Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

SPATIAL ANALYSIS OF CONSUMER BEHAVIOR IN A FOOD PRODUCTS MARKET

Rafael Suárez VEGA
Departamento de Métodos Cuantitativos en Economía y Gestión,
Instituto Universitario de Turismo y Desarrollo Económico Sostenible (Tides)

José Luis Gutiérrez ACUÑA
Departamento de Economía y Dirección de Empresas
Universidad de Las Palmas de Gran Canaria-Spain

Manuel Rodríguez DÍAZ
Instituto Universitario de Turismo y Desarrollo Económico Sostenible (Tides)
Departamento de Economía y Dirección de Empresas

Abstract
Market is a spatial reality characterized by two factors influencing the demand: the distribution system and the geographic component of the market. The aim of this article is to analyze the spatial behavior of consumer food products within a geographic market area including two different zones: urban and rural. Academic literature has developed several models based on the distance and the size of the store, as the basic but not unique variables that explain consumer behavior in retailing. This paper deals empirically with these postulates to verify if, at present time, they continue to be effective in the grocery sector, and to develop a framework to analyze the market from a geographic perspective. Telephone surveys were carried out to determine the degree of attractiveness of the stores, coming to the conclusion that in the geographic scope studied a substantial change had taken place in the behavior of the consumers of food products. The study demonstrates that attraction increases with proximity and the fact that the large size of the stores is no longer decisive in the buying decision. It also analyzes the best dimension range for the retailers. The results obtained represent a spatial restructuring of the demand that has effects in companies' strategies, urban planning, geomarketing and location decisions applied to consumers and retailers of food products.
Keywords retailing, location, geomarketing, GIS, urban planning, food market, grocery, gravitation models.

1. INTRODUCTION

Retail location and its implications in the consumer behavior and demand flows have been widely studied in marketing, urban planning and geomarketing, and as a consequence, different location models have been formulated. These are divided into those that follow the Reilly (1931) and Converse (1949) deterministic approach (Applebaum and Cohen, 1961; Christaller, 1935; Lösch, 1954; Jones and Mock, 1984; Kohsaka, 1992) or probabilistic approach (Huff, 1964; McFadden, 1974, 1977; Fotheringham, 1983; Fotheringham and O'Kelly, 1989).

However, these models have not been considered from the perspective to contribute to the study and accomplishment of the urban planning of the cities, nor have been developed either to the point to enter in an integrated process of macro and micro-location. What is more, it is generally accepted to treat them as econometric models where certain explanatory variables of the process of decision making of the consumers are analyzed, but without connecting the determination of the capacities of attraction with the economic and environmental viability, as well as with the design of the commercial supply that is required to obtain the enterprise and social objectives. The buying behavior of the consumers has also been studied taking into account the shopping trips, being carried out different studies on the dynamic models from election behavior (Timmermans and Borgers, 1989), the tendencies of the clients (Dellaert, et al. 1998) as well as shopping activity-based transport studies (Bhat and Pendyala, 2005; Gliebe and Koppelman, 2002, 2005; Zhang, et al. 2002, 2004; Srinivasan and Athuru, 2005; Wang and Li, 2009).

In urban planning, location plays a core role as it has been demonstrated that commerce has a great potential to generate a coherent urban plan (Lowe, 2000), facilitates the process of decentralization of the cities (Schiller, 1986; Fernie, 1995), contributes to the competitiveness of the cities (Warnaby, 1998) and generates economic activity (Jackson and Watkins, 2005). The competitiveness of the cities is based on urban planning (Beg, 1999; Van den Berg and Braun, 1999), where marketing plays a significant role in structuring the capacities of the cities (Bramezza, 1996). At the same time, the decentralization process that certain cities have been experienced has caused multiple effects that affect the commercial urban planning, such as urban regeneration (Elizagárate, 2006; Lowe, 2005) and Town Center revitalization (Forsberg, Medway and Warnaby, 1999; Ravenscroft, 2000; Thomas and Bromley, 2003). It has caused a new reconsideration of the cities (Uduku, 1999) and the Town Centre (Schiller, 1994; Page and Hardyman, 1996). In this context, Schiller (1986), Fernie (1995) and Warnaby (1998) have shown that this decentralization process has been planned in many occasions based on different retail strategies.

A specific discipline called geomarketing has been developed within marketing. According to Latour and Him Floc' h (2001), geomarketing consists of a system integrated by data, computer programs, statistical methods and graphical representations designed to produce useful information for decision making, through instruments that combine digital cartography, charts and tables. Baviera-Puig, et al. (2013) defined the geomarketing as the discipline that uses the GIS as an instrument for the analysis and decision making within the market, with the objective to satisfy the necessities and desires of the consumers as well as to accomplish the profitability of the company.

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

The main actors that integrate the market are the demand and the supply as well as all the elements of the surroundings that affect them. With regard to the demand, the potential of the local market and the capacity of purchase depend on the demographic characteristics of the influence area (Johnson, 1989; Mulhern and Williams, 1994; Grewal et al., 1999). According to Johnson (1989), the geodemographic characteristics constitute the classification of the people according to the type of neighborhood they live in instead of the conventional socioeconomic criterion, such as income or social class (Bearden et al., 1978; Bawa and Shoemaker, 1987; Kalyanam and Putler, 1997; Ailawadi et al., 2001). Sleight (1995) considers them as demographic information by geographic unit, obtained from different sources such as the censuses of population or surveys.

The aim of this paper is to analyze the customer buying behavior referring to retail food products from a spatial perspective. The situation has been displayed as a Huff model where customer decisions are taken according to the attraction they perceive from the facilities. This attraction depends on the distance to the facility ant its size. To do this, data about customers' behavior was collected through telephone surveys. Survey respondents, food stores and demand points were georeferenced in order to estimate the parameters determining the effect of size and distance on customers' preferences.

