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MODELS AND PRACTICE OF RETAIL LOCATION ON THE ROMANIAN MARKET

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Abstract

This paper makes a review of the main types of location, respectively of probability models, gravity models, utility models, location- allocation, but also of new spatial analysis instruments. In this context, we emphasize the fact that the new location models, based on a geographic information system and the Big Data analysis instruments, open new opportunities for the practical location decision based on a larger set of criteria and by taking the market dynamics into account.

The paper has the following objectives: to study the theoretical basis of location models, i.e. of the criteria (the variables) used and to compare them with the criteria used currently in decision-making practice. The study is based on qualitative research investigating the opinions of decision -makers in the area of distribution regarding the location strategy of new stores. The research findings confirm the existence of differences between the criteria retained by location models and the practice of distribution companies on the Romanian market.

This type of approach – models and practices of location for distribution companies – is a novelty for the Romanian market. The study can be useful both for research (perfecting the location models vis-a-vis present-day evolutions of the business environment), as well as for the decision makers in distribution (the valorization of research findings in decision-making practice).

Keywords: location models, distribution companies, optimal location, Geographic Information System (GIS), Big Data

JEL Classification: L81, O33, L86

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Introduction

This paper aims at researching into the theoretical data base of location models and at identifying the criteria at the basis of the location decision. The location decision assumes completing several phases, such as: company strategy analysis, selecting the markets or the geographical area, selecting the location for the new store, forecasting turnover and configuring commercial network. Selection of location represents a determining factor for the success of the store. In specialty literature, location is considered of major importance: "three factors ensure the success of the new store: location, location, location" (Kotler and Armstrong, 2010, p. 406).

Location models represent rational approaches, developed on a finite number of criteria (Cliquet, 2016), used in practice. For example, location models were used to determine the optimum location for a bank subsidiary in Lille-Flandre (Calciu, 2003); also with the help of a gravity location model, commercial surfaces were placed for a furniture retail store chain (Cliquet, 1990). Other researchers (Erbiyik, Ozcan and Karabog, 2012) applied location models starting from a definite number of criteria and using the analytic hierarchy process.

This paper is one of practical applicability academic research. From the literature review and the discussions with practitioners in the field of distribution, other considerations came about and were taken into account when taking the location decision, and they do not appear in table no. 1. Among them, we could mention administration costs (such as obtaining operating permits) or the relationships with existing companies on the market, the so-called small companies.

1. Review of the scientific literature

The literature review focuses on presenting relevant models in the area of location of distribution companies, and showing their development stages.

The criteria at the basis of the location decision can be classified thus (Turhan, Akalin and Zehir, 2013): store performance, population structure, economic factors, competition, degree of market saturation, attractiveness of store, store characteristics. (Figure no. 1).

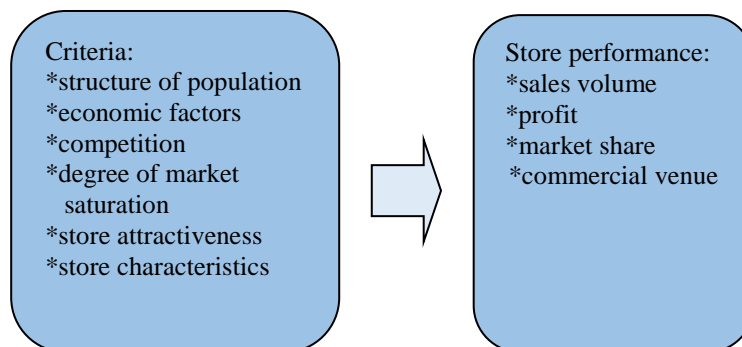


Figure no. 1: Criteria at the basis of the location decision

Source: Turhan, Akalin, and Zehir, 2013, pp.392

Starting from these criteria location models were developed, which, taking into account some variables, identified some potential placement for the store location.

