

# Data mining and mall users profile\*

## Minería de datos y perfiles de usuarios en los centros comerciales

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### ABSTRACT

Marketing scholars have suggested a need for more empirical research on consumer response to malls, in order to have a better understanding of the variables that explain the behavior of the consumers. The segmentation methodology CHAID (Chi-square automatic interaction detection) was used in order to identify the profiles of consumers with regard to their activities at malls, on the basis of socio-demographic variables and behavioral variables (how and with whom they go to the malls). A sample of 790 subjects answered an online questionnaire. The CHAID analysis of the results was used to identify the profiles of consumers with regard to their activities at malls. In the set of variables analyzed the transport used in order to go shopping and the frequency of visits to centers are the main predictors of behavior in malls. The results provide guidelines for the development of effective strategies to attract consumers to malls and retain them there.

#### Key words authors:

CHAID, Consumer behavior, data mining, malls.

#### Key words plus:

Consumer Psychology, Psychoeconomics, Marketing

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### RESUMEN

Recientes estudios del ámbito del marketing ponen de manifiesto la necesidad de incrementar la investigación empírica sobre las actividades desarrolladas por los consumidores en los centros comerciales, con el objeto de obtener una mejor comprensión de las variables que explican el comportamiento de estos. La metodología de segmentación CHAID (chi-square automatic interaction detection) se ha utilizado con el objeto de identificar los perfiles de los consumidores en relación con las actividades que desarrollan en los centros comerciales, con base en variables sociodemográficas y de comportamiento (cómo y con quién van a los centros comerciales). Una muestra de 790 sujetos contestaron un cuestionario on-line. El análisis CHAID de los resultados permite identificar los perfiles de los consumidores con respecto a sus actividades en dichos centros. Del conjunto de variables analizadas, el transporte utilizado y la frecuencia de las visitas son los principales predictores de la conducta en los centros comerciales. Los resultados obtenidos proporcionan directrices para el desarrollo de estrategias que faciliten la atracción y fidelización de los consumidores a los centros comerciales.

#### Palabras clave autores:

Centros comerciales, CHAID, comportamiento del consumidor, minería de datos.

#### Palabras clave descriptores:

Psicología del consumidor, psicoeconomía, mercadotecnia

## Introduction

In recent years the retail business has undergone a deep transformation, which has been labeled by some authors as a commercial revolution (Loukaitou-Sideris, 2000; Oke & Gopalakrishnan, 2009; Rankin, 2008). In this context, the so-called malls are undoubtedly the most representative trade and distribution centers in this new era. But as a result of economic recession several authors have pointed out that malls are in crisis. However, in Spain in the coming years the 25 inaugurations foreseen will increase retail space and, in addition, workplaces (Asociación Española de Centros Comerciales [AECC, Spanish Association of Malls], 2010).

Different authors explained the growth as a result of decentralization to the periphery of the cities wealthiest population (Kilroy, 2007; Longstreth, 1997), increasing the use of car (Alzubaidi, Vignali, Davies & Schimdt, 1997; Steg, 2005) and the share of distribution companies with an obvious expansion of vertically integrated retail formats, mainly branches and franchises (Ghost & McLafferty, 1987; Sakarya, Eckman & Hyllegard, 2007) with the participation of hypermarket companies in the work of investment and promotion of the new malls.

It is possible to distinguish different retail trading formats such as hypermarkets, retail parks, business parks, outlet centers and entertainment complexes under the umbrella term of “mall”, depending on location and dimensions, and the type of establishments benefiting from them.

In this study the malls are understood as

(...) a set of independent, commercial establishments planned and developed by one or more entities, conforming to a criterion of unity, whose size, business mix, common services and complementary activities are related to their environment, and to having a stable image and a management body. (AECC, 2005, p. 89)

In Spain, the emergence of shopping malls in the 1980s led to a genuine transformation of consumer behavior and the use of leisure time, and a far-reaching transformation of the cityscape.

In this regard, Saramago (2000), recently deceased, said:

People no longer meet in the streets; they go to malls, which are where we lead our lives in public. In these Shopping Centers, nothing happens. Our ancestors lived in caves to protect themselves from the elements and the wild beasts: *mutatis mutandis*, that is what is happening now: in the mall one feels secure, safe: you don't even have to buy anything, the main thing is that you are there, that you get used to being able to satisfy all your desires in that place. (para. 11)

Since the 1980s Barcelona (Spain), like other large European cities, has specialized in the service sector, trade is one of the main economic engines of the city. This growth is closely related to the boom of the malls.

