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From Geomarketing to Spatial Marketing

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10.1 Introduction

Geomarketing has been developed from geographic information system (GIS) techniques, which enable both researchers and practitioners to map in a rather quick way markets they are working on. However, even though easy mapping constitutes a real progress toward a better understanding of markets, the true aim is now to introduce more or less systematically space into marketing research and marketing decisions (Cliquet 2006). Such a purpose imposes to link several disciplines. Geomarketing relates already marketing, geography, and information systems, but now it cannot go without considering sociopsychology, economics, and, once again, information systems through mobile technologies. That is the reason why geomarketing should move toward spatial marketing in a more global and local vision of markets called "glocal" (Bartlett and Ghoshal 1989).

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This chapter is divided into five sections according to the marketing themes likely to be changed by a spatial vision. After a definition of geomarketing and spatial marketing, it deals with spatial consumer behavior, then a new conception of a geomarketing mix, before a complete approach of what we can call geo-retailing, and, finally, some issues about mobile marketing in its spatial conception (Cliquet 2020).

10.2 What Is Geomarketing?

"Geomarketing" is an English word invented by European marketing practitioners to refer to a discipline mixing marketing, geography, and computer science resulting in the determination of "geographic information systems" (GIS). But this term is totally unknown in the US as the acronym GIS is predominantly used. The problem is that GIS points out very technical tools and masks the true question: How can we integrate space in marketing decision (Cliquet 2006)? This is the reason why we do prefer talking about spatial marketing rather than "geomarketing" even though this latter term should be used whenever technical tools (GIS) are used. Hence, we first strive to distinguish geomarketing and spatial marketing before describing applications and technical tools like software, specific statistics, and models.

10.2.1 Why Geomarketing and Spatial Marketing?

Geomarketing applications involve GIS and specific mapping software to get a better understanding of markets through their geographical aspects. Spatial marketing means, more generally speaking, introducing space in marketing decisions without entailing the systematic use of these techniques. The purpose of spatial marketing is first of all strategic, and defining strategic marketing implies that marketers should localize market features, a real revolution (Rigby and Vishwanath 2006), by taking into account local characteristics of customers, suppliers, outlets, and logistics, with and/or without GIS. It concerns what is now called "location business intelligence." New mobile technologies with devices

like smartphones and touch pads enforce to consider spatial dimensions as these devices are equipped with GPS.

It is strange to see that, since a very long time, many economists (Hotelling 1929; Von Thünen 1826; Weber 1909) have been aware of the necessity to take into account spatial considerations, whereas marketers have often neglected these aspects by favoring more global approaches. GIS have been used for several decades almost exclusively for retail purposes like store location. But now interactive maps are available to help marketers in their decision process and mobile devices enforce space as a determinant marketing variable.

Spatial marketing can be then defined as everything dealing with the introduction of space in marketing at the conceptual, methodological, and strategic levels (Cliquet 2006). This means not only everything concerning local and regional environment at the micro-economic level (Grether 1983), but also with territorial coverage in its geographical sense. And this does not imply necessarily to consider political boarders as cultures often go over the edge (Hofstede et al. 2002; Ohlin 1931). Geomarketing can be defined as a set of techniques enabling to enter spatial data in order to build maps related to markets because "About 80% of all business-relevant information within a company has a relation to spatial data" (Menne 2009, citing Wagner 2006).

Spatial marketing affects consumer behavior, and hence we should talk about spatial consumer behavior, marketing research which should take into account spatial data, and, finally, strategic marketing and marketing management. Then the critical strategic question now is: Adaptation or standardization (Cliquet 2020)? As today consumers want customized products possible through technology, and politicians around the world ready to "deglobalize" economy, predicting the future of standardization seems to be very difficult.

10.2.2 Applications of Spatial Marketing

As applications in retailing have been developed for decades, concerning essentially store location problems (Ghosh and McLafferty 1987), it is necessary to gather and synthetize all the spatial applications concerning

other marketing activities. Retailers or bankers should work predominantly with customers located close to their units (stores, branches, etc.) creating then a stock of clientele, whereas hotel managers deal with people coming sometimes from very far, in other terms a flow of clientele. Banks have develop since decades many geomarketing applications to extend their branch network and now to reduce it, but this problem is identical to the retail question of store location. Concerning restaurants and hotels, the problem is more complex as customers are not necessarily located close to the unit.

