

THE INFLUENCE OF ECONOMIC GEOGRAPHY ON SUPERMARKET CONCENTRATION

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Abstract: The number of supermarkets in Bratislava has rapidly risen in the past years. It can be considered as a successful business result, when the Slovak groceries market sees the entry of non-traditional sales forms such as communal gardens, farmer markets, and other alternative forms of grocery sales aimed to increase the access to groceries. In this context, the article focuses supermarket concentration and also evaluates supermarket locations in Bratislava from 2011 to 2016. To calculate the concentration of supermarkets in Bratislava relative entropy was employed, using data from supermarket network from 2011 and 2016 located in the of Bratislava. The special distribution of supermarkets within the city was evaluated using a geographic information system. Although, there were changes in the distribution of supermarkets in each part of Bratislava during the observed period, the results show that supermarkets sufficiently cover the city. The changes concern mainly moves away from the city's center further out to the city edges. These changes will continue and reflect changes in grocery demand, current healthy grocery trends, settlement changes and creation of new counties.

Keywords: Special concentration, geographical concentration, supermarkets, economic geography

1 Introduction

Retail geography is attracting attention due to dynamic purchasing and consumption as well as the existence of retail units in growing competition. It evaluates the retail network's special structure during two periods. The creation of a great number of retail units characterizes the first period. The second period is marked by international retail chains entering the Slovak market. Construction was concentrated mainly in larger cities. New retail unit were constructed in the second half of the 90s, the first of which were hobbymarkets and groceries; hypermarkets followed and later shopping malls ensued. Development of large scale shopping complexes brings problems like declining city centers, outflow of commercial functions to the city's periphery, commuting and ecological problems, closure of small and traditional retailers.

2 Literature review

Several authors focus on retail unit concentration in Slovak cities. By defining the theoretical and real number of retail units, and by comparing these two numbers these authors obtained information about the surplus and deficiency of retail units in each town (Bilková a Križan, 2013). Ceapraz focuses on special specialization and concentration from the perspective of competitiveness of the European union. His article provides different perspectives of diverse economic theories on concentration and special specialization development. Ceapraz defines concentration and special specialization in connection to manufacturing structure and tries to explain regional employment structures (Ceapraz, 2008). Lang, Marcon, and Puech view special concentration through the distance-based methodology used to improve spacial economics of economic activities through accurate spacial layout evaluations (Lang, Marcon, Puech, 2016). Badia-Miro (2015); Furtună, Reveiu, Dărdală, Kanala (2013); Glaeser, (2012); Arbia; Copetti, Diggle (2009); Fingleton (2006); Desmet, Fachamps (2005) focus on analyzing the impact of a city's territorial structure based on an inner metropolitan approach. Garcia-Lopez and Muniz (2013)

further analyzes the city employment growth model based on a dynamic agglomeration economic tied to a city's spacial structure using distance of employment center to judge metropolitan effects and variable distances to measure neighborhood effects. Fujita and Mori (2005) provides and overview of the development of spacial economics while emphasizing spacial economic theories, i.e. general location economics.

3 Objective

The article focuses on supermarket concentration in Bratislava as rapidly developing city. The first part examines the supermarket as a dominant retail format in the retail store structure in retail chains. The second part provides an analysis of supermarket concentration in Bratislava. This article also evaluates the spacial supermarket distribution in each city district from 2011 to 2016.

4 Spacial concentration

Krugman (1991) indicates that production is concentrated in space, he considers this as one of the important features of the current economic activity geography. Thus, the article's focus is on the supermarket spacial concentration in Bratislava and if there exists a spacial concentration among industries within its economic.