The malls distribution in Spain is not homogeneous. Almost two thirds of all national malls are grouped in the Community of Madrid, Andalucía, Valencia and Catalonia. In this last community 44 malls are located, representing 8.5 of the total number (AECC, 2005).

The *Regiduría de Comercio* of *Ayuntamiento de Barcelona* [Department of Trade of Barcelona City Council], aware of the importance of trade for the whole city has, since 1998, conducted a series of surveys, the so-called Omnibus Municipal, whose main objective is to understand the buying habits of the people from Barcelona. Some of the most relevant data about malls gathered in the 2007 survey indicated that 55.8% of respondents normally buy in malls; the most frequented is Illa Diagonal (10.5%) and Baricentro (9.7%). The most popular outlets were those selling leisure and culture products (20.4%), followed by clothing, footwear and household products (17.4%).

Likewise, it is worth mentioning that the levels of consumer satisfaction were low with regard to the customer attention provided at the malls. Only 3.2% of the respondents considered that they received good service in this type of establishment, compared to 52.7% who said that service was better in local shops (Omnibus Municipal, 2008).

In fact, according to the study, it seems that the main reason why these institutions are perceived favorably is because of the variety of products on offer (46.2%). In addition, buyers can combine going for a stroll and shopping (7.7%). Instead, other studies suggest that the main reason is to combine leisure and pleasure dimension (Escudero Gómez, 2008; Frassetto, Gil & Mollá, 2001; Munuera & Cuestas, 2006; Rodríguez, 2004).

### Literature overview

Retailers and retail sale researchers often aim to learn how and why people go shopping. Their research has resulted in several paradigmatic proposals for different shopping typologies (e.g., Arnold & Reynolds, 2003; Bellenger & Korgaonker, 1980; Darden & Reynolds, 1971; McDonald, 1993; Sharma & Levy, 1995; Stone, 1954; Tauber, 1972; Walsh, Gennig-Thurau, Wayne-Mitchell & Wiedmann, 2001; Walsh, Mitchell & Hennig-Thurau, 2001; Wang, Siu & Hui, 2004; Westbrook & Black, 1985; Yavas, 2003).

In this sense, several studies focus on the demographic and psychographic characteristics of mall users (e.g., Bloch, Ridgway & Dawson, 1994; Jarboe & McDaniel, 1987; Roy, 1994). Malls are viewed by consumers as places not only for shopping but also for other activities such as going for a walk, going to the movies and so on, in other words, leisure activities (Bloch et al., 1994).

A number of researchers argue that the main reason why many people visit the malls is because of the excitement of the experience (e.g., Cockerham, 1995; De Juan, 2004; Graham, 1988; Molinillo, 2002; Stoltman, Gentry & Anglin, 1991). The data obtained from a survey carried out in Spain in 2005 by the Centro de Investigaciones Sociológicas [CIS, Center for Sociological Research] indicates that 42% of Spaniards regard going to malls as a leisure activity (García Ferrando, 2006).

However, only a few empirical studies have analyzed the motivational aspects that explain why consumers are attracted to shopping malls (e.g., Bodkin & Lord, 1997; Dennis, Marsland & Cocklet, 2001; Nicholls, Li, Kranendonk & Roslow,

2002; Nicholls, Li, Mandokovic, Roslow & Kranendonk, 2000; Ruiz, 1999). In this sense, marketing scholars have suggested a need for more research on consumer response to malls (e.g. Bloch et al., 1994; McGoldrick & Thompson, 1992), because there are only a few empirical studies on the subject.