The log-linear transformation proposed by Nakanishi and Cooper (1974) has been used to obtain the Huff parameters. In order to seek for evidences that indicate behavior differences between urban and rural zones, the estimations were made using subsamples depending on the area where the polled belongs. On the other hand, parameters were contrasted with the departure propositions of the traditional location models, which establish that a bigger size of the store produces a higher capacity of commercial attraction. Therefore, the buying behavior of the consumers determines the commercial geography of the demand and the optimal location of the stores.

The article is organized as follows. In Section 2 the methodology applied is developed, followed by the characteristics of the empiric research. Afterwards, in Section 3, the results are decrypted in rural and urban zones, displaying the obtained data in maps. Finally, the main conclusions are exposed.

2. RESEARCH

In this section we are going to differentiate three stages. The first one consists of determining the methodology for studying the market from a geographic perspective. Later, a model for analyzing supply and demand from a spatial perspective is presented. Finally, it is exposed the characteristics of the real case where these results were carried out.

2.1. Methodology

The following steps are required in order to analyze the market from a geomarketing perspective:

1. Delimiting the geographic study area as well as the divisions of the zones where data and results will be displayed. Generally the administrative divisions of countries, regions, provinces, or municipalities are used although more restricted scopes like districts, streets, blocks or buildings can be also chosen.
2. Defining the potential demand from the spatial perspective. Then, the size of the minimum sample to identify the buying characteristics of the customers is determined. All the information must be properly geocoded.
3. Determining the existing offer and its main structural characteristics properly geocoded.
4. Selecting the most suitable spatial interaction model according to the characteristics of the research and the market.
5. Carrying out the field research to obtain the market information and calibrating the corresponding model.
6. Analyzing the statistical results from the spatial perspective.
7. Visualizing geographically these results by a GIS application.
8. Determining the tendencies and making forecasts so that strategies from the different agents involved can be developed.

In order to apply the methodology a market study is carried out in a zone of the island of Gran Canaria (Spain), analyzing the commercial demand and offer on the base of location gravitational models developed in the marketing research. All the information has been geocoded so that it can be represented and analyzed by means of GIS, supporting the decision making in different aspects such as the competitive strategies of the companies that concur in that market as well as the urban planning decided by the Public Administrations to satisfy the demand of the population with a competitive commercial offer.

Model

Spatial interaction models were the first gravitational models developed in the marketing literature. These assumed analogies between the human behavior and the gravitational laws of Newton. The

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

formulation is based on the idea that the movement of individuals between two points is inversely proportional to the distance between them. This model was applied by Reilly (1931) and Converse (1949) to analyze the demand attraction and the market areas. Later, Huff (1964) proposed an alternative model overcoming certain limitations of Reilly's approach. This model is probabilistic and takes into account the attraction power of the store j on the consumer who lives in a locality i as follows:

$$P_{ij} = \frac{S_j^{\alpha} T_{ij}^{\beta}}{\sum_{k=1}^{n} S_k^{\alpha} T_{ik}^{\beta}}$$

Where:

Pij = Probability that a consumer in i (origin point) moves to store j (destination).

Sj = Square meters of sales space in the store j.

Tij = Shopping trip time from the origin (i) to the destination (j) points.

α = Customer sensitivity parameter to the retailing sales space.

β = Customer sensitivity parameter of the shopping trip time.

n = Total number of stores in the studied market.

Parameters α and β are estimated through empirical data. The multiplicative competitive models (MCI) have been developed in order to extend the variables to measure the attractiveness of stores, being the mathematical formulation as follows:

$$\pi_{ij} = \prod_{h=1}^{H} X_{hij}^{\beta_h} \delta_{ij} / \sum_{j=1}^{m_i} \prod_{h=1}^{H} X_{hij}^{\beta_h} \delta_{ij} \qquad (1)$$

Where:

πij = Probability that a consumer in the location of election i (period and/or area) selects the j object or store (i = 1.2,…, I; j = 1.2,…, m).

Xhij = Value of variable h for object j in the location of election i (Xhij ≥ 0, h = 1.2,…, H).

βh = Parameter of sensitivity of πij with respect to the variable h.

δij = Independent error with logarithmic normal distribution.

Nakanishi and Cooper (1974) proposed a series of transformations on the MCI that allow the estimation of these parameters by means of ordinary least squares. The linear model proposed by these authors is:

$$\log(\pi_{ij}/\tilde{\pi}_{i\cdot}) = \sum_{h=1}^{H} \beta_h \log(X_{hij}/\tilde{X}_{hi\cdot}) + \log(\delta_{ij}/\tilde{\delta}_{i\cdot})$$

Where:

$\tilde{\pi}_{i\square}, \tilde{X}_{i\square}, \tilde{\delta}_{i\square}$ are the geometric averages of πij, Xhij, δij throughout j in the situation of election i, respectively.