According to p. Kotler, on this level of analysis of the grocery market the individual retail unit don't pose as competition to one another but it is on the retail chain level where there is competition to offer the most utility to the consumer in the exchange process (Kotler, Keller, 2006, p 30-38). Acquisition of merging of various businesses within the distribution channel can explain the concentration. This market structure resembles an oligopoly where only a small number of businesses represent the offer. Based on this, the market becomes less competitive as the competition grows. The grocery market shows a clear propensity towards concentration which leads to the creation of global enterprises (retail chains) and strategic business alliances. Concentration happens also on the organizational and spacial accessibility levels (the retail units concentrate in shopping center, commercial venues, etc.). The concentration process has a negative influence, e.g. closure of numerous small commercial businesses, which can't compete with retail chains. On the other hand, it improves the effectiveness of businesses and thus improves consumer satisfaction. The highest level of concentration is observable on a retail chain level where fast moving merchandise is sold mainly in supermarket and hypermarkets. The existence of retail units on a inter-regional and regional level is due mainly to a correct strategy based on an accurate analysis of the market landscape (Cimler, 1994; Kunc et al. 2012).

5 Economic geography

This field of research focuses on the uneven distribution of economic activities in space. Two colliding theories are influential in the field: institutional economic geography and "new" economic geography. Institutional geography is lead by experts with a background in cartography and carries many similarities with institutional economics (Hodgson, 2001). Plainly said, institutional geography states that the uneven distribution of wealth in an area is due to institutional differences (Whitley, 2000). New economic geography results from neoclassical economics (Krugman, 1991; Brakman et al., 2001) and considers the uneven distribution of economic activities as a result of universal processes of the agglomeration fueled by production factor mobility. The lack of intersections between the two fields can be explained as two immesurables such as institutional and neoclassical economics (Boschman & Frenekn, 2006). In many cities or regions, retail is considered as stabilizing industry for socio-economic development. From a food policy perspective, it provides nourishment for the citizens, i.e. citizens living in cities or on the countryside and make it accessible to low-

income consumers to limit malnutrition or overconsumption. While analyzing food policy, various authors focus on understanding the relations in geographical accessibility of healthy groceries to ensure nutritional security (Batestersby et al., 2014) and supermarket concentration in Bratislava along with their placement among districts. On a macro scale, analyzing relations within economic chains focuses on globalization processes manifested in the presence of multinational retail chains on the grocery market. These are strongly concentrated and supported by an established supplier and logistics network along with their offensive marketing strategy and widespread distribution. Globalization in Slovakia is observable not only on the number of domestic and international retail chains but also on their supply policy and price stability. On a micro scale, retail chains focus on providing food access to consumers based on a relation between consumer income; and food prices and consumer behavior. The increasing consumer interest in healthy and fresh produce in the past decade results from impacts of grocery scandals in developed countries which contributed to the increased interest in food safety (BSE, food-and-mouth disease in cows). At the same time, changes in consumer behavior towards distrusting food processing procedures or unfavorable stances to the anonymous environment of supermarket and shopping center. The consumers are also aware of the increasing number of red flagged groceries in retail chains. From this perspective, the new food security program places the small farmer into the spotlight of its efforts to resolve a growing worldwide problem of food insufficiency. In this respect, Slovakia is on the tail end in Europe and on a global scale, according to the Global Food Security Index, established by the Economist in 2012 (table 1).

Table 1: Food security index 2012 - 2016

Year	2012	2013	2014	2015	2016
Rank	27.	37.	31.	32.	40.

Source: The Economist <http://foodsecurityindex.eiu.com/>

6 Geographical localization

Even though it seems that this problem is more severe on the countryside, the opposite is the truth. This problem increasingly concerns population in cities, where it takes form of accessibility. Accessibility to groceries in cities depends on the ability of the family to realise the purchase, this ability is influence by their level of income, grocery prices, and retail unit location (Karamychev, van Reeve, 2009). Groceries can be economically accessible but not present within a certain space (the store is located too far or it is difficult to get to). On the contrary, groceries can be available in the given space (supermarket) but economically non-accessible (the merchandise is sold out). Grocery supply in Slovakia leans on a developed distribution system of each retail chain.

7 Supermarkets

The result of developing large surface store was the boom in supermarkets, originally supposed to cover the needs of higher and middle class citizens. Currently, supermarket is the most widely constructed retail store format due to rapid district urbanization such as in Bratislava. In contrast to traditional food distribution systems, farmer market, communal gardens, and niche oriented stores (Starý otec. Bio market) serve as key selling point for small and medium farmers not able to compete with large surface stores (Pinard et al., 2016). Customers in these stores search for a greater shopping experience and foster a personal relationship with the farmer or vendor.