The basis of the research was that some shoppers are attracted to malls for purely economic motives, others are attracted for emotional reasons, while multi-purpose shoppers are driven by a combination of these motives (Ruiz, 1999). These differences could be explained by the consumers' lifestyle (Plummer, 1972; Shieh & Cheng, 2007; Wells & Tigert, 1971). The lifestyle segmentation research analyses people Activities, Interest and Opinions (AIO), in terms of how they spent their time, which are their interests and values, their self-perceptions, and some related demographic data (Kucukemiroglu, Harcar & Spillan, 2009). Recently, research studies have become to use segmentation in direct marketing because of the development of database marketing techniques. McCarty and Hastak (2007) point out:

These data mining approaches provide direct marketers with better ways to segment their current customers and develop marketing strategies tailored to particular segments and/or individuals. (...) database marketing techniques have evolved from simple RFM models (models involving recency of customer purchases, frequency of their purchases, and the amount of money they have spent with the firm) to statistical techniques such as chi-square automatic interaction detection (CHAID) and logistic regression. (p. 656)

In the present study, the CHAID (Chi Square Automatic Interaction Detector), developed by Kass (1980) has been chosen for data analysis. It is similar to the RFM (Recency, Frequency, and Monetary value) developed by Hughes (2000), because it creates groupings (nodes) of database members. The main difference is that "these groupings are not created a priori as in the case with RFM where the file is split according to a statistical algorithm after a test mailing is conducted", and "the procedure

starts with a node that includes everyone in the test file” (McCarty & Hastak, 2007, p. 658). Levin and Zavari (2001), McCarty and Hastak (2007) and Magidson (1988) have shown that CHAID is superior to judgment based on RFM with respect to the identification of likely responders, because CHAID can accommodate a variety of independent variables.

In addition, the CHAID allows multilevel division of the nodes, whereas others only allow dichotomous divisions, such as the CART algorithm (Classification And Regression Tree, developed by Breiman, Friedman, Olshen & Stone, 1984) or the QUEST algorithm (Quick, Unbiased, Efficient Statistical Tree, developed by Loh & Shih, 1997).

The purpose of the present study was to identify the consumer profiles in relation to their activities at malls, based on socio-demographic variables (age, gender, number of occupants per household, number of children and number of children per household, education level, employment status, number of car owners, number of cars per household) and behavioral variables, which include information about travel modes to malls (means of transport used, frequency of visits and traveling time) and accompanying persons. CHAID methodology was used to reach this objective.

## Method

### Participants

The sample consisted of 411 men and 379 women, aged 16-56 years old ( $M = 35.87$ ,  $SD = 9.74$ ) from the Barcelona Metropolitan Area. It has a total population of 4,992,193 inhabitants, an area of 3,236 km which includes 36 municipalities around Barcelona and a population density of 1,542 inhabitants/km. For purposes of the analysis, five age groups were established: participants under 19 years old (1.9%), from 20-29 (29.6%), from 30-39 (32.7%), from 40-49 (24.3%) and over 50 (11.0%). Four respondents (0.5%) did not state their age.

A quota sampling by gender and age (Institut d'Estadística de Catalunya [IDESCAT, Catalan Institute of Statistics], 2006) was used. The sample

had a margin of error of 3.5% (confidence level 95%).

### Procedure

An on-line panel was used to recruit the sample. Panelists who matched a specific sample profile (Barcelona Metropolitan Area malls' users between 16 and 55 years old) were recruited by the research team invitation and offered an incentive to participate in the study. The panel respected the privacy law previously acknowledged by the panelists. Data was collected from November 26 to December 3 2008, using an ad-hoc on-line questionnaire (Codina, Pestana, Romeo, Bonet & Pol, 2008).

### Instruments and variables

The questionnaire was divided into three different sections: socio-demographic variables (gender, age, etc.), behavioral variables related to travel habits (*How do you usually go to the mall? How long do you take to get to the mall?, How often do you visit the mall?*) and behavioral variables regarding the accompanying persons (*Who do you go to the mall with?*). We used the following variables in the questionnaire:

Endogenous variable. Main activities developed. This is a nominal variable that originally consisted of 11 levels of response, and can be grouped into three blocks as the goal is to go to mall in order to test products, to buy or to develop other activities.

Among the products that were established to test: music, perfumes and electronic products (e. g., computer games). Among the products that were established to buy: food, leisure products, clothing, footwear and household items, perfumes and cleaning products. Finally, the activities were: going for a walk, going to movies and eating out.

The low response levels in some areas led us to reduce the number of levels to seven. The subcategory of going to test products (music, perfumery and electronics products) are grouped in the category of Windows Shopping, and the purchase of clothing footwear and household items and perfume and cleaning were grouped into a single category.