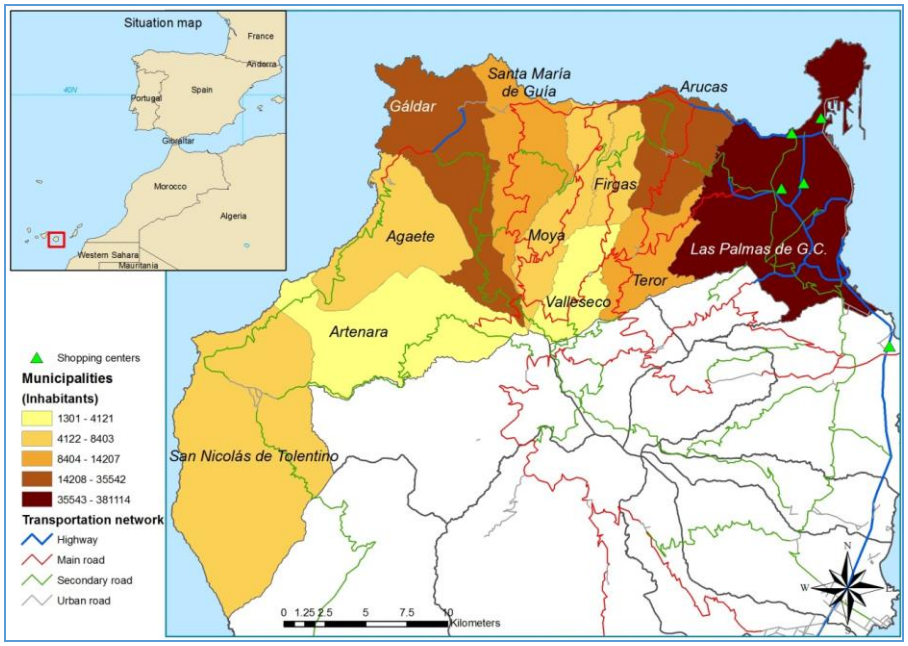

FIGURE 1: SITUATION MAP AND STUDY AREA

Empiric study

The study was carried out in the north of the island of Gran Canaria, one of the seven islands of the Canarian Archipelago (Spain), located in the Atlantic Ocean and 100 kms away from the North Coast of Africa (Figure 1 shows the situation map). The main port and airport of the medium Atlantic are in this island, as well as one of the main tourist destinations of the world. The explanatory field study consisted of telephone surveys to homes located in the north of the island. The purpose was to determine the percentage of food bought in different shopping centers (Figure 1 shows their locations) as well as in proximity stores. With this information the attractiveness of the stores is determined, letting the

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

calculation of the parameters associated to sale space and distance using the procedure proposed by Nakanishi and Cooper (1974). 726 telephone surveys were carried out, differentiating two zones: urban and rural. The urban area is represented by the capital, Las Palmas de Gran Canaria, with a population of 381,114 inhabitants, whereas the rural population is distributed in nine municipalities with a total population of 121,542 inhabitants. The second column of Table 1 shows the distribution of the population in the municipalities studied (2008 Census).

TABLE 1 - POPULATION AND STORE OFFER INFORMATION BY MUNICIPALITIES

Municipalities	Population	<120	[120,399]	[400,999]	[1,000,2499]	[2,500,4,999]	≥5,000
Artenara	1,301 (13.84)	2 (13.84)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Teror	12,818 (24.18)	18 (12.64)	3 (6.08)	1 (5.46)	0 (0)	0 (0)	0 (0)
Valleseco	4,121 (25.96)	9 (19.65)	1 (6.31)	0 (0)	0 (0)	0 (0)	0 (0)
Moya	8,010 (26.47)	10 (11.24)	2 (6.49)	1 (8.74)	0 (0)	0 (0)	0 (0)
Arucas	35,542 (26.70)	54 (13.67)	3 (2.19)	3 (5.91)	1 (4.92)	0 (0)	0 (0)
Santa María de Guía	14,207 (26.82)	23 (14.57)	4 (7.32)	1 (4.93)	0 (0)	0 (0)	0 (0)
Firgas	7,424 (27.75)	20 (24.25)	1 (3.50)	0 (0)	0 (0)	0 (0)	0 (0)
Las Palmas de GC	381,114 (32.53)	520 (12.28)	57 (3.89)	23 (4.22)	20 (9.18)	3 (2.95)	2 (2.62)
San Nicolás de Tolentino	8,403 (37.61)	8 (8.57)	4 (12.38)	2 (16.66)	0 (0)	0 (0)	0 (0)
Gáldar	23,951 (41.67)	45 (16.91)	8 (8.68)	3 (8.77)	1 (7.31)	0 (0)	0 (0)
Agaete	5,765 (47.70)	17 (26.54)	2 (9.02)	1 (12.14)	0 (0)	0 (0)	0 (0)

The size of the shopping centers was collected from the Spanish Association of Shopping Centers (Directory of Shopping Centers, 2010); while the size of the rest of the stores was collected from the Commercial Census of the year 2006 elaborated by the Government of the Canary Islands and updated in 2012 (Censo Comercial de Canarias, 2012), being classified by intervals of sales space (in m2): less than 120, between 120 and 399, 400 and 999, 1,000 and 2,499, 2,500 and 4,999, and bigger or equal to 5,000. A total of five shopping centers and 872 food stores were geocoded. As the exact sale space of store was not known, the following sizes were considered for the different intervals: 90, 260, 700, 1,750, 3,750 and 5,000 m2. These values were calculated as the mean of each interval (supposing that the sizes were uniformly distributed along the intervals) and considering 60 m2 as a reasonable lower bound for the smaller stores. Only two stores with a minimum size of 5,000 m2 existed, one with 5,000 and another with 5,200, so 5,000 m2 was selected for representing their size. Considering these representative sizes, the ratio sale space per 100 inhabitants was calculated. Table 1 shows, for each

interval of surface and municipality, these ratios (in brackets) and the number of stores in each category. The figure appearing in brackets in the Population column is the ratio considering the total sales space (considering all the stores) by 100 inhabitants. Note that 75.82% of the population is concentrated in the municipality of Las Palmas de Gran Canaria as well as 71.67% of the grocery stores. Moreover, the largest stores (sales space of at least 2.500 m2) are only located at the capital. Municipalities in Table 1 are displayed in increasing order for the ratio sales surface per 100 inhabitants. As this table shows, the three municipalities with higher ratio are those more distant from the capital.

Considering the population as an infinite universe, the sample error of surveys was 3.71%. The customers surveyed and the supermarkets were also geocoded. Regarding to the buying trips time, it was calculated the fastest route between customers surveyed and the commercial stores (six shopping centers and the retailing stores of food products). To do that, ArcGis® software and a roads map supplied by Grafcan (http://www.grafcan.es/) were used. To calculate the time spent in the shopping trips, it was necessary to allocate an average speed to each stretch of road, having to classify the routes in highways and main, secondary, local roads (Figure 1 shows the transportation network). Taking the travel time between polled individuals and stores and the stores size, the method proposed by Nakanishi and Cooper was carried out to estimate the parameters.