The public sector (public communities, regions, states, etc.) has also developed many geomarketing applications to better understand citizens' needs and to respond to them through public services. Real territorial information systems have then been built like, for instance, in Italy (Amaduzzi 2011). Another example deals with health policy showing how maternities could be better located to serve the population, avoid problems for maternities with low rate of activity, and reduce costs (Baray and Cliquet 2013; Kong et al. 2010).

Internet and the possibility to display maps facilitate the diffusion of geomarketing techniques in tourism (Bourliataux-Lajoinie and Rivière 2013; Parker 2007).

10.2.3 Techniques and Software of Geomarketing

Developing geomarketing involves the use of specific techniques and, first, the adjustment of a relevant GIS, which means: a geocoding system, a spatial database, a database on studied actors (consumers, companies, stores, etc.), and a mapping system to display maps on a computer screen and to print them. However, nothing is possible without a geographical division of the studied territory. This division can concern zip codes in the US or Iris in France, where it is against the law to work on set of less than 2000 individuals. Interactive mapping software are now more and more commonly used by marketing decision-makers.

Statistical tools can also be employed like I of Moran (Moran 1950), C of Geary (Geary 1954), or the Gini coefficient (Gini 1914, 1921). Geomarketing software packages are based on GIS, and many of them

offer these statistical tools. One usually distinguishes software, websites, and platforms. Software are generally expensive and devoted to companies able to use them on a regular basis, whereas software on websites or on platforms are available for others. Some of these software give the opportunity to use attraction models (see Sects. 10.2 and 10.4), and simulation systems like agent-based model (ABM) already used in logistics for retail companies (He et al. 2013).

10.3 Spatial Consumer Behavior

A marketing approach starts by studying consumer behavior. As space is treated here as an essential variable, we talk about spatial consumer behavior. Surprisingly, this topic has not been much tackled by marketing researchers. Geographers and more recently sociologists have developed a consistent literature on spatial consumer behavior. Geographers have found very interesting results stemming from observations and models but without any business orientation (Golledge and Stimson 1997). In sociology, recent publications deal with mobility which is considered a major change in behaviors (Centola 2018). Two main spatial consumer behavior types appear: one consists in understanding and predicting outdoor spatial consumer behavior, whereas another deals with in-store spatial consumer behavior.

10.3.1 Outdoor Spatial Consumer Behavior

Many concepts are useful in understanding outdoor spatial consumer behavior and concern mainly the following: attraction, gravitation and spatial interaction, several approaches of distance, shopping trips, mobility, ubiquity, clientele stock and clientele flow, market area, trade area, spatial indifference, market saturation, and retail leakage.

Attraction, gravitation, and spatial interaction are the three major concepts to be considered in spatial marketing. Attraction is a very global concept which can be treated as spatial or a-spatial. Psychologist are used to consider interpersonal attraction in an a-spatial approach defining

it as "a product of the initial evaluations we make about others": this evaluation is realized through two dimensions: "capacity to facilitate the perceiver's goals/needs and potential willingness to facilitate those goals/needs and willingness" (Montoya and Horton 2014). In its spatial meaning, attraction is a true strategic element in retailing in a sense that consumers are more and more mobile. As far as consumers are considered living in a permanent dwelling, we talk about gravitation as this concept implies a mass and a geographic (or temporal) distance. But concerning various cases like a threshold effect (Malhotra 1983), when distance is not a key choice element within a given area, or through the use of Internet, we talk about spatial interaction because many other variables can enter into account (Cliquet 1995).

Distance is a polysemous concept. The most-often-used distance is the geographical or temporal distance according to the measurement method: kilometric (or mileage) or time that is the most often used (Brunner and Mason 1968) as transportation means play a critical role in outdoor spatial consumer behavior. Probabilistic models like Huff (1964) model or multiplicative competitive interaction (MCI) (Nakanishi and Cooper 1974) model use the temporal distance. This last fact becomes now questionable as an increasing number of consumers come back to closer and smaller retail stores for time, convenience (Gahinet and Cliquet 2018), or environmental reasons.