The answers then fell into the following categories: going for a walk, going to movies, eating out, buying food, buying leisure products, buying clothing, footwear, household items, perfumes and or cleaning products, and window shopping.

Exogenous variables. They consisted on socio-demographic variables (age, gender, number of persons per household, number of children and number of children per household, education level, employment status, number of car owners, and number of cars per household) and behavioral variables. The latter variables included information about the mobility profile to malls (means of transport used, frequency of visits and traveling time) and accompanying persons (with whom you go).

**Data Analysis**

Data was analyzed with SPSS v.17.1. Given the sample size, we have maintained the algorithm stopping criteria established by the program, the minimum size of parent and child nodes being 100 and 50 respectively, in order to overcome the potential problems of violating the statistical assumption of normality (Bhattacharyya & Johnson, 1977) for ANOVA procedures.

**Results**

**Participants' Description**

Table 1 shows the socio-demographic profile of mall users in the present study.

The gender distribution is about equal and the mean age of the participants was 35.87 years (*SD* = 9.74). Most participants have at least completed primary education, while the group with university studies was the most numerous. 78.4% are currently working. Two thirds of the sample have no children and live in family units consisting of two to four members.

The type of transport used to reach malls in conjunction with traveling time, can be seen in Table 2. Car and motorbike are the primary means of transport (in particular car). The longer it takes to reach the centre, the more people who use pub-

**TABLE 1**  
*Shows the socio-demographic profile of mall users in the present study.*

Characteristic	%
Gender	
Male	52
Female	48
Age	
14-30	37
31-42	35.7
43-56	27.3
Educational level	
No studies	0.1
Primary school	3
High school	26.8
Vocational/Technical school	20
University	43.7
NA	6.3
Occupation	
Student	10.1
Household management	0.9
Employed	78.4
Unemployed	6.6
Retired	1.1
NA	2.9
Children	
Yes	32.5
No	67
NA	0.5
Number of children	
None	67
One	15.3
Two	14.2
Three	2.7
More than three	0.4
NA	0.5
Number of children per household	
None	5.2
One	14.2
Two	11.3
Three	1.9
NA	0.5
Number of people per household	
One	8.4
Two	24.6
Three	18.5
Four	19
Five	3.7
More than five	3
NA	22.9
Number of cars per household	
None	71.5
One	16.8
Two	8.9
Three or more	2.3

Source: own work  
Mall Users' Sociodemographic Profile

**TABLE 2**  
*Means of Transport in Relation to Travel Time*

Time/transportation	n	%
Less than 15 minutes		
On foot/by bicycle	78	29.4
Motorcycle/car	158	59.6
Public transport	29	10.9
Approximately 15 minutes		
On foot/by bicycle	49	30.4
Motorcycle/car	90	55.9
Public transport	22	13.7
Between 15 and 30 minutes		
On foot/by bicycle	44	17.8
Motorcycle/car	137	55.5
Public transport	66	26.7
More than 30 minutes		
On foot/by bicycle	15	12.8
Motorcycle/car	57	48.7
Public transport	45	38.5

Source: own work

lic transport and the fewer who cycle or walk, but this proviso does not have such an impact on the percentages of people using private transport.

In relation to the previous point, only 28% mention that they have their own car, so it may be assumed that they travel in other people's vehicles.

In relation to the behavior patterns in the mall, the answers were: going for a walk (*N* = 199), movies (*N* = 82) eating out (*N* = 66), buying food (*N* = 172), buying leisure products (*N* = 84), buying clothing, footwear, perfumery and household products (*N* = 153), window shopping (*N* = 32). The data are summarized in Table 3.

The majority of respondents had not been to the mall in the previous two weeks. Only 4.2% visited the mall daily, with weekly, monthly, or less than monthly visits being the most frequent. 53.2% go to malls with their partner. In general terms, the most common activity is going for a walk (25.3%) followed by buying food (21.8%).