The following two assumptions were considered:

- Each familiar nucleus consumes food products.
- The purchase of proximity in food products will be the difference between the total amount spent in food products and the consumption of them in shopping centers.

The parameters associated to the distance and the sales space in both scopes were calculated with the purpose of analyzing the shopping behavior in urban and rural zones. The number of valid surveys in rural and urban scope was 478 and 248, respectively. The dependent variable of the model is the buying probability and the independent variables are the distance, measured in terms of time of trip, and the sales space, expressed in squared meters.

3. RESULTS

The study was carried out in the two areas above mentioned: rural and urban. To establish the type of store that better reflects the proximity consumer behavior, a statistical regression was run separately in each zone. The objective was to determine the proximity selling space that reflects better the habits of the consumers. Seven regressions were carried out considering the proximity purchase as the one

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

made in the nearest food store belonging to each interval of size. Table 2 and Table 3 show the estimation of the parameters and the adjusted R2 obtained in the different scenarios. The first column (N-AS) presents the results corresponding to the regression considering that proximity buying were made at the nearest food store regardless of the size. The rest of columns represent the results obtained when the proximity buying is allocated to the closest store belonging to each interval of size, that is, the 90 (N-90), 260 (N-260), 1,750 (N-700), 3,750 (N-3750), and 5,000 (N-5000) m2 nearest food store. In the following sections, the results obtained in the rural and urban areas will be commented with more detail, with the purpose of establishing if there are similarities or differences in the consumer shopping behavior.

TABLE 2 - REGRESSION RESULTS OF THE BUYING BEHAVIOR OF FOOD PRODUCTS IN THE RURAL AREA

Food products	N-AS	N-90	N-260	N-700	N-1750	N-3750	N 5000
α (size)	-0.5291	-0.5825	-0.4018	-0.5527	-0.4283	-1.1985	-0.8302
Prob α	3.75E-40	1.73E-50	1.25E-16	5.50E-24	2.16E-10	8.15E-50	2.90E-20
β (time)	-0.3856	-0.3193	-0.9092	-0.9308	-1.9756	-2.8575	-3.0513
Prob β	4.35E-29	4.94E-19	6.21E-59	3.05E-77	4.72E-136	7.38E-67	1.92E-79
Adjusted R^2	0.4036	0.4099	0.42574	0.4052	0.3915	0.1965	0.1586
Average time (sec)	43.59	47.64	151.34	196.82	548.87	1400.17	1409.47
Average size (m^2)	167.66	90	260	700	1,750	3,750	5,000

Rural area

Results in Table 2 reveal that the size of proximity food stores that better fits the regression model is 260 m2, with an adjusted R2 of 0.42. However, in the scenarios where the size of proximity considered varies in the range from 90 to 700 m2, the adjusted R2 obtained is around 0.4, whereas the stores with 1,750 m2 obtained a high adjusted R2 of 0.39. Nevertheless, when the proximity purchase is allocated to the bigger stores (3,750 or 5,000 m2) the adjusted R2 shows a significant decrease. These results demonstrate that the proximity commerce of food products in rural areas at present is integrated by stores with a selling space until 1.750 m2, confirming the success that are performing the chains of supermarkets with a selling space of 1,500 m2 that are considered by the customer as proximity commerce.

Regarding the parameter estimations, Table 2 shows that the stores with 260 m2 have a parameter of -0.4018, being the rest of the values obtained in the other regressions very similar. This implies that a large selling space is not the principal attractive for the consumers of food products. On the other hand, the parameter referred to the time spent in the shopping trip for the rural population is -0.9092, increasing significantly in the scenarios in which the size of proximity stores is at least 1,000 m2. The probabilities of the parameters also demonstrate that the results are significant. The average time spent

from the home of the surveyed customers to the proximity store used in the regression analysis was another aspect considered. Table 2 shows that the rural consumer takes an average of 151.34 seconds (the time is measured in terms of car displacement) in arriving at the store included in the interval of 260 m2, approximately, whereas the buying trip to stores with a size bigger than 1,000 m2 is about 10 minutes.

While the results obtained in rural areas in terms of time of displacement follow the principles of gravitational and probabilistic models, the results of the selling space are against them. Although it is verified that the distance influences inversely to the commercial attraction of the stores, the results of the selling space revealed that the current preferences of customers are more in favor of the proximity than the size of stores. Therefore, these results allow us to state that proximity is becoming more and more important as a strategic factor for food distribution companies in the rural area considered, which will have implications in the redesign of geographical and commercial urban planning with the aim of creating services areas of proximity.

TABLE 3 - REGRESSION RESULTS OF THE BUYING BEHAVIOR OF FOOD PRODUCTS THE URBAN AREA

Food products	N-AS	N-90	N-260	N-700	N-1750	N-3750	N-5000
α (size)	-0.7260	-0.7199	-0.9181	-0.9402	-1.0533	-1.1126	-0.8792
Prob α	1.48E-51	3.99E-56	8.33E-65	2.09E-33	9.45E-30	1.90E-20	3.94E-11
β (time)	-0.2725	-0.2762	-0.3844	-0.8180	-0.8899	-1.1114	-0.9439
Prob β	7.34E-15	2.40E-11	4.55E-12	9.26E-31	4.93E-36	1.08E-26	1.73E-18
Adjusted R^2	0.3721	0.3913	0.3714	0.3343	0.3064	0.1681	0.0944
Average time (sec)	21.78	25.15	68.77	99.83	95.83	203.06	241.77
Average size (m^2)	246.93	90	260	700	1,750	3,750	5,000

Urban area

It is reasonable to think that the results obtained in the rural area may be influenced by the distance of the population to the main distribution stores, which would determine a higher attracted demand to the proximity commerce. To confirm that the increase in sales of the proximity commerce is a real tendency of change in the customer's buying behavior, it is necessary to verify if this phenomenon also takes place in the urban area, where the commercial offer is much broader and the buying trips are smaller. Table 3 illustrates that the biggest adjusted R2 obtained was 0.3913 and corresponds to the regression of stores around 90 m2. The scenarios with bigger proximity stores had also a reasonable fit until the interval of 1,750 m2, where the adjusted R2 was 0.3064. On the contrary, the bigger stores obtained a R2 very low, of 0.1681 for stores with 3,750 m2 on average size and 0.0944 for those of 5,000 m2. This demonstrates that, although in the urban area there is a bigger number of big supermarkets and

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

hypermarkets, they do not have a significant influence in the attraction demand of the proximity commerce.