Psychological distance (Mulder 1960) related to power relationships can also influence this behavior. The social or socio-spatial distance, defined as proxemy (Hall 1968), has been used to measure distances in communication between individuals, theses distances being different according to cultures. These differences are present not only in consumer behavior but also in organizational management, and this implies that space should be considered in both market analysis and managerial practices, and learning about these practices can be of great interest in commercial negotiations at the international level. Hence, distance is not only a quantitative variable to include in geomarketing software but also a complex notion of spatial international marketing.

Shopping trips are central in outdoor spatial consumer behavior. Several distinctions should be considered: single purpose shopping trips and multipurpose shopping trips, and with Internet, research online, buying offline (ROBO) (Kalyanam and Tsay 2013), which can be developed in several omni-channel shopping trips insofar as consumers tend to use any channel of communication and test any marketing channel when purchasing (Fulgoni 2014). Recent techniques based on GPS or any other technology enable a follow-up of consumers during their trips even though regulation tends to protect them against privacy violation.

Mobility and ubiquity have been recently introduced to understand outdoor spatial consumer behavior as smartphone usages have considerably changed the way shopping trips are envisaged by consumers. Consumers adopt increasingly a browsing behavior developing thus more complex mobility where distance can play a role in value assessment (Brooks et al. 2004). With their mobile devices, they can stay connected anytime, anywhere, and with any device (ATAWAD) and about any content (ATAWADAC). This phenomenon is defined as ubiquity which is the capability to be everywhere at any time.

Clientele should be split into clientele stock and clientele flow. Given the increasing mobility of consumers, markets cannot be only analyzed from the retailer's point of view and from the store perspective. Now marketers talk about consumer trade area which means that retailers should be located along possible shopping trips. "Big boxes" like hypermarkets located in peripheral zones which were accustomed to draw a clientele stock dwelling in the surroundings are now facing great difficulties not only due to transactional websites but also to convenience stores which can supply consumers anywhere at almost any time. Anywhere at any time means here that consumers can choose the way they go shopping, favoring then opportune frequentation instead of time saving: Kairos versus Chronos (Gahinet and Cliquet 2018). But most of spatial consumer behavior models deal with clientele stock as modeling clientele flows is much more difficult because of the number of possible shopping trip categories and the ignorance of spatial origins of these mobile consumers.

The principle of spatial indifference relies on the notion of "just noticeable distance." Applied to consumer behavior, it means that consumers do not choose inevitably the closest store, but a store located in a spatial

area of indifference given that the marginal cost is minimal (Nystuen 1967). This has been confirmed by a study using a threshold model of store choice (Malhotra 1983): beyond a given distance, consumers do not visit the stores as it is the case in the furniture market (Cliquet 1995). Geomarketing software can be of great interest to delineate this threshold and determine market areas within a given territory.

Market area and trade area should not be confounded. A market area is a local market which should be considered when studying competition among retailers. Examining this competition at the national level is often meaningless. For instance, in France, a specific study using a giant geomarketing software at the level of this country (Brafman 2008) revealed that 60% of the 629 French local markets were actually in a local monopoly situation, whereas 25% had only two competitors and 15% several. Each competitor in such a market area has a trade area which is supposed to include the potential population living around. Actually these trade areas do not look like three circles any more. These circles represent a primary trade area with between 60 and 70% of consumers, a secondary trade area between 15 and 25% and a tertiary trade area with the residual portion (Applebaum 1966). But they have probably never existed. Using geomarketing software researchers have shown that a trade area looks like an archipelago composed of a series of spots of various sizes sometimes located far from the studied store, each spot, within the market area, corresponding to specific categories of consumers sharing the same store patronage (Baray and Cliquet 2007).