1.1. Classical location models

Preoccupations in the area of spatial analysis go back as far as the 7th century, when the bases of the theory regarding economic activities were laid, and later commercial location theory was designed. It is founded on three principles: the principle of centrality, the principle of the demographic threshold to implant a selling point and the principle of grouping shopping. Christaller W. and Losch A. (1954), has a well-known contribution to developing economic geography. They proposed the theory of central points according to which the consumers will always try to buy a product or a service by using the shortest possible distance from their homes.

Later on, Applebaum (1966) developed a location method based on a control list, which represents a first attempt of assessing the potential of a location for a selling point comparing it to other possible options. Later, the method was improved (Jallais, Orsoni and Fady 1987) and other variables were taken into account, such as: the competition environment, the social and economic structure of the area, consumer behaviour, traffic, access facilities, parking possibilities, etc. The advantages of this method consist in its easiness of application, but also in the possibility of collecting information for the various location options, so that the optimal location is eventually selected.

A new phase in the development of location models was represented by the appearance of gravity models. They define utility functions for consumers, which include on the one hand factors connected to location, and on the other hand factors connected to consumers' preferences. A first gravity model (Huff, 1964) started from the premise that the usefulness of a store depends on its surface and on the distance made by the consumer from the consumer's home to that store. Mathematically, the model can be described in the following way:

$$P_{ij} = \frac{S_j / (d_{ij})^\beta}{\sum_{j=1}^n S_j / (d_{ij})^\beta} \quad (1)$$

where:

P_{ij} : probability that a consumer i goes to store j ;

d_{ij} : distance from store j to consumer i ;

S_j : commercial surface of the store

n : total number of stores in the area

β : variable reflecting the effect of the distance on time necessary for the purchasing process

Later, the Huff model was developed (Nakanishi and Cooper 1974) and a new model was proposed. This took into consideration new variables, such as: level of prices, advertising, number of employees, number of cash registers, and store image. The general formula of the model is:

$$P_{ij} = \frac{\sum_{k=1}^q c_{kij}}{\sum_{j=1}^m \sum_{k=1}^n c_{kij}} \quad (2)$$

where:

P_{ij} : probability that a consumer who lives in area i selects store j;

c_{kij} : a variable k, describing j in situation i;

k : sensitivity parameter relating to c_{kij} ;

m: total number of stores;

n: number of variables;

ij: admitted error

Location-allocation models are based on the principle according to which all possible locations in a geographical area are determined simultaneously with the assessment of the demand for each place and the placement optimizing store performance is retained (Belu, 2008). In the case of a distribution company, their objectives met by applying these methods are: optimising the number of selling points, optimising their location and the allocation (orientation) of consumers towards these selling points. We could mention the following location-allocation models:

- Model proposed by Goodchild (1984), which includes two alternative submodels: one model sensitive to competition, having as goal maximising the market share owned by a store and another model ignoring competition, having as goal maximising total demand.
- Model developed by Durvasala, Sharma and Craig (1992), which allows forecasting market share for a new store, thus determining the optimum location. According the model, potential market share depends on the market shares obtained by the competing stores and the market growth rate.
- Model proposed by Tammy Drezner (1994) determines, following many iterations, the optimal territorial location of a store chain, by taking into consideration variables such as purchasing power, number of already existing stores, distance, and store surface. The respective model calculates the location of the new store so that maximum market share is obtained.
- Achabal, D., Garr, W. and Mahajan, V. (1998) developed a model to plant small surface store chains (for example, proximity stores, convenience stores, fast-foods). The authors of this model proposed a profit maximising function depending on which the location of a new store is decided.