With regard to the parameters estimation, Table 3 reveals that the size of the stores obtained a parameter of -0.7199 for the stores of 90 m2. This parameter increases with the size of the proximity store considered, except for the case where the biggest stores are considered in which the parameters are drastically reduced. In all the cases, the estimated parameters are highly significant. These results demonstrate that the tendency in the change of the consumer buying behavior of food products is global, that is, the increasing attractiveness of nearby stores is verified in both areas.

The time variable obtained negative parameters, as it was expected. Particularly, for stores around 90 m2 the parameter was -0.2762, showing a similar tendency to that presented by the parameter associated with the size. The probabilities calculated for the time parameter also demonstrate that the estimations are significant. These results show that the urban consumer also appreciate the proximity of the stores of food products in his buying decisions. As the size grows, the parameter also increases in negative sense. Therefore, the food demand is mostly concentrated in nearby stores with a selling space of less than 1,750 m2.

Joint analysis of the areas considered

In view of the results obtained in both geographic zones, we can confirm that a substantial change in the consumer´s buying behavior of food products has taken place in the area considered. The proximity stores are increasing their sales while the bigger stores, despite offering a broader offer, are not able to dissuade the clients to make long buying trips. Regarding the adjusted R2, a very similar tendency is observed in both zones, as the highest values were obtained with small stores of 260 m2 and 90 m2, in the rural and urban areas, respectively. Another important result is that the influence of stores around 1,750 m2 in the proximity commerce is very significant, supporting he multilocation process developed by the great chains of supermarkets, letting them achieve important competitive advantages in logistics costs.

The comparative analysis between the parameters of size and time also exhibits results to stand out. Although the parameters of size are negative in both zones, the value is bigger in the urban area. For example, for stores of 90 m2 the parameter in the urban area is -0.7199, whereas in the rural area is -0.5825. In the commerce of 260 m2, the value obtained in the urban zone is -0.9181, whereas in the countryside is -0.4018. These results indicate a higher sensitivity to the size in the urban zones, due to the fact that the customers are able to decide on a greater variety of nearby stores, in contrast with the rural area. Moreover, in this last zone the time weighs negatively more in stores equal or bigger than

260 m2. In particular, the parameter of the travel time in this size is - 0.9092 and -0.3844 in the urban zone. This shows a bigger dissuasion for long buying trips in the rural consumers, which preferred to make its buying in nearby groceries. This result is also corroborated in the average buying trip time in the zones studied. In the rural area the displacement averaged for 90 m2 stores is 47.64 seconds, in contrast with the 25.25 seconds required in the city. As the size of the stores grows, the differences increase until achieving the stores of 1,750 m2, where the average trip time is 548.87 seconds in the rural area, while in the urban zone the displacements are smaller, with an average of 95.83 seconds. These results support the strategy of the great chains of supermarkets oriented to gain market share in the urban areas, where they can obtain a higher capacity of attraction due to the higher density of population, although there are lot of opportunities to exploit in the rural zone.

Graphical analysis

The data and results obtained in the research can be visualized through a GIS. Although the results are not generally exhibited in an image directly, we consider very useful to bring into play a GIS to describe or simulate a reality in a concrete geographic space. In our case, it had been divided into two different zones in the north of the island of Gran Canaria. On this base it is possible to analyze the spatial distribution of the proximity stores in order to detect market opportunities.