Market saturation and retail leakage are two related concepts. Retail leakage may happen in a local market for at least two reasons: either the retail offer is not sufficient and consumers should drive to another market area for shopping or, on the contrary, retail offer is totally saturated, consumers should wait for a long time before being served, and they do prefer shopping outside. In the first case, retail activity must be reinforced, whereas in the second case new stores have to be opened. Geomarketing software may display these retail leakage and market saturation through purchase flows (Douard et al. 2015).

10.3.2 Models of Outdoor Spatial Consumer Behavior

Researchers and consultants have proposed models in spatial consumer behavior: the law of retail gravitation (Reilly 1931), Huff model (1964), and MCI model, either objective (Nakanishi and Cooper 1974) or subjective (Cliquet 1995). These models are also useful to determine store locations (see Sect. 10.4).

Reilly (1931) proposed the first model to determine the relative attraction between two cities, and hence the breaking point (Converse 1949) where the attraction is equal between the two cities given their relative importance in terms of population or purchase power. Two variables area involved in the model: a geographic distance and a mass represented by a population or its purchase power. This model is deterministic, which means that when a consumer is living in a given area, she/he should shop in a given city or in a given store: this model does not consider that a consumer has a choice, and it is its main drawback with the fact that only two variables can be introduced in the model.

Huff (1964) suggested to replace the deterministic approach of the Reilly's law by defining a probabilistic model which is more adapted to urban contexts. It is a probabilistic model as it enables to give a probability for a consumer to choose one store or another. But once again, only two variables are involved: a geographic or temporal distance and a mass here representing the size of the store. Many geomarketing software have integrated the Huff model.

Nakanishi and Cooper (1974) have generalized the Huff model to a theoretical infinity of variables even though actually only a few variables are usually utilized in these models: this is notably due to the difficulty to measure qualitative variables, which implies to use questionnaires. This is the reason why a subjective MCI model has been proposed to measure every variable by consumers' judgments as human decisions are made from the perception of the reality rather than from the reality itself (Cliquet 1995).

As far as spatial consumer behavior is concerned, these former models (see formulas in Sect. 10.4) are only useful when dealing with clientele

stock and not at all concerning clientele flows. Building a model for clientele flows is difficult as many situations of mobility can be met in the real life and the smartphone usage extension generates more hinders (see in Sect. 10.5). However these models are still useful and used for store location (see Sect. 10.4).

10.3.3 In-store Spatial Consumer Behavior

If we consider now in-store spatial consumer behavior, we should notice that the literature is rather poor concerning that topic. However, the stake is critical for most retail companies because Internet is changing in-store spatial consumer behavior and most hypermarkets, supermarkets, and supercenters should adapt quickly to this new deal and many of them are facing strong difficulties. The implementation of click and collect systems allow customers to stay out of the store. To make them coming back into the store, retailers should improve welcome and accompaniment of customers in their shopping trips within stores: this is called now indoor location-based applications.

The stake of understanding in-store shopping trips consists clearly to increase the number of visits, to transform these visits into shopping and then shopping into purchases. But indoor shopping trips are not easy to capture. Technologies can help to follow customers with their agreement in order to avoid privacy violation. Beyond usual observations, researchers, marketing companies, or even retailers are developing systems based on technologies like Near field communication (NFC) (Kahn 2012), radio frequency identification (RFID) (Larson et al. 2005), WIFI and mobile devices (Yaeli et al. 2014), and a mecatronic intelligent system called sCREEN (Paolanti et al. 2017). Another technology is based on magnetic fields in order to get round the difficulty to use GPS inside building as this technology is related to satellites which cannot cross concrete ceilings.

10.4 Geomarketing Mix

Marketing strategies are mostly defined at a global level without taking into account of local aspects. In an economic world where "glocalization" (Svensson 2001) already applied at McDonald's (Crawford et al. 2015) seems to be more important than the traditional "globalization" (Levitt 1983) so much criticized (Douglas and Wind 1987). Such an evolution cannot but point out the importance of spatial marketing development and the use of geomarketing software among other things.

Despite some very severe critics, a marketing strategy is usually defined by the famous four Ps (McCarthy 1960) of the marketing mix: Product, Price, Place, and Promotion (Van Watershoot and Van der Bulte 1992). But these four elements can be spatialized. If this is obvious for Place (see Sect. 10.4), this is not the case for the three other Ps. However, several research works can be attached to each of them.

