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Recognition of business risks when purchasing goods on the Internet using GIS: experience from Slovakia

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Abstract For operators of Internet shops and their investors on the one hand, and suppliers on the other hand, knowledge of the consumer market is becoming critical in terms of the risk of non-payment for purchased goods, as most small e-shops maintain their stocks according to current demand. The aim of this paper is to identify customers who come from different districts of Slovakia and display a certain type of consumer behavior regarding the risk connected with willingness to pay for goods purchased via the Internet. To solve this problem we used data from a specialized e-retailer and Geographic Information Systems (GIS) as a Decision Support System generator for constructing maps of consumers to investigate the operation of an e-shop. In the article, we used data from the years 2012–2015 concerning 489 buyers, including their addresses and other geographical data about the consumers and their purchases, and integrated them into the GIS environment. Subsequently, the data were analyzed and documented by means of GIS and maps of consumers were generated. The result of this study is to show that GIS can play a significant role in the decision-making process of e-shops in support of a manager's

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experience. The geographical results were evaluated statistically in order to offer a better information capability.

Keywords E-commerce · GIS · Risk attitude · Willingness to pay · Decision support system

JEL Classification L81

1 Introduction

As we enter the twenty-first century, business conducted over the Internet (which we refer to as 'e-business'), with its dynamic, rapidly growing, and highly competitive characteristics, promises new avenues for the creation of wealth [1]. The e-commerce industry represents one of the largest industries worldwide. For example, in the United States, it is the second largest industry in terms of both the number of establishments and profits, with sales of $3.8 trillion annually [2]. This reality is also reflected in Slovakia, where the consequences of this trend have resulted in a continuous emergence of new online stores and online companies. From year to year, the opportunity to compete on the market, differentiate, and especially to build the brand is becoming more and more limited. In 2013, according to the portal heureka.sk, Slovakia had more than 7000 e-shops.[1] In 2015, according to the Association of e-shops portal, more than 8000 e-shops were operating in Slovakia.[2] According to the statistics of this portal, about 70% of all Internet shops are smaller e-shops which are operated by their owners as part-time jobs. The remaining 30% are regular full-time shops. For comparison, in the neighboring Czech Republic, with a consumer market twice as large as that in Slovakia, there are about 38,000 e-shops.[3]

From the available sources [15, 17, 18] it is clear that the e-commerce market in Central and Eastern Europe has been developing dynamically in recent years and mirrors the development in economically advanced countries of the world.[4] The reasons for the strength and the persistence of the growth in the electronic marketplace are threefold: there are still substantial numbers of online buyers using the Internet for the first time; existing online consumers spend more per capita, and many new transactional websites have been launched by established offline retailers (Clements 2011). On the other hand, e-retailers calculate that there are high

[1] http://www.zive.sk/clanok/69419/pocet-e-shopov-na-slovensku-presiahol-7-tisic.

[2] http://onas.heureka.sk/pre-media/tlacove-spravy/article/pocet-e-shopov-na-slovensku-presiahol-8000-10366, http://asociaciaeshopov.sk/o-nas.

[3] https://www.shoptet.cz/tiskove-zpravy/vysledky-e-commerce-za-rok-2015—obliba-nakupovani-pres-internet-stale-stoupa-/.

[4] https://www.ecommerce-europe.eu/news-item/eastern-europe-an-upcoming-e-commerce-market/.

operating costs that are related not only to the technological development of e-shops [26], but also to the logistics of goods, marketing, etc.

The aim of small vendors is to offer quality products and reputable brands to consumers through their own online shop, such as, for example, ortobenex.sk, which started to operate on the Slovak market in 2012. Access to the internal data of this e-shop was crucial for our ability to write this paper. During the preparation of the article, the authors asked the following research questions, the answers to which could serve the general discussion on the practical use of geographic information about customers for the needs of businesses in e-commerce:

- What is the geographical distribution of shoppers at an e-shop specializing in the sale of medical products in Slovakia? Does this elementary knowledge of the spatial distribution of the shoppers have any significance for the seller?
- From which types of territories (regions) do the customers of the e-shop being monitored usually come? Are they mostly urban regions, or is the residence of customers not important for shopping at an e-shop? How does the relationship between the urban and rural nature of the region influence the average rate of turnover?
- What socio-economic indicators explain the spatial variability of shoppers in the e-shop? How, for example, does computer knowledge or the membership of Romani in the Slovak population influence the intensity of Internet shopping?