Table no. 1: Location models variables

Model	Variables
Christaller, W. and Losch, A. (1935, 1954)	<i>Physical factors</i> : distance from consumer to new store
Applebaum (1966)	<i>Store characteristics</i> : surface <i>Physical factors</i> : distance from consumer to new store;
Huff (1964)	<i>Store characteristics</i> : surface <i>Physical factors</i> : distance from consumer to new store; <i>Competition</i> : location of competing companies; number and size of competing companies;
Nakanishi and Cooper (1974)	<i>Store characteristics</i> : surface; access to store (public transportation, easy access; delivery facility); <i>Competition</i> : location of competing companies; number and size of competing companies;
Goodchild (1984)	<i>Competition</i> : location of competing companies; number and size of competing companies; <i>Store performance</i> : sales; demand; market share
Jallais, Orsoni and Fady (1987)	<i>Store characteristics</i> : surface; access to store (public transportation, easy access; delivery facility); store image; parking (number of parking spots; access to parking) <i>Costs</i> : maintenance cost; renting contract;
Durvasala, Sharma and Craig (1992)	<i>Store performance</i> : sales; demand; market share
Tammy Drezner (1994)	<i>Physical factors</i> : distance from consumer to new store; <i>Economic factors</i> : purchasing power; <i>Store characteristics</i> : surface; <i>Store performance</i> : market share
Achabal, D., Garr, W. and Mahajan, V. (1998)	<i>Costs</i> : maintenance cost; renting contract; <i>Store performance</i> : sales; demand; commercial venue; market share

The variables used in the presented location models are summarized in table no. 1, with the aim of emphasising the main elements of classical location models, but also the evolution of concepts regarding the importance of store location.

1.2. The geographic information system

The concept of the Geographic Information System (GIS) can be defined as a set of instruments used for spatial data acquisition, stocking, processing and visualising world spatial data with a certain goal (Burrough, 1986). The Geographic Information System is

based on three main components: software, hardware and the human resource (Faiz and Krichen, 2013).

Implementing a GIS is based on specific software (for example, QGIS – an *open-source* programme or ArcGIS, a programme developed by ERSI), the necessary hardware to run the software, but also to stock, administer and process data; GIS data (*layers*, meaning specific entities and associate attributes); the human resource (specialists involved in project development); methods used to collect and process data (see figure no. 2).

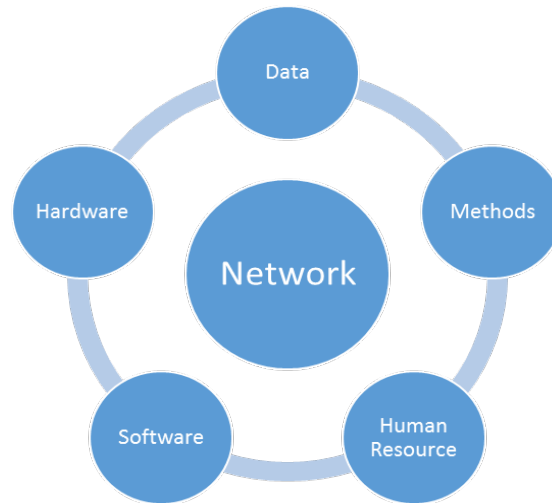


Figure 2. GIS structure

Source: Longley, Goodchild, Maguire and Rhind, 2005

The spatial data base is considered one of the sub-branches of the system which makes the difference between the GIS and other mapping or graphics programmes. In a GIS type programme, the information volume is structured in layers and stocked in the *Database Management System* in the form of tables and theme maps. A spatial data base must contain functions for updating, editing and manipulating attribute type and graphic type data. "Practically, a geographic informatic system contains various data about the environment" (Albăstroiu, Felea and Vasiliu, 2014, p.605).

GIS allows applying more analysis methods, such as *buffer* analysis, proximity analysis and spatial analysis (Simion, 2015). For example, in case of deciding the location of a new store, proximity analysis can offer information regarding the number of consumers in a certain area, but also information regarding the distance between the store and the home of the potential customer. And spatial analysis can be useful in the process of deciding for a location through the comparison of territorial aspects, for example, road infrastructure or number of stores in a certain geographical area.

By using GIS technology location models in the field of distribution were improved due to using more complex and sophisticated data bases. Thus, GIS technologies favoured the

appearance and development of information programmes such as Locus, Model, Winsite, used in the stage of selecting the location for a new store (Cliquet, 2006).

1.3. Big Data and location models

New technologies allow a diversification of location criteria and offer pertinent solutions regarding the location of the future store. Criteria such as market dynamics or the changes in the competitive environment, or changes in consumers' behaviour can be taken into consideration; information, at the basis of these criteria, are given in real time and come from various sources.