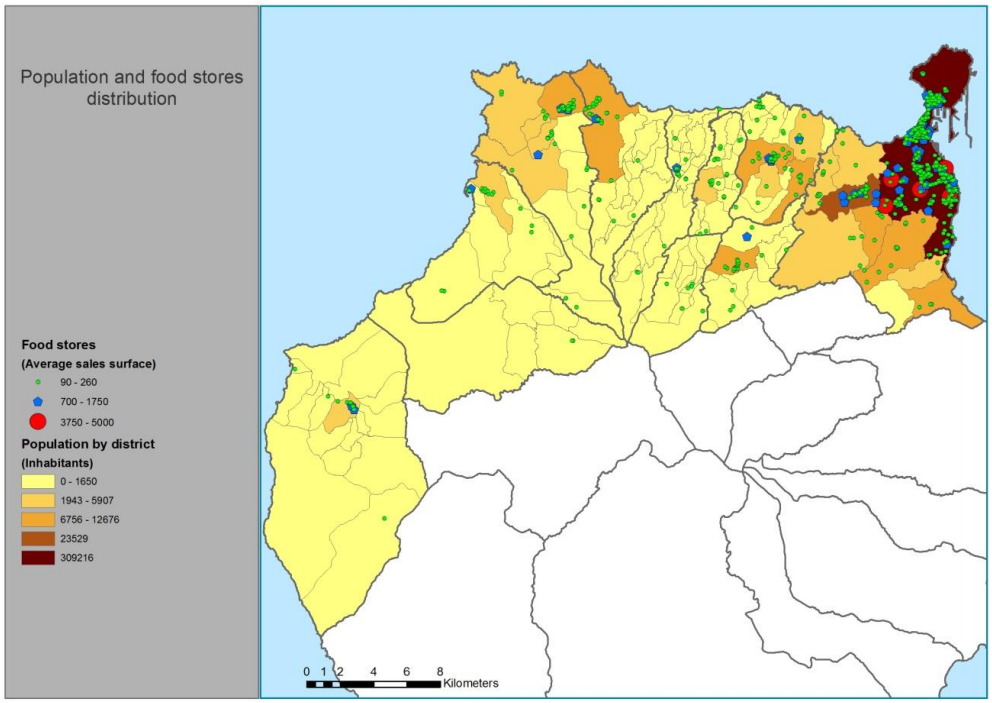

FIGURE 2 - OFFER AND DEMAND GEOGRAPHIC REPRESENTATION

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

Figure 2 shows the location of the grocery stores as well as the population by districts in the study area. This figure allows comparing the density of grocery selling space with the potential proximity demand. We can assume that, in those areas where there is a high concentration of groceries, a strong competition also exits reducing the possibility of entry for a new competitor (bigger or smaller). However, there are always opportunities for companies that develop innovative systems adapted to the new customer necessities. It is possible to observe in this figure that the most populated zones, painted with a darker color, have got commercial retail equipment with higher sales capacity. However, the highest populated districts in the rural area show a higher density of proximity stores because the retail offer is designed to sell to customers who live in small populations and far from the main urban nucleus. What is more, there are municipalities with small populations where the total selling space is very high in relation to the rest of the island. This is because of the fact that in rural areas the groceries are located in very accessible places, where the clients normally can go by public transport or private car.

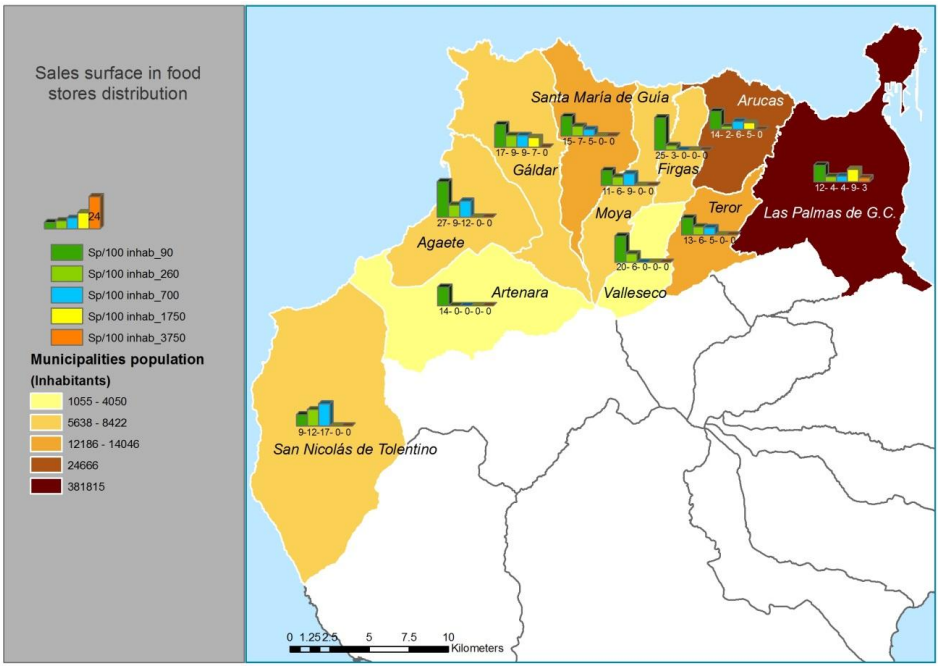

FIGURE 3 - SELLING SPACE PER 100 INHABITANTS DISTRIBUTED BY MUNICIPALITIES

Figure 3 reveals the commercial retail equipment distributed in intervals of size per municipalities and the ratio of selling space per 100 inhabitants. To make easier the comprehension of the figure, ratio for 5,000 m2 stores was not presented because they are all sited in the capital, taking a value of 2.62. This map highlights how the largest stores are located in the capital, despite the fact that there are also a significant number of small stores nearby. In contrast, the tendency in the rural area is to have proximity stores with smaller dimensions, in spite of the fact that customers have to make a trip to buy in them. Only in the municipalities with high population, the commercial offer tends to large supermarkets. What

is more, one may think that in this rural area there are more expansion opportunities for supermarkets of medium size, even for some stores of 3,750 m2. The results obtained for the municipality of San Nicolás de Tolentino require an individualized analysis. This municipality is located in the other extreme of the island, far from the capital and the principal urban nucleus. The geographic distance lets a higher store density of stores of 260 and 700 m2 (12.38 and 16.66 m2 per 100 inhabitants, respectively), in relation to the stores of 90 m2 that have a ratio of 8.57 m2 per 100 inhabitants. In this municipality is clearly shown that the time of transport is a factor of dissuasion that let increase the proximity retail offer. However, bigger supermarkets do not find an opportunity because the market is very limited.

Finally, conclusions related to the development of the commercial activity in the rural area of the graphical analysis can be extracted. First, the proximity retail commerce is concentrated in small proximity stores. Second, opportunities for businesses in stores from 700 to 1,500 m2 are also found, because the clients consider them as proximity commerce and have a competitive assortment. Finally, these have implications for the competitive strategy of the chains of supermarkets and the urban planning, in order to plan services areas to satisfy the most essential necessities of the population..

4. CONCLUSIONS

The results obtained in this study have implications in the geographic and strategic planning of distribution companies. This paper presents useful information to select the location that optimizes the productivity of the stores per square meter. The proximity tendency is getting an increasing acceptance by the consumers, forcing the distribution companies to design their commercial strategy based on these new parameters. For the consumers of the zone studied, it is more important to have a close grocery that satisfy its basic necessities with reasonable prices than a big store with a wide variety but located far away and implying a long buying trip.

