consumer and social issues in Canada's new food and health product industries. Victoria, B. C. : Advanced Foods and Materials Network, 2007. 52 pp. ISBN 978–1–55058–355–7.
22. Supeková, S. – Honza, M. – Kačenová, D.: Perception of Slovak foodstuffs designated by protected geographical indication by Slovak consumers. Journal of Food and Nutrition Research, *47*, 2008, pp. 205–208.
23. Unistat 5.6, Statistical Package for Windows. User's guide. London : Unistat, 2005. 953 pp.

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