The great volume of data obtained by retailers from different sources (web data, data obtained in the social networks, open data, data collected from questionnaires) pose the issue of stocking and processing them with the goal of adapting the marketing strategy, in real time, to the demand of the market. At present, implementing Big Data is considered a business decision and not an IT decision.

Big Data represents data stocked and processed in huge quantities, due to cheaper stocking media, faster processing methods and more performing algorithms (Mayer-Schonberger and Cukier, 2014). Big Data specific characteristics are given by the volume (data volume is growing), speed (real time applications), variety (the large share of unstructured data, increasingly more varied data sources) and truthfulness (establishing trust in used data).

Apache Hadoop allows programming and executing specific Big Data applications, applications processing a great data volume; for example, information petabytes can be processed (1PB=10¹⁵). Hadoop allows shared storage of information and system analysis (White, 2011). Companies use Apache Hadoop to manage and assess the very great volume of structured or unstructured information (text, images and video) with the aim of monitoring service for customers, observing customer behaviour or making forecasts (Oracle, 2013).

Big Data analysis instruments represent a new type of analysis, combining statistical analysis with the possibility to correlate unstructured data, i.e. a digitalisation of the analysis. Moving to Big Data analysis instruments also means standardising GIS information, necessary to real time processing, collaboration and data exchange.

At the same time, Big Data analysis instruments allow companies direct access to information and real time analyses. For example, with the *Customer Journey Mapping* method, based on the observation according to which a client, is usually in contact with several representatives of several departments, companies try to make them loyal through a trip as comfortable as possible to the store, more precisely through a positive experience for the customers (Oracle, 2013).

Basic information, such as location, personal data, preferences and consumer habits are used to understand consumer behaviour. Lately, companies have extended their data bases and have used different sources of information on social networks, from the history of web search engines. Thus, they try to develop new models, which run a high volume of diversified information (Calciu, Moulins and Salerno, 2015).

At present, distribution companies increasingly use Big Data and adapt their marketing strategies according to forecasts following processing a great volume of data. It is the case

of giant Walmart considered a pioneer in the field of Big Data usage. Through the applications they have developed, the company succeeds in monitoring sales in various geographic areas in real time. For example, Walmart implemented a Big Data analysis instrument, *Data Café*, which processes a huge volume of 2,5 PB information per hour and which allows a real-time anticipation of consumers' needs (Marr, 2016).

In the future, the retail industry will use Big Data analysis instruments on a larger scale. Implementing new analysis instruments ensure a real-time analysis, which means: a better understanding of consumer behaviour, a more precise market segmentation, a more exact demand forecasting and implicitly obtaining necessary information to elaborate the location strategy.

Developing location models, from classical models, with a relatively reduced number of variables, to models based on new technologies, there followed the evolution of commercial formulas, from traditional retail to modern retail (for example, hypermarkets and supermarkets). Location models were adapted, with the help of the new technologies, to the modern distribution system.

2. Research methodology

This paper uses in-depth interviews, an effective technique in obtaining verbal information from the interviewees, in order to verify some hypotheses or to scientifically describe the studied phenomena (Lefter, 2004). Our research aims to underline the existence of some differences between prescriptions of theoretical models and the practice of big distribution companies on the Romanian market.

Thus the objectives refer to the assessment of the way location strategy of distribution companies are founded, and to the identification of the selection criteria at the basis of selecting a location for a new store.

The research was made as a semi-structured and semi-directive in-depth interview, and the questions targeted mainly the criteria at the basis of the location decision. We did not choose the unstructured non-directive interview, as the great variety of responses makes the interpretation of findings difficult. For the interview we selected people in managerial positions in hypermarkets and supermarkets, starting from their relevance as business formats in Romanian retail, with a high degree of development and a large market share.

The interview operator had meetings with representatives of distribution companies and addressed some questions to them, based on the interviewing guide. They gave the possibility to the interviewees to follow the questions on another form. Each interview was programmed for a duration of approximately 40 minutes, when the representative of the distribution company answered some questions, after a short introduction. The interviews took place in December 2016.