2 Theoretical background

In online shopping, with the passage of time the variety of marketing channels is increasing, as is the complexity of consumers' purchasing behavior [5]. Given that anybody can sell products online through cybermediaries, coupled with the anonymity of the Internet, customers face a tougher challenge to verify the credibility of the vendors and authenticity of the products listed for sale [20]. Against this background, consumers tend to switch between e-channels when buying products, mainly because of the considerably increased financial, security, and performance risks the Internet poses in comparison with offline shopping [13]. Thus, they tend to buy products and use web vendors that offer high quality and low risk [4]. As a result, e-retailers adjust their thinking and focus on the minimization of the risks connected with a client not paying for goods. Knowledge about the impact of the perceived risks of non-payment with regard to online vendors is still scant. This paper seeks to make a contribution that builds on the small but growing body of work in this area [11], which views the uncertainties associated with the handling of transactions and perception of the risk to e-shops as some of the major problems causing consumers' hesitation about taking advantage of willingness to pay to support a manager's experience.

Because of the high level of dynamism in technological developments, an online channel provides an innovative retail environment. The Geographic Information Systems (GIS) technology uses stored data to create customized computer-based

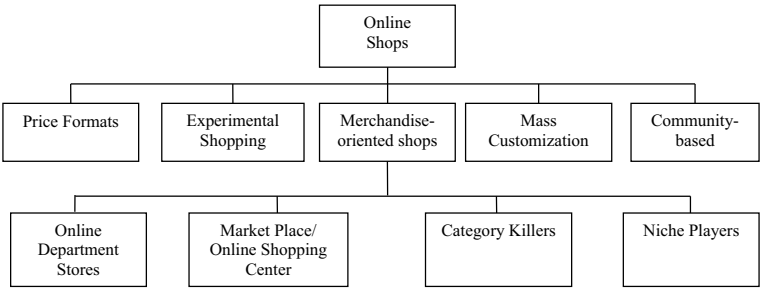

Fig. 1 Formats in online retailing. *Source*: Zentes et al [31]. *Strategic Retail Management*. GABLER, p. 76

maps showing location and attribute information about objects of interest to a decision maker [12]. In particular, GIS is a specific software technology that Sprague and Carlson [22] call a decision support system generator, a tool used to create decision support systems for use with specific decision-making needs. When analyzing the performance of sales, specifically shoppers, GIS is suitable not only as a cartographic (visualization) device, but also as an analytical (interpretative) research tool. GIS can be considered an appropriate tool for dealing with retail trade [3, 21], also from the managers' viewpoint.

In terms of the classification of e-shops (Fig. 1), as in traditional stores, because not all online shops follow the same business – similarly to the categorization of store formats, it is possible to distinguish between e-shopping formats in online retailing [31]. Their work identifies the most important retail formats in online retailing.

This classification of e-shops shows that online shoppers have a specific decision-making style and their knowledge of the market and products which, according to Schwartz et al. [24], indicates an individual's "tendency to seek optimality" on a one-dimensional satisfying-maximizing continuum [23].

3 Methodology and data

For the achievement of this study, an investigation was designed with a quantitative, descriptive, inductive, transversal and correlated approach. Data were collected from the firm's database, which covered all its customers in the period 2012–2015. To identify the spatial coordinates we used the "Geocoding" tool (see Goldberg [10] or Zandbergen [28, 29]). The geocoding process is defined as the process of converting the descriptive form of the localization of a site into spatial coordinates. The technical specifications are defined in the ISO 19133 standard.

For our geocoding needs, we selected two services available in Slovakia. Primarily, we used Google Maps and subsequently, during the process of the verification of location and Google's misidentification, we used the application "mapa.zoznam.sk", which had more current base map and address points.

Table 1 Summary of reasons for poor localization within the process of geocoding. *Source*: Authors' own research

Causes of erroneous localization	Correction records
Street name (use of abbreviations, errors in words, unlisted address)	61
Street name (diacritical errors)	31
House number (incorrect, unreported, unidentified)	22
Total	114

Before the geocoding process, it was necessary to manually fix errors in the addresses in the list of the e-shop's customers. Within this manual correction, it was necessary to correct 114 addresses. An overview of the problems in the addresses is provided in Table 1. The correction of an incorrect or inaccurate address was performed in the following way: in cases of the misidentification of the house number, the location was placed on the centerline of the street and in the case of an unidentified street, the location was placed on the centroid of the municipality. In the course of the process of geocoding, it was found that the address points that were used are more up-to-date than the maps used in map servers.