These store format don't play such a significant role in the city's fresh food supply as do supermarkets, although increasingly important for job-creation. Slovaks have taken their shopping behavior from Western countries but the main purpose of traditional and non-traditional distribution systems is still providing the citizen with fresh and processed food. The rapid development of supermarkets has a significant influence on non-traditional food distributors. Supermarket intensify competition with non-traditional distributor by becoming increasingly universal in their offerings to cover lower-income consumers.

Although, groceries are becoming more accessible to the low-income families (Fan, Brzeska, 2016), this effort leads to lack of quality in the groceries and leads to price wars among competition (Pickles et al., 2016). A neoliberally managed market, at first glance brings unclear positive consequences for low-income consumers, who don't realize it. On the contrary, the business sphere is significantly affected in market entry, competition and control.

8 Methodology

The field research took place in the metropolitan area during two periods, first from February to May 2011 and second from October to November 2016. The research took place in Bratislava, Slovakia's capital, since it is the largest metropolitan area in Slovakia's market. Using a geographical information system, the geographical distribution of supermarket and their concentration in Bratislava was identified.

Two research questions were formulated based on the defined objective:

1. Is each of Bratislava's districts sufficiently covered by supermarkets?
2. Have there been changes to the territorial coverage of supermarkets in Bratislava between 2011 and 2016?

The utilizing formula for calculating entropy enables measuring spacial dispersion of the population. The more the population is disperse in space, the higher the entropy. Geographers measure use entropy to gauge outflow of residents from the countryside. When the entropy is low, the population dispersion is decreasing, thus population concentration is higher (Cliquet G., Fady, A., Basset G., Croizean J-P., 2006). In the article, the entropy formula applied on retail chains supposes that their development will increase their areal coverage.

The authors of the article utilized the following formula to calculate the territorial supermarket coverage in Bratislava.

$$^kE = - \sum_{i=1}^k f_i \log f_i \quad (1)$$

$i = 1$

where: E - entropy;

k – number of divided geographical areas;

f_i – number of retail unit within area i .

Application of relative entropy:

$$RE = E / \log k \quad (2)$$

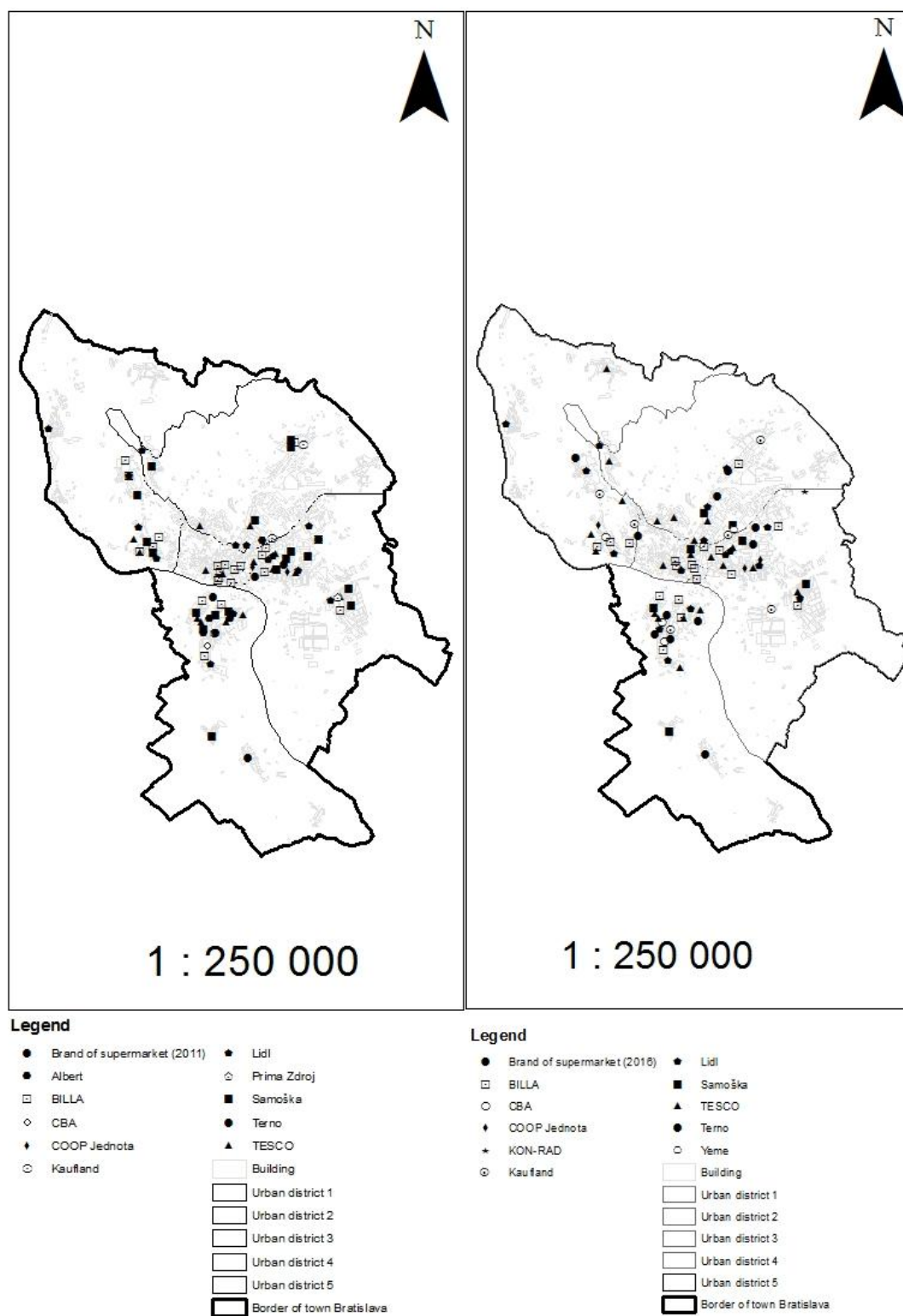
(Cliquet G., Fady A., Basset G., Croizean J-P., 2006)

k is calculated within the interval $[0, 1]$ to ensure the simplest comparison with competitors (Cliquet G., Fady A., Basset G., Croizean J-P., 2006). For calculating the relative entropy in Bratislava $k=5$, due to the administrative division into 5 districts (Bratislava 1, Bratislava 2, Bratislava 3, Bratislava 4, Bratislava 5).

9 Results

Although, most common literature focuses on sufficient provision of food for residents to ensure their sufficiency, from this perspective the focus should be on the groceries on offer in the whole city, i.e. if retail store formats offer a wide range of healthy and fresh groceries at competitive prices. For this reason, the study focuses on supermarket chains supposing they provide a complete assortment of fresh groceries at low costs and profit margins. This is in accord with the work of Apparicio et al. (2007) or Leat et al. (2011). In 2011, the field research resulted in locating 99 supermarkets belonging to 13 retail chains, displayed in scheme 1. In 2016, field research localized 119 supermarket under 14 chains.

Scheme 1: Supermarket network in Bratislava in 2011 and 2016



Source: Own research

Supermarkets are located in every district of Bratislava. Table 2 displays the format and number of retail unit per chain in 2011 and 2016. Based on the available data, the most numerous are Billa and Tesco. Changes happened among retail chains as well. Chains as Albert, Bala, Hypernova, Prima Zdroj were present only in 2011; whereas Delia, Malina, Môj obchod, Yeme were present only in 2016. Other retail chains were localised in both years.

Table 2: Overview of supermarkets in Bratislava

Retail chain	Type of store	Number of stores in 2011	Number of stores in 2016
Albert	Supermarket	4	x
Bala	Small sized store	4	x
Billa	Supermarket	22	20
Carrefour	Hypermarket	2	2
CBA	Supermarket	5	3
DELIA	Small sized store	x	9
Hypernova	Hypermarket	1	x
Jednota	Supermarket	2	4
Kaufland	Supermarket	3	6
KON-RAD	Supermarket	x	1
Lidl	Supermarket	15	16
Malina	Small sized store	x	5
Môj obchod	Small sized store	x	8
Prima Zdroj	Convenience store	1	x
Samoška	Supermarket	18	7
Terno	Supermarket	1	11
Tesco	Hypermarket/supermarket	21	26
Yeme	Supermarket	x	1

Source: Own research

Tables 3 and 4 show the relative entropy of all competing supermarket chains in Bratislava, in 2011 and 2016. The calculation are done for all five districts.