The selection of distribution companies from the category of hypermarkets and supermarkets is motivated on the one hand by the positions they hold in the rankings of the main distribution companies and on the other hand on the type of expansion adopted.

3. Analysis and discussions

Starting with 1990, the Romanian retail market registered profound transformations, with the beginning of the process of restructuring and modernisation of the domestic distribution system. The national business environment allowed international distribution companies to penetrate the market, which led to developing the first modern commercial formulas (Belu, 2004). At present, from the perspective of commercial formulas the distribution system in our country can be characterised as a modern one.

New business models have appeared on the Romanian retail market. For example, the *omni channel* distribution strategy has been adopted by an increasing number of distribution companies. Carrefour Romania and Cora have launched the online hypermarket in 2013; Mega Image, the most extended supermarket chain in Romania, has developed a partnership with the eMAG online platform "supermarket at your home"; Metro Office Direct offers clients the possibility to purchase products online or by phone. (Belu and Marinoiu, 2014)

At the present, the retail market in our country can be briefly characterised as follows.

- Firstly, the market is dominated by modern retail formats (hypermarket, supermarket, cash&carry, discounters), which have gained ground against traditional retail. In 2016, hypermarkets represented the most important modern commercial in the retail market, with a 29% market share and approximately half of the value of modern trade. Supermarkets have registered a decrease in the number of customers, while discount stores have managed to attract new buyers (see figure no. 3). As can be seen in the figure below, the market is fully concentrated, modern retail formats have a 60 % share of the total market (GfK, 2016).

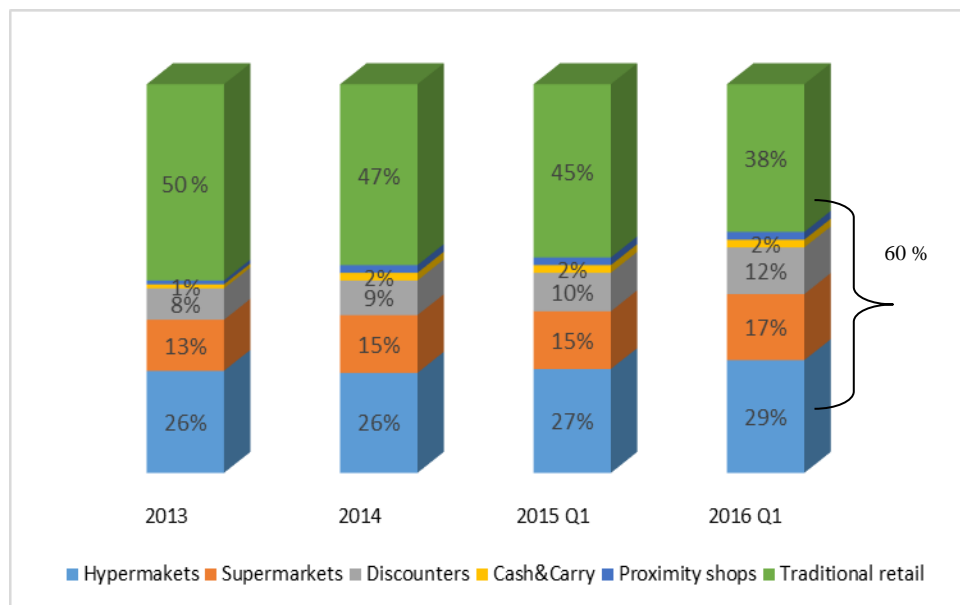


Figure no. 3: Romania: retail formats shares

Source: GfK, 2015, 2016

- Secondly, a marked growth of proximity stores is registered. For example, Mega Image and Profi have opened a great number of stores. Cash&carry stores have limited their expansion, but have consolidated existing businesses.

- Thirdly, in an increasingly competition environment, distribution companies have adapted their strategies, have emphasised attracting new customers and customer loyalty, communication policies and consumer behaviour studies (Florea, 2015).