At the beginning of the analytical section, after the presentation of the basic characteristics of the data that were surveyed, we used a classification of Slovak districts based on an urban/predominantly urban/rural trichotomy. When classifying the districts of Slovakia within these three classes we used the methodology adjusted to reflect the specific characteristics of Slovakia, based on the territorial definition of rural areas applied in the EU (Eurostat), i.e., on two hierarchical levels of territorial units: the local level and the regional level. At the local level—NUTS V (Nomenclature des unités territoriales statistiques)—a rural area is defined as a rural community with a population of less than 3000 inhabitants and a population density of less than 100 inhabitants per km^2. If a municipality has the status of a town, regardless of the previously mentioned criteria, it is classified as a community of the urban type. At the regional level, rural municipalities in the NUTS III and NUTS IV categories, a rural region is an administrative unit that is classified according to the degree of rurality, which is based on the share of the population living in rural municipalities of the total population in the region. Those regions where 15–50% of the population lives in rural areas are considered predominantly urban regions and those regions where more than 50% of the population lives in rural areas are considered predominantly rural regions. Those regions where less than 15% of the population lives in rural areas are considered urban regions.[5] In correlation and regression analysis, we used, among other things, the variable of the proportion of the rural population (2015). Under this variable we obtain precise values for the share of the population living in rural areas calculated according to the methodology outlined above.

For the needs of further spatial and statistical analysis, the characteristics of the shoppers were aggregated into higher-order administrative units, particularly at the district level. The spatial data of the administrative classification of Slovakia were

[5] Considering the fact that there is no district in Slovakia with more than 85% of the population in rural municipalities, this type of rural district was not defined in the methodology.

obtained from ZBGIS® (a basic database for the Geographic Information System) at "generalization level 1". To analyze the consumers from our dataset deeply we used statistical data available from publicly accessible databases of the Central Office of Labor, Social Affairs, and the Family and the Statistical Office of the Slovak Republic. In the case of the purchasing power of the population, we used the GfK map for obtaining the categories (a total of 9), not specific values. Considering the higher number of categories, within the correlation and regression analysis this ordinal variable was treated as a cardinal variable.

4 Results

The e-shop that was analyzed, ortobenex.sk, focuses on the sale of medical goods to the general public and athletes and began its operation in 2012. In its first year of operation it registered a total of 58 purchases and the total turnover was less than EUR 2500 (2364). The following year, the number of purchases and sales increased significantly, as shown in Fig. 2. The e-shop achieved its highest sales in 2014, when it reached 6.5 thousand EUR, but the number of purchases decreased. In 2015, the number of purchases and sales decreased. In our opinion, a possible cause of the decrease may be, e.g., the lack of marketing activities on the part of the operator. On the other hand, it should be emphasized that in 2015 the competition in this retail segment in Slovakia increased massively. Nevertheless, the constant increase in the average price of one purchase, from 35 EUR (2012) to 45 EUR (2015), can be considered a positive aspect. Cumulatively, over the past four years the e-shop reached almost five hundred purchases (489) and a turnover of over 20,000 EUR before tax (20,094).

Spatially, the development in the years 2012–2015 was very uneven, characterized by a gradual increase in the geographic field covered by the e-shop. While in 2012 the purchases were registered in 36 districts of Slovakia, in 2013 the figure had already reached 61 districts. In the next two years, the number of districts decreased (2014: 56, 2015: 50 districts), but in 2015 the internet shop ortobenex.sk reached a coverage of nearly two-thirds of all the districts in Slovakia. The total number of locations (municipalities) in which purchases were registered increased in 2012–2015 to 227 (for comparison, in 2012 it was only 44 municipalities). In most districts there were two or more locations; the highest numbers were reached in south-western Slovakia (districts of the capital, Bratislava), the lowest in the eastern part of the country (Prešov and Košice). If we look at the indicator of spending per 10,000 residents of a district, then its development over time varied considerably (see Fig. 3).

Considering the relatively low number of purchases each year and their considerably high spatial differentiation, we cannot analyze the sales potential of the districts of Slovakia from year to year, but if the data are aggregated together over the period, we can. Therefore, the available economic results of the e-shop are aggregated into a synthetic map, which also indicates the level of urbanization of the territory, which can be considered to be one of the key conditions for business success (see Fig. 4).

As shown in Fig. 4, demonstrating the average cost of purchases and sales equivalent to 10,000 members of the population of the given district in 2012–2015, the purchases from the e-shop were mainly concentrated in western districts or,

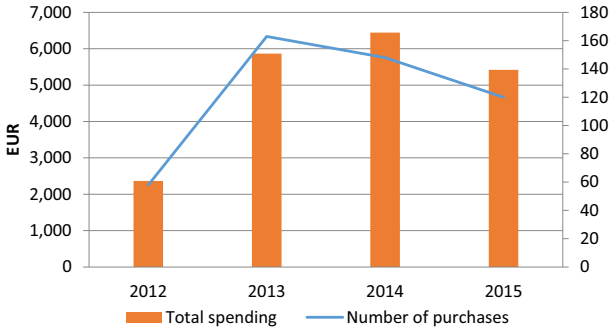

Fig. 2 Number of purchases and the total spending (in EUR) at the e-shop ortobenex.sk in the period 2012–2015. *Source*: authors' own research