### Segmentation and Profiles

About the results obtained using CHAID, we obtained a tree with 12 nodes, including seven ter-

**TABLE 3**  
*Mall User Behavioral Variables*

Behavioral variables	%
Last visit	
Today	10
This week but not today	42.3
1-2 weeks ago	30.3
2 weeks-1 month ago	9.1
1-3 months ago	6.2
3-6 months ago	1.3
More than 6 months ago	0.8
NA	0.1
Frequency	
Daily	4.2
Weekly	31.3
Monthly	33.4
Less than monthly	31.1
Who with?	
Alone	27
Parents	10.1
Children	17
Grandparents	0.5
Brothers/Sisters	7.6
Friends	23.4
Partner	53.2
Other	1.6
Main activity	
Going for a stroll	25.3
Going to movies	10.4
Going to a restaurant	8.4
Buying food	21.8
Buying leisure products	10.7
Buying clothes, footwear, perfumery and household products	19.4
Window-shopping	4.1

Source: own work

minals, and a maximum depth of three. Of all the exogenous variables introduced, the CHAID only retains means of transport, age, frequency of visits to the mall, traveling time between home and shopping center, and gender. The overall percentage of correct clusters considered is 33%, and the activity of buying clothing, footwear and household products is the best classified (69.3%).

The commonest activity is going for a walk (25%) but there are differences depending on the means of



Figure 1. Tree classification.  
Source: Own Work.

transport used to go to the mall, which is the first segmentation variable. Means of transport are grouped into three nodes: Node 1: Walking / cycling; Node 2: By car / motorcycle; Node 3: Public transport.

At nodes 1 and 3 the most common behavior at the malls is still going for a walk (33.9% and 30.6% respectively), whereas the majority of people traveling by car buy food (25.8%) and clothing, footwear and household products (22.4%). The percentage of those traveling by car that listed going for a walk as their main activity is 19.7%.

Node 1 is subdivided according to the time it takes to get to the mall. When travel time exceeds 15 minutes, the percentage of people who stroll increases to 40.7%. The percentage devoted to walking (30.7%) decreases and those devoted to food purchases increase (going from 22.6% to 29.9%) when time is less. These two nodes (identified by numbers 4 and 5 in Figure 2) are terminal.

Node 2 (Car / Motorbike) is subdivided according to the frequency of use of the mall. People who travel by car and make frequent use of the mall (more than once per week) tend to buy food (39%), while if the frequency is less than weekly they tend to buy clothes, footwear and household items (28.2%) or only tend to walk (20.3%), relegating the purchase of food to third place (19.6%). Number 6 is a terminal node, while node 7 (less frequently than weekly) is subdivided according to whether or not users are accompanied by the couple. When accompanied by a partner, the percentages of people engaged in the purchase of apparel, footwear and household goods (29.3%) and food (21.5%) increase. Instead, when users do not go with their partner, they increase leisure purchases (going from 12% to 20%).

Node 3 (Public Transport) subdivides customers by gender. Thus, men who travel by public transport dedicate their time in malls to going for a walk (36.8%), purchasing entertainment products (18.4%), and going to the movies (15.8%), while women also like going for a walk (25%) but the percentage that buys clothing, footwear, perfumery and household products (25 %) increases. Both nodes are terminal. The results are shown in tree form in Figure 1.

## Discussion

The descriptive results show, on the one hand, that the main activity in malls is going for a walk (25%), followed by the purchase of food (21.8%) and the purchase of clothing, footwear, perfumery and household goods (19.4%).

Specifically, people whose main activity is going for a walk usually arrive at the mall on foot / by bicycle (30.9%) and take about 15 minutes (29.4%) from their homes. In the case of those who arrive by car, their main activity is to buy food (25.8%), and clothing, footwear, perfumery and household goods (22.4%).

Depending on the frequency of visits to the center, trends in buying behavior vary. Those who go on a daily or weekly basis mainly buy food (39%), and those who go monthly usually buy clothing, footwear, perfumery and household goods (28.2%). As regards people who visit monthly, if they are unaccompanied they buy a significantly larger amount of leisure products (20%).

Among the subjects that use public transport, 38.8% usually take between 30 minutes and one hour to get to the mall and their main activity is going for a walk (30.8%). We found significant differences in the activities of men and women who travel by public transport. Men buy entertainment products (18.4%) and go to movies (15.8%), while women buy clothing, footwear, perfumery and household goods (25%).

In addition, the results show that only 11% of the subjects engaged in recreational activities such as eating out (8.4%), going to the movies (10.4%) or window shopping (4.1%).