- Fourthly, we are noticing an increase of distribution companies' profits (Table no. 2), due both to commercial networks expansion and factors favouring consumerism (for example, VAT reduction to food products, income increases for some categories of consumers).

Table no. 2: Main distribution companies in Romania

Crt. No.	Company	Net turnover (mil. lei)			Profit/ net loss (mil. lei)		
		2015	2014	Variation (%)	2015	2014	Variation (%)
1	Kaufland Romania	9,174	7,998	14.70	649	410	58.27
2	Carrefour Romania SA	5,150	4,562	12.89	128	119	7.31
3	Lidl Discount	4,724	3,887	21.55	172	60	186.67
4	Metro Cash&Carry Romania SRL	4,494	4,489	0.13	35	-1	3,600.00
5	Auchan Romania SA	4,444	3,771	17.86	53	-62	185.48
6	Mega Image SRL	3,563	2,816	26.53	103	56	83.93
7	Selgros Cash & Carry SRL	2,934	2,833	3.58	43	15	186.67
8	Rewe (Romania) SRL	2,656	2,335	13.74	13	11	18.18
9	Profi Rom Food SRL	2,548	1,845	38.14	53	27	96.30
10	Romania Hypermarche SA (Cora)	1,723	1,712	0.68	-40	-25	60.00

Source: Popa and Dascălu, 2016

An analysis of the distribution companies on the Romanian market shows that they have concentrated mainly in the main cities, where salary level and purchasing power have high values.

Bucharest has an approximately 30% contribution to modern retail, followed by Ilfov (4.7%), Braşov, Constanţa, Timiş and Cluj (see Table no. 3). Thus, the first five counties have approximately half of total modern commercial formulas (hypermarket, supermarket, discount, and cash&carry). These are the areas most preferred by retailers due to low unemployment and high salaries, compared to other counties.

Table 3: Territorial distribution of modern retail formats

County	Total county	Share from total (%)	County	Total county	Share from total (%)
Bucharest	511	29.7	Bistrița Năsăud	21	1.2
Ilfov	81	4.7	Caraș-Severin	21	1.2
Brașov	74	4.3	Satu Mare	20	1.2
Constanța	72	4.2	Brăila	19	1.1
Timiș	67	3.9	Mehedinți	19	1.1
Cluj	62	3.6	Olt	19	1.1
Prahova	59	3.4	Neamț	17	1.0
Hunedoara	47	2.7	Vrancea	17	1.0
Bacău	44	2.6	Buzău	16	0.9
Bihor	40	2.3	Giurgiu	16	0.9
Iași	39	2.3	Gorj	16	0.9
Argeș	38	2.2	Teleorman	14	0.8
Mureș	36	2.1	Vâlcea	13	0.8
Galați	35	2.0	Botoșani	12	0.7
Sibiu	34	2.0	Covasna	12	0.7
Arad	33	1.9	Harghita	12	0.7
Suceava	30	1.7	Ialomița	12	0.7
Maramureș	28	1.6	Vaslui	12	0.7
Alba	26	1.5	Tulcea	10	0.6
Dolj	26	1.5	Sălaj	9	0.5
Dâmbovița	24	1.4	Călărași	8	0.5

Source: Roșca, 2016

In Bucharest, distribution companies' location was made mainly in respect to population income. The distribution of commercial formulas in the six sectors of the capital is the following: in sector 1, where the incomes are above average, we see the greatest number of commercial formulas (hypermarket, supermarket, cash&carry, discount); at the opposite pole, are sectors 4 and 5, where we can find the smallest number of modern commercial formulas – the two sectors are considered the poorest of the capital city (see figure no. 4). If we consider the number of stores opened in Bucharest, Mega Image is the leader of modern retail in the capital city.

Information obtained in the interviews showed that besides the location criteria identified in specialty literature and presented in table no. 1, when deciding the location of a new store, decision-makers in retail also take into consideration other variables, such as: cost of land to be purchased; time necessary to obtain the necessary approvals to start construction of the new store; time necessary to obtain operating permits; development of residential neighborhoods; complementarity of the new store with existing stores within the company; impact of future projects for the same area.