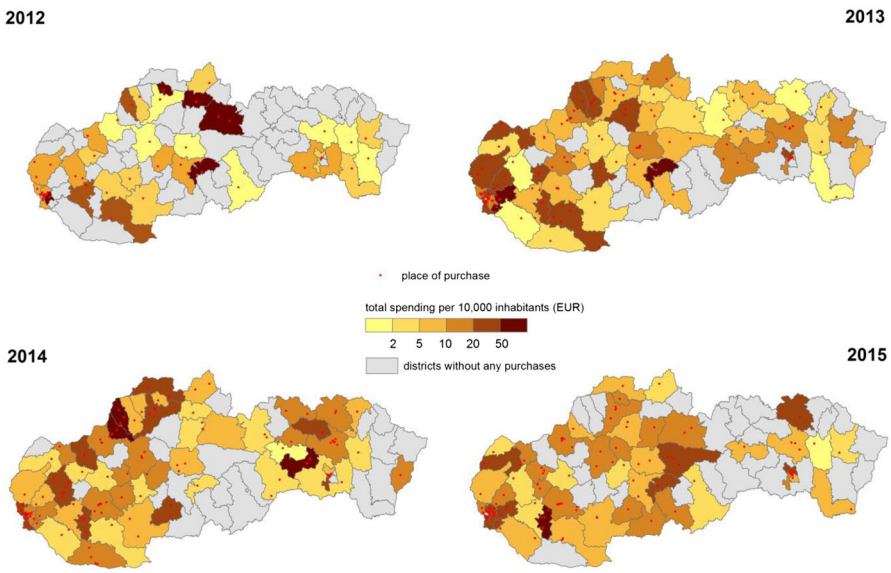

Fig. 3 Places of purchases and relative spending (EUR/10,000 inhabitants) for goods from ortobenex.sk in districts of Slovakia in the years 2012–2015. *Source*: authors' own research

partly, central districts of Slovakia, where the economic potential is mostly concentrated [9]. Compared to the rest of Slovakia, it is an area with above-average purchasing power (GfK Slovakia). In most cases, the average price per purchase was higher there than in other districts of Slovakia, and the turnover of the e-shop per 10,000 inhabitants was also relatively high (in Bratislava, the capital of Slovakia, it was 71 EUR, while in predominantly urban districts it was 41 EUR). In contrast, the east of the country does not show high business potential for the e-shop, with the exception of the central part of the region, which is the urbanized territory of the Košice-Prešov agglomeration, with a population of more than 0.5 million. Nevertheless, this region lies outside the main development axes of Slovakia and is characterized by a number of negative socio-economic phenomena

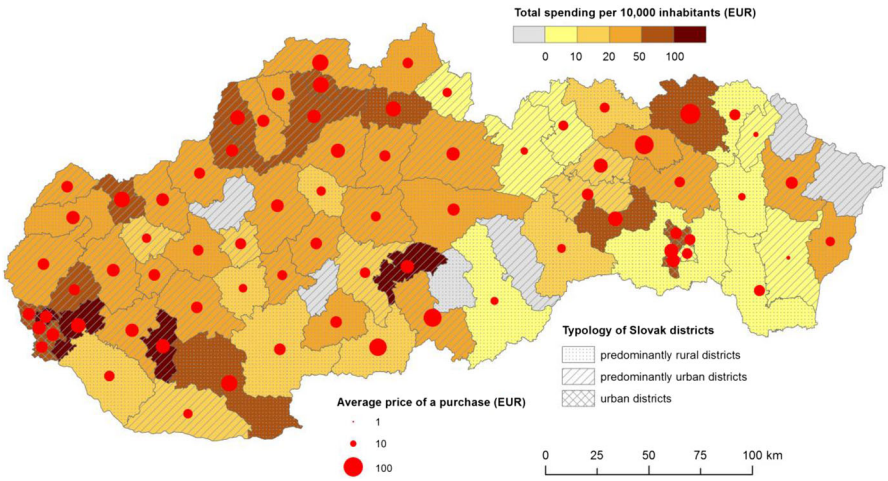

Fig. 4 Total expenditure (EUR) per 10,000 inhabitants and the average purchase price (EUR) in the districts of Slovakia in 2012–2015. *Source*: authors' own research

[9], which include, in particular, a significant concentration of the Romani population [19]. The predominantly rural districts near the borders with Poland, Slovakia, Ukraine, and Hungary are also commercially less promising areas. In the 4-year period there were only six districts in which no purchases were registered (see Fig. 4).