10.4.1 Geomarketing and Products

As far as products are concerned, two important research topics have been tackled: innovation diffusion, and merchandising.

Innovation diffusion is based on five categories of behaviors vis-à-vis innovation (Rogers 1962): innovators, early adopters, early majority, late majority, and laggards. A model (Bass 1969) based on word-of-mouth gives the opportunity to distinguish these five categories (Mahajan et al. 1990). Many other models have been built from this basis but this is an a-spatial approach. Very few research exist in marketing about spatial diffusion of innovation. Actually there are two approaches of spatial diffusion of innovation (De Palma et al. 1991): a geographic diffusion or neighborhood diffusion on the one hand, and a hierarchical diffusion on the other hand based on the theory of central places (Christaller 1933). However, these two logics do exist in Hägerstrand (1967) model: this model considers innovation a spatial process and the author could show how innovations are diffused in agriculture, as others explain the diffusion of tractors in a similar environment (Cliff and Ord 1975). Steyer (2005) proposed an interesting theory of avalanches to explain the diffusion of

ideas, products, and technologies based on a random diffusion like in the Bass model and a geographic distance.

Merchandising is another type of product management likely to be spatialized. Its contents are: assortment management, product display and commercial animation within store departments, and sales promotions. Passing from merchandising to geo-merchandising means adapting the merchandising to the local context of the store. Geomarketing can help by designing maps displaying data to better match product assortment and trade area (Kalyanam and Putler 1997) and that could need to adapt also the structure of the retail organization (Vyt 2008): it is obviously easier within a franchise or a cooperative system where stores are managed by their owners. The stake is clear and consists in adapting the sales surface to the trade area (Volle 2006). And another managerial stake is at work: a precise knowledge of trade areas enables retailers to better assess the work of store managers or franchisees as a benchmarking implemented with a data envelopment analysis (DEA) including spatial data could show this (Vyt and Cliquet 2017).

10.4.2 Geo-pricing

When considering spatial aspects in pricing, we can talk about a true geo-pricing. Analyzing pricing strategies at the global level is often a vain simplification: too many local factors are involved to really understand pricing policies. A first reason concerns the local competitive situation. According to the local number of competitors, pricing policies change, and this is true at the very local level as it is also at the level of countries: when a competitor is leader in a given country and challenger in another, it cannot implement the same policy in both countries. A second reason stands in the retailers' power: many of them apply their own pricing policy, which is not always compatible with manufacturers' pricing policies. A third reason is given by consumers' imperfect information (Miller 1996). A fourth reason depends on transportation costs and logistics means according to factories' locations (Weber 1909): this problem sometimes questions outsourcings (Lampóna et al. 2015). Many

other reasons can play a role like the country of origin (COO) (Peterson and Jolibert 1995), local regulation, or local consumer's taste.

At the theoretical level, the minimal differentiation principle (Hotelling 1929) gives an excellent example of relationship between pricing and location. As far as products can be differentiated, stores delivering these products have great interest in locating close to one another, pricing being fixed according to various criteria like assumed quality or positioning. Too many pricing theories rely on product homogeneity, which is far from being true in the real world (Anderson and de Palma 1988). When comparing three pricing policies applied by manufacturers, uniform pricing, mill pricing, and spatial discrimination pricing, the most favorable to consumers is uniform pricing, whereas mill pricing is the most unfavorable (Anderson et al. 1989). At the retail level, two main pricing policies can be met: everyday low price (EDLP) as implemented by Walmart, and HILO pricing, which consists in attracting consumers with very low prices, whereas other products are priced with much higher margins, even though this last policy is now questionable as consumers use more and more their mobile devices to compare prices. Actually, some retail chains price their products the same way in every store like Lidl, whereas others develop a geo-pricing strategy (Khan and Jain 2005), which means a local autonomy for store managers. It has been shown that implementing a geo-pricing strategy within an adapted micromarketing could bring a higher margin (Montgomery 1997).