In 2015 Carrefour adopted an expansion strategy based mainly on the supermarket segment, Carrefour Market, and on proximity stores, Carrefour Express. In 2016, Carrefour took over supermarket chain Billa, and planned to transform these stores in Carrefour Market units (the total number of stores of this type was 118 units at the end of 2016). Carrefour continued the process of expansion on the hypermarket segment, too, by

inaugurating 3 stores in 2016. Carrefour, the second retail player, reached a number of 29 hypermarkets.

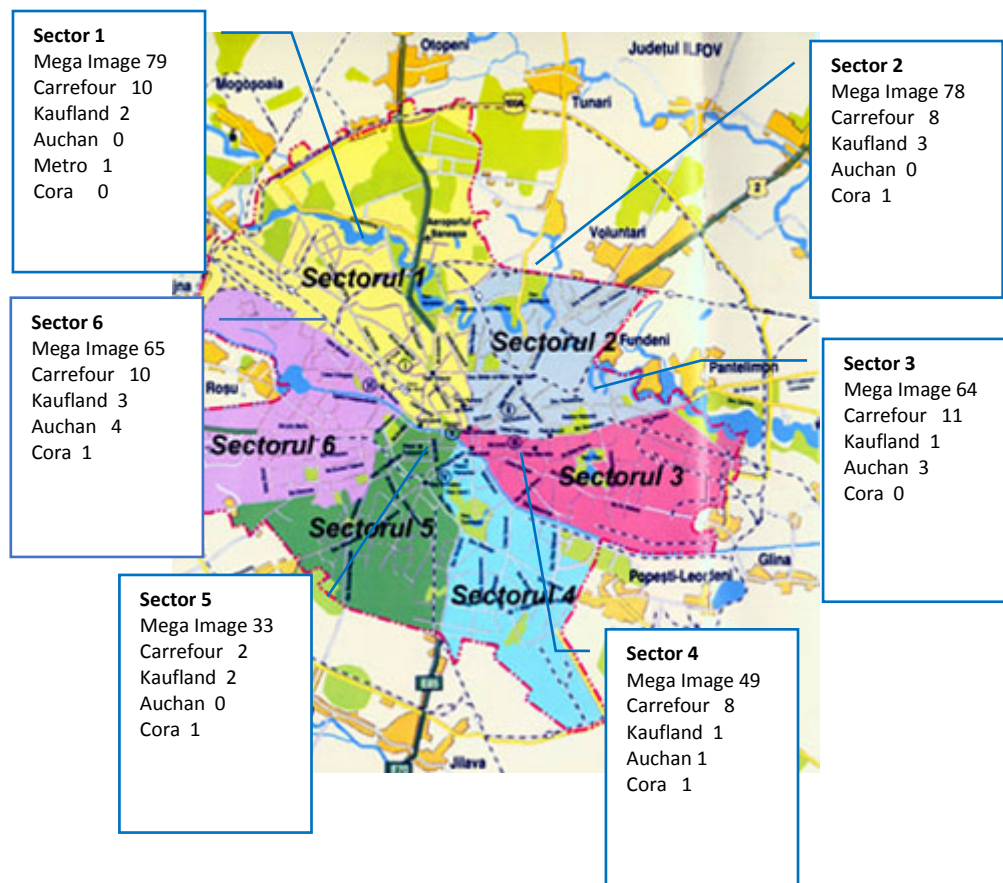


Figure no. 4: Location of stores in Bucharest

Kaufland expansion strategy is based on two basic principles, a detailed study regarding local market potential and location of new stores in different geographic areas, by ensuring accessibility of potential customers. For Kaufland the criteria at the basis of the location decision are: analysis of attraction area, considered a circle with a 0-15 km radius; areas of at least 60,000 inhabitants situated at no more than 15-20 minutes from the future store; analysis of commercial space existing in the area (the bigger this is, the smaller the new stores sales will be); strong competition determines a central positioning of the future store (easy access to the store is assured); land price (from the very beginning of entering the Romanian market, Kaufland opted for their own stores, on land they own, to the detriment of stores rented in commercial outlets).