From the above it is clear that the character of the area significantly determines the business results of the e-shop. The following part of our analysis therefore focused on the statistical verification of the findings. We monitored the dependences of two variables—turnover per 10,000 inhabitants (in EUR) and the price of a purchase (EUR)—on the category of districts defined in the methodology (predominantly rural, predominantly urban, and urban districts). The results are shown using multiple box plots supplemented by the statistical test results (see Figs. 5 and 6). Since the data cannot be approximated by a normal distribution, in both cases the statistical significance of a factor was evaluated using a non-parametric Kruskal–Wallis (K–W) test. It turned out that the category of districts is a statistically significant factor which influences the total turnover per population (p value: 0.00), while on the other hand the influence of the district categories on the price per purchase was not confirmed (p value: 0.56). The mean value of the price of a purchase is similar in all three groups of districts, as are the upper and lower quartiles of the price. It differs only in extreme values that can be found mainly in predominantly rural districts, where the maximum even exceeds 300 EUR (Fig. 6).

From the above facts it is clear that the degree of urbanization of districts plays a significant role in online shopping. People living in regions characterized by a higher proportion of urban population buy more than others, while the total purchase price remains roughly the same for all groups of districts.

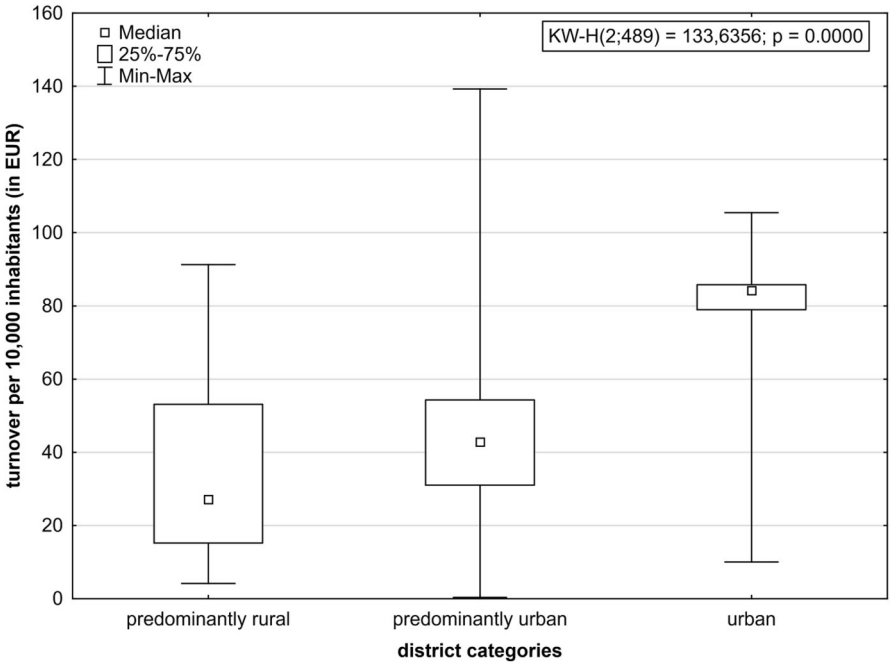

Fig. 5 Differentiation of turnover (EUR/per 10 thousand inhabitants) of ortobenex.sk in different types of regions in Slovakia in the period 2012–2015 (the districts with no purchases in the above period were not included in the analysis). *Source*: authors' own research

5 The regression model

The authors also tried to find a suitable model that would explain the differentiation of the number of shoppers[6] in the districts of Slovakia. The set of independent variables consisted of socio-economic indicators of the population with a potential relevance for the operation of an e-shop. The first step was the correlation analysis (Table 2), on the basis of which the authors tried to use a regression model to comprehensively describe and explain the different levels of participation in shopping at ortobenex.sk in various districts in Slovakia. The causality of the relationships between socioeconomic variables and the number of shoppers was not examined, because it is not the goal of the present paper.

Several important conclusions can be drawn on the basis of the above correlation analysis. Above all, it showed the interdependence of practically all the variables that were analyzed and the purchasing power of the population. The direct relationship with the purchasing power of the population is reflected in the average wage, working with the Internet, and the share of people with university education

[6] The number of purchases was, as a result of repeated purchases by the same customers, replaced by the number of shoppers. In the original model with the independent variable of the number of purchases the repeated purchases of the same customers proved to be significant, which concealed the effect of socioeconomic variables on buying behavior.