Tables 2 and 3 show the main results, confirming that, as it was expected, the buying behavior of the rural and urban consumer has an inverse relationship with the trip time. However, one of the most interesting results of this research was the fact that in the geographical space studied, the size of the stores has an inverse influence in the demand attraction of food products. That is to say, a bigger size of the store does not determine a higher attraction if the store is not located close enough to the consumers. This result is against the premises of the main spatial attraction models based on the gravitational demand, like those of Reilly and Huff. It also confirms a tendency in retail food products in which the attraction demand is increasing with the proximity, while the distribution systems based on the attraction of distant clients that move by car are losing competitiveness. In fact, this result is not absolutely contradictory to the opinion of specialists in the field, as was shown by Roig-Tierno et al.

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

(2013). In this paper, a group of retail site selection and marketing experts assigned an influence of only 2.44% to factors associated to the size (selling space, number of parking and number of check-outs) in the explanation of the success of a supermarket, being the factor related with the location the most valuated (75.72%).

The study demonstrates that the results are not an arbitrary change of tendency in the buying behavior of the consumers, because in both zones the same conclusions have been reached. What is more, the bigger stores located in the urban area do not produce a change in the buying decision process of the consumers, because they prefer the proximity stores of medium and small size despite having a lower variety of products. It was shown that the size of the proximity store that better explains the customer buying behavior is 260 m2 in the rural area, whereas in the urban area the groceries with 90 m2 obtained the best adjustment and reliability for the regressions made. Moreover, the size of the groceries that better fits the buying behavior of proximity includes stores until 1,750 m2 in both areas. In the rural populations the average time employed in the buying trips to the closest stores of 1,750 m2 is 548.87 seconds, whereas in the urban scope the store concentration allows the clients to spend less time in their displacements (95,83 seconds).

These results provide evidences of how nearby grocery stores are not only increasing their capacity of attraction in comparison to great supermarkets and hypermarkets, but that the optimal dimension varies from 90 to 1,750 m2. This conclusion is basic to elaborate the marketing strategy of grocery retailers, and emphasize the opportunities that exist in the rural area. Therefore, it must be taken into account two features: the demand attraction capacity and the logistic costs. Regarding the first aspect, the companies must search for the location with higher demand attraction, considering the commercial geography as well as the selling influence, density of population and competitors. On the other hand, it is necessary to establish the optimal dimension of selling space in order to reduce the logistics and distribution costs and to obtain a long term competitive advantage. Finally, all the information has been represented graphically with the purpose of plotting the two factors of the market: potential demand and retail offer. The ratio of selling space per 100 inhabitants is also developed in different geographic scopes. With this detail, it is possible to detect the opportunities that exist in the market as well as the differences between the rural and urban areas. In particular, the graphical analysis demonstrates that there is an opportunity in the proximity grocery, specially for stores with a surface between 260 and 1,750 m2. This circumstance must be considered in the urban planning with the intention of define locations for building service areas of proximity to satisfy the basic necessities of the population.

Future investigations should continue studying the spatial buying behavior of the demand, taking into account that the parameters can vary between zones and microlocations. Moreover, new methodologies must be developed in order to design a commercial geography for retail stores with two

objectives: satisfying the necessities of the clients and facilitating a minimum level of competition that guarantee the free pricing. All this knowledge is necessary to make an urban planning oriented to the populations, where the suitable commercial spaces must be determined in order to develop a competitive retail offer. In many occasions, this objective is disrupted because the urban planning has not had available this kind of information and they do not have anticipated enough commercial spaces, in terms of number and size. Following this policy competitive establishments are prevented to be implanted where they really cover the necessities of the population.

REFERENCES

Ailawadi, K. L.; Neslin, S. A. and Gedenk, K. (2001), "Pursuing the Value-Conscious Consumer: Store Brands Versus National Brand Promotions", Journal of Marketing, 65, 71-89.

Applebaum, W., Cohen, S.B. (1961), "The dynamics of store trading areas and market equilibrium", Annals of the Association of the American Geographer, 51, 73-101.

Asociación Española de Centros y Parques Comerciales (AECC) (2010), Directory of Shopping Centers 2010, Madrid, Spain.

Bawa, K. and Shoemaker, R. W. (1987), "The Coupon-Prone Consumer: Some Findings Based on Purchase Behavior Across Product Classes", Journal of Marketing, 51 (4), 99-110.

Bearden, W. O.; Teel, J. E. and Durand, R. M. (1978), "Media Usage, Psychographic, and Demographic Dimension of Retail Shoppers", Journal of Retailing, 54 (1), 65-74.

Baviera-Puig, A., Buitrago-Vera, J. and Rodríguez-Barrio, J.E. (2013), "Un modelo de geomarketing para la localización de supermercados: diseño y aplicación práctica", DOCFRADIS, workingpaper.

Begg, I. (1999), "Cities and competitiveness", Urban Studies, 36 (5-6), 795-809.

Berg, L. van den and Braun, E. (1999), "Urban competitiveness, marketing and the need for organising capacity", Urban Studies, 36 (5-6), 987-999.

Bhat, C.R. and Pendyala, R.M. (2005), "Modeling intra-household interactions and group decision-making", Transportation, 32, 443–448.

Bramezza, I. (1996), The competitiveness of the european city and the role of urban management in improving the city' s performance. Amsterdam: ThesisPublishers.

Canary Goberment, (2008), Censo Comercial de Canarias (2012). In http://www.gobcan.es/cicnt/temas/comercio/censocomercial/.

Christaller, W. (1935), Die zentralenorte in sudlentschland, Jena, E. Germany: G. Fischer.

Converse, D. (1949), "New laws of retail gravitation", Journal of Marketing, (14). 379-384.

Craig, C.S., Ghosh, A. and McLafferty, S. (1984), "Models of the retail location process: a review", Journal of Retailing, 60 (1), 5-31.

Dellaert, B.G.C., Arentze, T.A., Borgers, A.W.J., Timmermans, H.J.P. and Bierlaire, M. (1998), "Investigating consumers' tendency to combine multiple shopping purposes and destinations", Journal of Marketing Research, 35(2), 177-188.