10.4.3 Geo-promotion

Every promotional technique can also be spatialized, and we can talk about geo-advertising whatever media is used, spatial direct marketing, geo-promotion concerning specifically sales promotions, or geo-management of salesforce.

As far as advertising is concerned, the marketing literature is rather poor (Gallopel 2006), whereas practitioners have been using geomarketing since a long time. Geomarketing software can help in locating billboards: for example, there are about 600,000 billboards in France and over one million with 6700 digital displays in the US, then choosing a site can be

both of interest and difficult for the advertising company and its client. Knowing where movie theaters are located can be important as well. GIS gives a good idea of where newspapers and magazines readers are dwelling not only to better know readers but also to help client firms to choose the right media vehicle. The interest is the same for radio and television audience. However, we can wonder whether GIS can be a real support when advertising on Internet: actually there is a web geography even though the technique to control it is somewhat different from usual mapping.

Spatial direct marketing cannot be implemented without geomarketing anymore. Some decades ago, flyers and prospectus were delivered in letter boxes or within the newspapers. Every store manager had a map in his/her office displaying assumed trade areas. Now with GIS it is much easier, more accurate, and more efficient.

Dealing with sales promotion, the approach is similar geo-merchandising. These techniques are also related to direct marketing. But the true stake is now to advertise sales promotions on mobile devices according to potential customers' location. It can be costly and that is why many small retail companies gather together to reduce costs (Carlbäck 2012).

Most of companies strive to better control their salesforce, and geo-marketing brings real advantages. And it is also today an essential tool for salespeople to better organize their rounds and better know their clients even though they sometimes complain that they are tracked the all day long. For that purpose, *Google* and Salesforce.com are now associated to develop *Google geospatial technology* (Arnold 2009).

10.5 Geo-retailing and Spatial Strategies

Economic activity location has been tackled in literature for a very long time (Von Thünen 1826). Marketing researchers have been more specifically attracted by store location problems, which is of interest for retailers almost exclusively. Several methods and models have been designed, and some of these models can be found in geomarketing software.

10.5.1 Store Location Methods

First of all and before developing store location methods, it is important we understand the store location decision process. This process is indeed different according to the size of the retail company: a new retailer who is looking for a good location for his/her first store develops a simpler process than the chain which is seeking to locate a new store. The complete process concerning a chain should start by an analysis of the company strategy before making three decisions concerning the market, the market area within this market, and the site in this market area. Then the company should assess the sales potential of the future store located in this site. If it concerns a chain, this new site corresponds to the desire of reticulation of this chain: Should it be franchised or company-owned? Answering this question consists in wondering whether this reticulation process fits into the continuing development of a strictly franchised network or of a wholly owned chain, or into the development of a plural form network (Bradach 1998). Once this last decision made, financial simulations can assess the potential profitability of this project. Hence, this process implies several studies.

An opportunity study should respond to the question: Is it the right moment to set a new unit (can be a store, a branch, a hotel, or a restaurant)? A market study, a market area study, and a site study can answer the question: Where is it worth to make it? Finally, a feasibility study on marketing and financial issues deals with the profitability of the project.

The PESTEL model (Evans and Richardson 2007) can help in analyzing targeted markets by explaining political, economic, sociological, technological, ecological, and legal issues before selecting a market. Studying a market area also requires secondary data to understand an eventual market leakage or a market saturation (Ghosh and McLafferty 1987). Analyzing purchase flows with a geomarketing software can help to better understand how consumers shop on a spatial basis (Douard et al. 2015). A GIS may be used to draw a much more precise potential trade area than the traditional primary, secondary, and tertiary circles (Applebaum 1966).

Other methods like the proximal area (Thiessen and Alter 1911) or the spline functions (Huff and Batsell 1977) have been proposed by researchers. The site evaluation is usually based on five principles (Lewison and DeLozier 1986): interception (can the unit catch passing consumers?), cumulative attraction (are similar units present around?), compatibility (are other units running compatible activities present?), accessibility (is the site accessible?), and store congestion (is the drawing power too strong generating then disadvantages for customers?). This analysis can be a good basis for a check list. A more recent method suggests to use filtering and convolution techniques (Baray and Cliquet 2007) and has been applied to locate a shopping center.