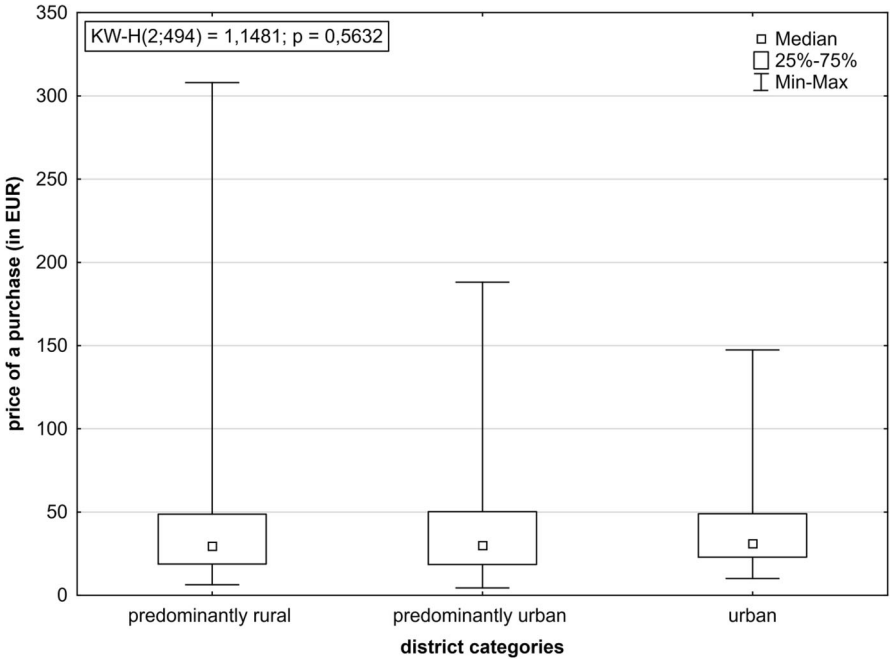

Fig. 6 Differentiation of prices of purchases from ortobenex.sk in different types of regions in Slovakia in the period 2012-2015. *Source*: Authors' own research

in the total population over 15 years of age, as well as in the explained variable of the number of shoppers in the e-shop that was monitored. For purchasing power, negative values of the correlation coefficient indicating an indirect relationship between the variables occurred in the unemployment rate, the share of the Romani population in the total population in each district, and the share of the population of the district living in rural areas. It is also apparent that there is a link between the unemployment rate and the share of the population with Romani ethnicity (a correlation coefficient of 0.81). The number of shoppers is generally higher in districts with higher average wages and purchasing power among the population, but lower in regions characterized by higher levels of unemployment or a share of rural population or of Romani ethnicity.

One of the prerequisites for the establishment of an appropriate regression model that would properly explain the independent variable (the number of shoppers) is the absence of multicollinearity. This will be provided by the correlation analysis, as correlation coefficient values of 0.8 or higher are usually considered too high. These pairs of variables are often the source of multicollinearity; therefore, to meet the assumptions of the regression analysis, one variable is eliminated in each pair of variables with a correlation coefficient higher than 0.8. The regression model presented below shows no signs of multi-collinearity, as is also confirmed by the variance inflation factor (VIF = 1.869). A graph showing standardized actual values and predicted residues was used to check the heteroskedasticity of the data.

Table 2 The relationship between the total number of shoppers at ortobenex.sk and selected socio-economic characteristics of the districts in Slovakia (expressed by values of the correlation coefficient). *Source*: authors' own research

		1	2	3	4	5	6	7	8
1	The total number of shoppers (2012–2015)	x	−0.57	−0.40	0.73	0.69	0.66	−0.52	0.73
2	Unemployment rate (2015)	−0.57	x	**0.81**	−0.59	−0.75	−0.52	0.53	−0.79
3	The share of Romani (2013)	−0.40	**0.81**	x	−0.39	−0.71	−0.36	0.33	−0.62
4	The average wage (2014)	0.73	−0.59	−0.39	x	0.68	0.73	−0.63	0.78
5	Computer knowledge—work with the Internet (2011)	0.69	−0.75	−0.71	0.68	x	0.79	−0.59	**0.82**
6	Percentage of the population with university education in the 15 + age group (2011)	0.66	−0.52	−0.36	0.73	0.79	x	−0.76	**0.81**
7	The share of rural population (2015)	−0.52	0.53	0.33	−0.63	−0.59	−0.76	x	−0.68
8	Purchasing power (2013)	0.73	−0.79	−0.62	0.78	**0.82**	**0.81**	−0.68	x

A statistically significant relationship, at a significance level of 0.05, was found between each pair of variables