With regard to socio-demographic variables (age, gender, number of occupants per household, number of children and number of children per household, education level, employment status, number of car owners, number of cars per household) and behavioral variables (how people go to shopping centers and who with) the results suggest two profiles as described below:

Profile 1: People whose most frequent main activity is going for a walk reach the mall on foot, by bicycle or by public transport.

Among those traveling by public transport, it is possible to distinguish two sub-profiles corresponding to gender. The main occupation of men who travel by public transport is going for a walk. The most frequent activities among women who travel by public transport are going for a walk and the purchase of clothing, footwear, perfumery and household goods. All these activities are pursued in similar percentages.

Profile 2: People whose most frequent main activity is buying food and clothing, footwear, perfumery and household goods reach the shopping centre by private transport, either by bicycle or car.

We find again two sub-profiles depending on the frequency of visits to the center: People who visit the mall on a daily or weekly basis purchase food at a higher rate, and people who visit the mall more sporadically mostly buy clothing, footwear, perfumery and household goods.

The profiles obtained reveal the importance of the means of transport as the main predictor for behavior in the mall, and therefore as the main variable in defining the profiles of consumers to be targeted in specific marketing actions for malls. Both relationships are consistent with the results obtained previously in the literature that indicate that a major reason to visit the mall are leisure and enjoyment with the purchase (hedonism), rather than the actual purchase of products (Reynolds, Ganesh & Lockett, 2002; Sit, Merrilees & Birch 2003).

These results must be understood within the context of Barcelona. In 1998, the local government and community organizations and associations signed the Pacto por la movilidad [Mobility Pact] (2000, 2007). From the start, it was intended to make a firm commitment to public transport and, in addition, to managing private transport more rationally. Accordingly, various initiatives have been taken in Barcelona, such as increasing the space allocated to pedestrians, improving the road network, and the introduction of a public bicycle sharing system (Pacto por la movilidad [Mobility Pact], 2007).

Also from the results obtained in this investigation, it appears that the role of locomotive which is usually attached to supermarkets and

hypermarkets, is diluted for other leisure activities such as walking, and “new patterns of consumption make losing weight a single-inducing activity to create synergies between all activities offered at malls increasingly diversified” (Gutiérrez, Carrera, Chicharro, Kleinfenn & Wehrhahn 2001, p. 83). The relationship between activities performed in the mall with leisure experiences has made Munuera and Cuestas (2006) point out that “leisure will constitute genuine locomotive shopping centers” (p. 114), since they offer an alternative to the usual entertainment of the citizens. So that, in a more general sense, future research about shopping centers from Barcelona and other cities may take into account the interaction of Activities, Interests and Opinions [AIO] (Plummer, 1972; Wells & Tigert, 1971), values and attitudes (Mitchell, 1981), and experiences that these places provoke, what contributes to the processes of space (Korosec-Serfaty, 1976; Moser, Ratiu & Fleury-Bahi, 2002; Pol, 1996; Vidal & Pol, 2005) and time appropriation (Codina, 2007; Codina & Pestana, 2009). Considering these aspects, and especially lifestyle patterns, “provide broader views of consumers so that marketers can think about them more intelligently” (Kucukemiroglu et al., 2009, p. 60).

Two caveats or limitations must be taken into account with regard to the method and time allocated to completing the questionnaire. In order to avoid rushing their answering when the questionnaire was answered in the mall, we considered an on-line questionnaire. In this case, we wondered how we would get different results if administered in the mall because they are segments of the population who do not usually use new technologies, but are going to the mall. A suggestion for future studies may be a comparison between the responses of on-line questionnaire and those of the questionnaire administered at the shopping center.

What is certainly clear is that the new technologies have encouraged the use of online questionnaires by the scientific community, which guarantee anonymity and confidentiality and are easier to distribute among large numbers of people in short periods of time.

Lastly, the survey was completed just before the Christmas season (between 26/November and 03/December/2008 in this case) the period of maximum customer flow in malls, according to the Índice Nacional FootFall [National FootFall Index]. As is well known, the consumer profiles vary from low to high sales periods and with this in mind it must be stressed that this research does not intend to present general conclusions. A proposal for further research might be a comparison of consumer profiles in low and high periods.

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