10.5.2 Store Location Models

Many location models can be found in the literature but three of them are still used by practitioners: the law of retail gravitation, the Huff model, and the MCI model, the two latter under various form being present in most of geomarketing software. These models are able to either predict consumer behaviors (see Sect. 10.2) or design future store locations.

The law of retail gravitation (Reilly 1931) suffers critics because of its deterministic conception and its limited number of variables (a mass—population or buying power—and a distance). However, it has been used for locating supermarkets in a rural context where consumer's choice is often reduced as it was done in Italy (Guido 1971) or shopping centers in the US (McKenzie 1989). Here is the Reilly's law formula:

$$A_X \Big/ A_Y = \left(P_X \Big/ P_Y\right) * \left(D_Y \Big/ D_X\right)^{\beta}$$

where:

- A_X, A_Y = activities drawn, respectively, by cities X and Y, in other terms the attraction of each of these two cities;
- P_X, P_Y = respective populations (or buying powers) of cities X and Y;

- D_X, D_Y = respective distances from the breaking point vis-à-vis the two cities X and Y;
- β = a coefficient specific to the distance but generally considered equal to 2 according to many experiences because determining β is a complex operation.

But urban environments demand a probabilistic methodology. The Huff model (1964) offers this opportunity, but like in the Reilly's law, only two variables can be introduced: a mass (here a store sales surface) and a distance (here measured by the driving time). Here is the Huff model's formula:

$$P_{ij} = \frac{S_j \left(T_{ij}\right)^{\beta}}{\sum_{j=1}^{q} S_j \left(T_{ij}\right)^{\beta}}$$

where:

- P_{ij} = probability for a consumer i to patron store j;
- S_j = sales surface of store j;
- T_{ij} = distance in time from home of consumer i to store j;
- β = coefficient related to the distance generally equal to 2 (cf. Reilly's law).

In order to compensate the very weak number of variables to be introduced in the Huff model, a generalization of this model was proposed called multiplicative competitive interaction (MCI) model (Nakanishi and Cooper 1974) with the following formula:

$$\pi_{ij} = \frac{\prod_{k=1}^{q} \left(X_{ijk}^{\beta_k}\right)}{\sum_{i=1}^{m} \left[\prod_{k=1}^{q} \left(X_{ijk}^{\beta_k}\right)\right]}$$

where:

- π_{ij} = probability that a consumer living in area i chooses the store j;
- X_{ijk} = value of the kth variable describing store j in area i;

- β_k = parameter for sensitivity of π_{ij} with respect to variable X_k;
- m = number of choice possibilities (here stores);
- q = number of variables X_{ijk}.

The MCI model can theoretically accept as many variables despite some limits. Its formula can be simplified through geometric means and a logarithm transformation, and so the resolution procedure has been demonstrated through a regression analysis (Nakanishi and Cooper 1974) which demands only ratio scale variables. But unlike the Huff model, the MCI model is based on both gravity models and market share models: if the distance does not appear as a determinant variable, this model becomes an attraction model able to supply market shares.

However, the MCI model presents a certain number of flaws. It needs a sufficient number of objects (here stores) to determine regression coefficients, otherwise a composite model is better adapted (Cooper and Finkbeiner 1983). There is a real difficulty to delineate the market area and to define an adequate geographical division like the Huff model and to measure determinant variables likely to explain store attraction: to do so, Cliquet (1995) suggests a subjective MCI model where every variable is measured with a questionnaire in a market survey. But in that last case, two conditions should be considered: (1) a survey collects ordinal data treated often as interval scale data, which should be transformed into ratio scale data by the zeta squared transformation (Cooper and Nakanishi 1983); (2) Bayesian statistics is needed as consumers do not know every store, and there are too many nonresponses in the final matrix. Finally, as every market share model, the MCI model comes up against the problem of independence of irrelevant alternatives (IIA) (McFadden 1974).