The values of the correlation coefficient higher than 0.8 are in bold

Table 3 Multiple linear regression model explaining the differentiation in the number of shoppers at ortobenex.sk in the districts of Slovakia (total numbers in 2012–2015). *Source*: authors' own research

Model	Unstandardized coefficients		Standardized coefficients
	B	Std. error	Beta
(Constant)*	−23.558	3.368	
Computer knowledge—work with the Internet (%)*	0.308	0.085	0.359
Average wage (EUR)*	0.014	0.003	0.481

Dependent variable: number of shoppers

*The coefficient is significant at the 0.01 level

As the points in the chart did not show any pattern in their arrangement, the heteroskedasticity of the data was excluded. All the assumptions of the use of multiple regression analysis were verified and fulfilled in the present model (Table 3).

The final regression model consists of two[7] independent variables: the share of the population with the ability to work with the Internet, and the size of the average wage (Table 3). These two variables (according to the coefficient of

[7] The variable share of university graduates in the total population aged over 15 has been excluded from the resulting regression model since it does not increase the share of variability of the dependent variable explained by the model.

determination)[8] explain almost 60% of the variability in the number of shoppers at the e-shop under examination for the districts of Slovakia. The equation below summarizes the results of the regression model:

$$Number\ of\ shoppers = -23,558 + 0.308 \times computer\ knowledge + 0.014 \times average\ wage$$

6 Discussion

The above-mentioned aggregated sales figures are made up from the individual performances of extremely large numbers of individual Internet retailers, and although the trend line is rapidly rising, there is much evidence to suggest that not all retailers have been equally successful in their attempts to develop an effective web presence [8]. Consequently, for many years, the reasons why some web businesses flourish in this rapidly expanding but highly competitive market-place whilst others fail have been the subject of much academic scrutiny, as well as practitioner interest and debate [7].

The practical contribution of this paper is the knowledge that through the application of correctly selected marketing procedures, when running business activities, we can achieve adequate development, and we can maintain a competitive advantage as a defense against the ever-greater globalization of markets and constantly increasing competition. Electronic commerce is not just another of the channels where one can buy, but the Internet also allows consumers to get much more information about products before buying them. In terms of sales promotion, small e-shops have limited opportunities to target the target market because they do not have a large customer database and neither do they have sufficient funds to create a large long-lasting advertising campaign. They traditionally work with large dedicated providers of these services who have the ability to reach out and find potential customers. In this context, small e-shops acquire a specific position in the internet market. On the one hand, they are important customers paying for advertisements based on the enhanced technology developed by Facebook.com, Google.com, Amazon.com, and eBay.com to be effective in selling. On the other hand, these large portals consider them to be supportive as they help them to collect important information about captive consumers, as stated by Zhou et al. [32], if they use these portals to sell their goods. In general, this example of the e-shop analyzed here confirms the value model in e-business, as suggested by Amit and Zott [1]. This model is based on four sources of value—efficiency, complementarity, lock-in, and novelty [1]. In this case, the fundamental source of value for a small e-shop is the offer, which ensures the effectiveness of the transaction and reduces the customer's search and bargaining

[8] The coefficient of determination can be artificially increased by a higher number of variables that enter into the analysis. Considering the number of cases (79 districts of Slovakia), three independent variables seems to be an ideal number. Therefore, in this case, the adjusted coefficient of determination (Adjusted R Square) differs only slightly from the normal coefficient of determination; its value is 0.586.

costs [16], as well as opportunistic behavior [27]. Complementarity manifests itself in the offer that brings vendors benefits from these well-known securing brands, as consumers may be more likely to trust a retailer who shows the brand on its site [30].

The Lock-in feature, which prevents the migration of consumers and strategic partners to competitors, thus creating value in the aforementioned way, did not manifest itself as very few customers made more than two purchases. As far as the Novelty feature is concerned, e-commerce is an innovative business, as is manifested by the way transactions are structured. This means that the architecture of the e-shop analyzed here allows customers to purchase discounted items, which differentiates it from other e-shops dealing in healthcare devices. The connection of the features Novelty and Complementarity is reflected in the results of the e-shop in an increased transaction efficiency reached by reducing market failure. Similarly to the study by Song et al. [25], our analysis confirms this fact and indicates that customers judge the quality of information on the basis of the amount of information about the product presented on the retailer's website. In this context, GIS obtains important information for small e-shops about their customers, and also about the possible improvement of their operating efficiency, enabling the e-shop owners to direct their strategic decisions about the creation of total value for a customer in the market. Such successful integration of GIS into strategic management and its subsequent connection to entrepreneurship theories of value [1] allows flexibility in decision making, enhanced cooperation, and the creation of trust in terms of asset specificity, demand uncertainty, and task complexity and frequency.