Table 3: Relative entropy calculation for the complete set of competing supermarket chains in Bratislava in 2011

Mestská časť	fi	log fi	fi log fi	E	k	log k	RE
Bratislava 1	0,121212121	-0,916453949	-0,111085327				
Bratislava 2	0,292929293	-0,533237197	-0,156200795				
Bratislava 3	0,151515152	-0,819543936	-0,124173324	0,67823647	5	0,69897	0,970337
Bratislava 4	0,191919192	-0,716881594	-0,137583336				
Bratislava 5	0,242424242	-0,615423953	-0,149193686				

Source: own research

Value fi and $fi \log fi$ were calculated of every retail chain to obtain the relative entropy of every retail chain in Bratislava. In 2011, Terno, Prima Zdroj, Jednota, Hypernova attained the lowest entropy values. These retail chains attained an entropy

value of 0 due to their incomplete territorial coverage of Bratislava. In 2016, KON-RAD was the only chain to attain an entropy value of 0. On the contrary, Tesco in 2016, and Billa in 2011 attained the highest entropy values.

Table 4: Relative entropy calculation for the complete set of competing supermarket chains in Bratislava, in 2016

Mestská časť	fi	log fi	fi log fi	E	k	log k	RE
Bratislava 1	0,168067227	-0,774516966	-0,130170919				
Bratislava 2	0,268907563	-0,570396983	-0,153384063				
Bratislava 3	0,168067227	-0,774516966	-0,130170919	0,687224	5	0,69897	0,983195102
Bratislava 4	0,151260504	-0,820274456	-0,124075128				
Bratislava 5	0,243697479	-0,613148963	-0,149422857				

Source: own research

Tesco supermarkets are present in each district. It had 7 units in district Bratislava 2, attained a frequency of fi 0,269230769 and value of $fi \log fi$ -0,153427968. In Bratislava 1, Tesco has 3 units with a frequency of fi 0,115384615 and value of $fi \log fi$ -0,108213703. Tesco's entropy value is $E = 0,680623155$ and relative is $RE = 0,973752$. Relative entropy ranges between 0

and 1. Therefore, Tesco covers almost all of Bratislava, i.e. it has an excellent territorial supermarket coverage.

10 Discussion

The answer to the first research question is: Yes, supermarkets sufficiently cover every district of Bratislava. The answer is supported by the displayed calculations where the relative entropy attains a value of 0,983195102 in 2016 and 0,970337 in 2011. Although, there are district with a lower number of supermarkets per capita; such as: Bratislava 4, Bratislava 5 in 2011 as well as 2016.

The answer to the second research question is: Yes, there have been changes in the territorial supermarket distribution. Scheme 1 shows the supermarket distribution in 2011 and 2016, there has been a certain movement from the center towards the peripheries. In 2011, supermarkets were more concentrated around the center which left peripheries with low coverage. In 2016, noticeable changes are visible from the center towards the peripheries. This may be connected with the development of new peripheral areas, rising rent prices in the city center as well as changing settlement tendencies.

11 Conclusions

The Slovak retail market, as are other central European countries' markets, is typical for an enormous growth in concentration of distribution and radical changes in distribution channels. Modern grocery supply chains are increasingly tied by contracts (among distribution channel members) in their purchasing decisions. Supermarkets represent a large portion in sales of processed or fresh groceries among a limited number of preferred suppliers. Most supermarkets in retail chains dispose of a centralized purchase and distribution center. The supermarket revolution won't radically transform city systems of food supply in the future. Territorial changes in supermarket distribution will continue to reflect changes in demand for groceries, current healthy food trends, settlement changes, or new district creation.

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