Kaufland, the biggest player on the food market in Romania, opened 5 stores in 2016, with a total number of 112 commercial units. The success of the company, regarding location strategy, is explained through the location of stores usually in neighborhoods in the center

of town; consequently, Kaufland is perceived as a proximity store, as well as a supermarket. At the same time, Kaufland opted for the small towns in the country, as well (with a number of inhabitants in between 25,000 and 40,000), unlike hypermarkets (Carrefour, Cora, Auchan), which target cities with a number of 100,000 inhabitants. In Bucharest, Kaufland has 12 stores, situated in all sectors, located in central and semi-central areas of the capital city.

At the end of 2016, Mega Image had the network with the greatest number of stores at national level and a concentration of these stores for the Bucharest area (522 stores). The expansion strategy of Mega Image retail chain was based both on organic development, through opening new stores (brands Mega Image, Shop&Go and Gusturi Românești), as well as on acquisitions, taking over some local stores (for example, the takeover of 18 stores from company Angst, out of which 10 were transformed into Mega Image stores and 8 rebranded as Shop&Go stores). The Mega Image network registered the greatest growth pace within the Ahold Delahize group worldwide.

The expansion strategy Mega Image adopted was based in the first phase on locating its brands in important neighborhoods of the capital city, then followed expansion, in a second phase in Ilfov county, but also in big cities such as Brașov, Constanța and Ploiești. 90 % of Mega Image stores are located in Bucharest and Ilfov county. We can thus notice a preference of the company for the Southern part of the country.

The location strategy adopted by Mega Image in Bucharest is based on the principle according to which the route of the customer to a company store should not be more than 500 meters. That is how the location of Mega Image stores is explained in the capital city, at only minutes 'walk from the homes of potential customers.

Besides the aggressive expansion strategy (see Figure no. 5), Mega Image also adopted an aggressive policy regarding private brands, as the only international retailer that created a store brand specifically for Romanian products.

This year Mega Image will continue its expansion at the same rhythm and an expansion on the Cluj-Napoca market is forecasted, by opening their first store there. The strategic position of the future store will ensure the Belgian retailer a favorable position to expand in Transylvania. At the same time, placing the logistic warehouse near Cluj will allow supplying the future Mega Image stores in the area.

Development strategies adopted by the analysed companies aimed mainly at an extensive type development (opening new selling points). Care for intensive development (growth of sales per square metre of commercial surface) is still reduced, but it is still manifest on the cash&carry segment.

Conclusions

Our research shows that there is a difference between theoretical prescription (models) and the practice of big distribution companies on the Romanian market. Many times the location option is rather based on opportunity costs (areas with no competition or competition is represented by neighborhood stores – the best formula was acquiring them or franchising. Sometimes placing a hypermarket in an area served by small sellers (the convenience store at the street corner, small store – traditional retail) has brought the

disappearance of the latter. This explains the more and more reduced share of traditional retail out of the retail market (a share of 40% in 2016).

As a result of the analysis, we can draw the following conclusions:

- Each model uses a limited set of criteria (variables), there is no comprehensive model.
- Models cannot capture decision dynamics, i.e. passing from some priority criteria to others against the circumstantial changes or especially new opportunities.
- Models serve as a decision-making instrument in the sense of support/orientation and do not replace decision. In practice, decision should not be taken only by using one or several models. The results of models only represent arguments/ decision criteria in a more complex decision making system in which the deciding role is held by the manager. The human decides, not the model.
- It is through Big Data analysis instruments that we can make a real-time analysis, based on a great volume of information.

There are certain aspects limiting our research, such as: limitations to the main players on the food retail market in our country; not checking the hypothesis through running an IT software or through implementing a geographic information system; difficulty to access existing data bases, which represented the main problem.

A future research direction, which would allow us to go deeper into the signaled aspects, could be applying a location model from the category location-allocation, by using a geographic information system, Qgis software.

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