In the next section we will consider the potential benefits for e-shops resulting from the use of geographic information on business and its processing. First, we will generate the benefits to the firm concerning information search patterns for management activities for the e-shop. Second, we will consider the marketing potential in order to provide consumers with a particular experience which comes from its perception, offering the advantages of the e-shop. In our case, we start from the opposite assumption than that presented by Chorus and Timmermans [6]. Therefore, an assumption that has been made throughout the analyses presented here is that the analyst does not know the consumer's perceptions of the values of the attributes of goods; it is somewhat more intuitive.

6.1 Benefits to the firm

Geographically, it is obvious that during the period 2012–2015, consumers coming from the districts in the Prešov and Košice regions ordered the lowest amounts of goods. Even if the businessman does not have additional data, this situation may be more or less related to unemployment, or a preference for medical devices covered by health insurance, or cheaper competing brands. Although this is a form of heuristic reasoning of a manager, market segments can be correlated with the place, and this can be very useful for targeted marketing [14]. A web-based GIS model for an e-commerce system is used for the effective localization of an online store. This method determines the benefits of GIS to web businesses and allows access to an

integrated geoinformation system in e-commerce applications. The numerous benefits of a geomarketing approach for a small e-shop include:

- objectivity and transparency in terms of sales volumes, thus becoming a starting point for sales management, such as sales forecasting or identification of seasonality;
- a comprehensive, informed view of a wide range of data used for the identification of market segments (active athlete, medical customer, loyal customer) and tracking their development in terms of revenues as well as regions; identification of no-zone sales regions based on territorial customer analysis; adjusting the product offer; evaluating the possibility of involvement of the e-shop in discount portals or using cashback websites to promote sales and increase the attractiveness of the e-shop for customers;
- simplification of complex data relationships through their visualization on digital maps, which can help to identify the level of activity and health of individuals living in the given region at a given time in order to target advertising to a specific audience, development of new sports that consumers have started to prefer and practice, or product/health status relationship, i.e., the morbidity of the population in a given region;
- easy and fast communication of the results of analyses when deciding on the inclusion of new brands or new products in the e-shop offer, classification of regions on the basis of the share of the socially disadvantaged population in the total population of the region;
- drawing attention to new market insights that would otherwise remain unnoticed, resulting from a number of circumstances: increasing the level of computerization of undeveloped regions of the country along with the increasing level of economic activity, which contributes to understanding not only the behavior of new customers but also targeting new customers, the emergence of new sports-oriented associations and clubs in the regions and the establishment of cooperation with them, changes in the structure of healthcare in the regions and the related adjustment of the offer.

6.2 Benefits to consumers

The strategy adopted by the e-shop, based on the offer of several quality brands, is reflected in a low number of complaints from customers, which reduces costs and enhances the reputation of the e-shop on the discussion forums that evaluate services and customer care. The managers of the e-shop are aware that branded products offer the consumer the following benefits [20]: they (1) reduce search costs, (2) guarantee a certain level of quality and consistency, and (3) act as a source of psychological reward (i.e., a consumer derives psychological satisfaction from owning a brand product), (4) the increasing importance of a loyalty program in a small e-shop is confirmed by the growing number of loyal customers, as well as the amounts the customers spend. In terms of results, these benefits are reflected in rising orders and increasing amounts purchased.

One of the reasons for the positive development of the structure of orders is the architecture of the e-shop. It is built in such a way that a costumer has the best overview of products of various brands. This means that the e-shop is based almost exclusively on the logic of harnessing complementarities for consumers.

7 Conclusion

E-commerce is changing the retail environment. As a consequence of sophisticated information technology, strategic analyses of e-business will have to move beyond the traditional idea of the firm and the unit of analysis. A Geographic Information System is a valuable source of information and often the only one that can be used to compare and analyze the business environments in different regions.

In this paper, we have attempted to illustrate through the example of a small e-shop how to identify customers in order to avoid market failure. The analysis of customers on the basis of GIS helped to identify the possible future elements of the orientation of the offer to the values expected by customers. Geographically, the customer segmentation shows that the offer of the e-shop found its customers in municipalities in districts with higher average wages and greater purchasing power of the population, mainly from western Slovakia. The regressive model that was created also shows that the number of purchases is influenced by such variables as the share of university-educated people in the population over 15 years of age, computer literacy, and average salary. In the current situation in the market for healthcare devices, the specialized offer of Ortobenex.sk provides a good basis for its successful management. It suggests that the business focus on customer value is significant and a businessman will benefit from this approach to the market, even if it is confirmed that the e-shop being examined operates on a small regional market.

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