Theoretical and Empirical Researches in Urban Management
Volume 10 Issue 1 / February 2015

Elizagárate, V. (2006), "El comercio y la regeneración urbana de la ciudad: una estrategia integral de marketing de ciudades", Distribución y Consumo, (January-February), 40-49.

Fernie, J. (1995), "The coming of the fourth wave: new forms of retail out-of-town development", International Journal of Retail and Distribution Management, 23(1), 4-11.

Forsberg, H., Medway, D. and Warnaby, G. (1999), "Town centre management by co-operation", Cities, 16 (5), 312-322.

Fotheringham, A. S. (1983), "A new set of spatial interaction models: the theory of competing destinations", Environment and Planning A. 15, 15-36.

Fotheringham, A.S. and M.E. O´Kelly (1989), Spatial Interaction Models: Formulations and Applications, Kluwer Academic Publishers. Studies in Operational Regional Science.

Gliebe, J.P. and Koppelman, F.S. (2002), "A model of joint activity participation between household members", Transportation, 29 (1), 49–72.

Grewal, D.; Levy, M.; Mehrotra, A. and Sharma, A. (1999), "Planning Merchandising Decisions to Account for Regional and Product Assortment Differences", Journal of Retailing, 75 (3), 405-424.

Huff, D.L. (1964), "Defining and Estimating a Trade Area", Journal of Marketing, 28 (7), 34-38.

Jackson, C. and Watkins, C. (2005), "Planning policy and retail property markets: measuring the dimensions of planning intervention", Urban Studies, 42 (8), 1453-1469.

Johnson, M. (1989), "The Application of Geodemographics to Retailing-Meeting the Needs of the Catchment", Journal of the Market Research Society, 31 (1), 7-36.

Jones, K.G. and Mock, D.R. (1984), Evaluating retail trading performances. Store Location and Store Assessment Research, ed. Davies, R.L. and Rogers, D.S..John Wiley. N. York.

Kalyanam, K. and Putler, D. S. (1997), "Incorporating Demographic Variables in Brand Choice Models: An Indivisible Alternatives Framework", Marketing Science, 16 (2), 166-181.

Koshaka, H. (1992), "Three-dimensional representation and estimation of retail store demand by bicubic splines", Journal of Retailing, 68, 221-241.

Latour, P. and Le Floc'h, J. (2001), Géomarketing: Principes, méthodeset applications, Éditionsd'Organisation, París.

Lösch, A. (1954), The economics of location. New Haven, Conn. Yale University Press.

Lowe, M.S. (2000), "Britain's regional shopping centres: new urban forms?", Urban Studies, 37 (2), 261-274.

Lowe, M. (2005), "The regional shopping centre in the inner city: a study of retail-led urban regeneration", Urban Studies, 42 (3), 449-470.

McFadden, D. (1974), Conditional logit analysis of qualitative choice behaviour.Frontiers in Econometrics, ed. Zarembka, P., Academic Press, New York.

McFadden, D. (1977), Econometric models of probabilistic choice. Structural Analysis of Discrete Data with Econometric Applications, eds. Manski, C.F. and McFadden, D., Cambridge, Mass. MIT Press.

Mulhern, F. J. and Williams, J. D. (1994), "A comparative analysis of shopping behaviour in Hispanic and Non-Hispanic Market Areas", Journal of Retailing, 70 (3), 231-251.

Nakanishi, M. and Cooper, L.G. (1974), "Parameter Estimate for Multiplicative Interactive Choice Model: Least Squares Approach", Journal of Marketing Research, 11, 303-311.

Page, S.J. and Hardyman, R. (1996), "Place marketing and town centre management: a new tool for urban revitalization", Cities, 13 (3). 153-164.

Ravenscroft, N. (2000), "The vitality and viability of town centres", Urban Studies, 37 (13), 2533-2549.

Reilly, W.J. (1931), The law of retail gravitation. New York, W.J: Reilly, Inc.

Roig-Tierno, N., Baviera-Puig, A., Buitrago-Vera, J. and Mas-Verdu, F. (2013), "The retail site location decision process using GIS and the analytical hierarchy process". Applied Geography 40, 191-198.

Schiller, R. (1986), "Retail decentralisation: the coming of the third wave", The Planner, July, 13-15.

Schiller, R. (1994), "Vitality and viability: challenge to the town centre", International Journal of Retail and Distribution Management, 22 (6), 46-50.

Sleight, P. (1995), "Neighbourhood watch: geodemographic and lifestyle data in the UK GIS marketplace", Mapping Awareness, 9 (6), 18-21.

Srinivasan, K.K. and Athuru, S.R. (2005), "Analysis of within-household effects and between-household differences in maintenance activity allocation", Transportation, 32 (5), 495–521.

Suárez-Vega, R., Santos-Peñate, D.R. and Dorta-González, P. (2012), "Location models and GIS tools for retail site location", Applied Geography, 35(4), 12-22.

Suárez-Vega, R., Santos-Peñate, D.R., Dorta-González, P. and Rodríguez-Díaz, M. (2011), "A multi-criteria GIS-based procedure to solve a network competitive location problem", Applied Geography, 31 (1), 282-291.

Thomas, C.J. and Bromley, R.D.F. (2003), "Retail revitalization and small town centres: the contribution of shopping linkages", Applied Geography, 23 (1), 47-71.

Uduku, O. (1999), "Beneficial urban redevelopment: a Cape Town-Liverpool comparison", Environment and Urbanization, 11 (2), 95-111.

Wang, D. and Li, J. (2009), "A model of household time allocation taking into consideration of hiring domestic helpers", Transportation Research Part B, 43, 204-216.

Warnaby, G. (1998), "Marketing UK cities as shopping destinations: problems and prospects", Journal of Retailing and Consumer Services, 5 (1), 55-58.

Zhang, J., Timmermans, H.J.P. and Borgers, A., (2002), "A utility-maximizing model of household time use for independent, shared and allocated activities incorporating group decision mechanisms", Transportation Research Record 1807, 1–8.