The MCI model has been used for multiple store location associated to a location-allocation model, defining thus the MULTILOC model (Achabal et al. 1982), which has been applied by American retailers sometimes to open several stores in the same time. This model is also useful when downsizing a chain by reducing the number of units. A recent research developed a method based on an analytic hierarchy process (AHP) and on the center of gravity method using a GIS to locate franchisees within a franchise network (García-Castro and Mula 2019).

Even though these models are still used and are integrated in geomarketing software, they remain incomplete as they do not consider clientele flows of mobile consumers.

10.5.3 Spatial Strategies

Store location methods and models concern the opening of one or several units to choose the best site in a given market area. But most of retail and service chains should now develop spatial strategies to improve their territory coverage as quickly as possible and to be able to struggle against competitors. It should be noticed that most of unit sets are plural form (Bradach 1998) organized, which means that franchise and company-owned units coexist in the same set: this set is rather called a network as every unit can be in relationship with the others as there is legally no hierarchical power between the franchisor and the franchisees.

The first decision should strive to select the right spatial strategy. Three main spatial strategies can be distinguished (Davidson et al. 1988):

- A contiguous or contagious strategy consists in opening units in the same market area or in the same region;
- A beachhead strategy invites to locate units in other more or less remote market areas;
- An acquisition or merger strategy can be a good option if the targeted network may improve the territory coverage, but also expensive and difficult to "swallow up."

Other strategies have been implemented by retail firms:

- An infilling strategy: like *McDonald's* opening as many units as possible to prevent contenders to enter the market;
- A secondary market strategy: like *Walmart* in the US or *Groupe Beaumanoir* in France when they select first small and medium towns where there are few competitors;
- Recycled locations: for example, gas station transformed into bakeries.

Then in order to structure both organizational and spatial sides, a choice process concerning the unit status and a measurement process can be implemented. As far as the organizational side is concerned, a plural form network has to define which status (franchise or company-owned) a unit should get: this depends on the global strategy of the chain but also on the local situation and on the presence of potential franchisees. This location should also be able to complete the territory coverage of the network to diffuse the brand, to reduce logistics costs and to get access to national media. This coverage can be measured with the relative entropy; then it becomes possible to know whether the new unit adds something to the territory coverage or not and to compare with competitors' coverage (Cliquet 1998).

Location speed is also of great interest as a contender can occupy a very good site if the firm is too slow to decide. Whenever a retail or service firm decides to invade a new region, improving this speed needs to choose the best locations in order once again to diffuse the brand and to reduce logistics costs. The percolation theory is of great help to display the best way from one point to another (Cliquet and Guillo 2013).

Spatial strategies concern also plural form networks and it should be of great interest to model a store network location taken into account the choice process between franchise and company-owned units (Pirkul et al. 1987). But this last research suffers from little knowledge about plural form networks. Several publications have exposed since the advantages of this organizational form regarding the location of units (Bradach 1998; Cliquet 2000).

10.6 Geo-positioning and Smartphone Usages

The apparition of the smartphone in the market in 2007 is a real revolution in human behavior, and it justifies the concept of spatial marketing. Geomarketing is too restrictive and limited to GIS usage on computers. Even though some geomarketing software are GPS connected, every smartphone is GPS related, and it is today the favorite device with the

touch pad. Consumers can be tracked when using their smartphone or their touch pad (we will further use only the term "smartphone" but it includes also touch pad). And this is why firms strive to offer the best services enabling consumers to reach a store, a restaurant, or a hotel. The creation of a true mobile marketing or m-marketing in manufacturing companies is under way to complete the e-marketing for consumers' usage of informational and transactional websites and m-commerce for retail firms to respond to consumers' m-shopping.

Some authors has wondered whether distance is still alive with Internet (Cairncross 1997). The answer is obviously yes: distance is still of great interest and stores are far from being devoted to disappear. Among many other examples, *Amazon* decided to buy *Whole Foods* stores to be concretely in the market and diffuse a better image.

Implementing spatial m-marketing demands to well understand some specific concepts like proximity, mobility, omni-channel, and spatial databases. We already met proximity and mobility when talking about spatial consumer behavior in Sect. 10.2. Omni-channel (Fulgoni 2014) means that consumers tend to use any marketing channel at anytime and anywhere, and firms, whatever activity they run (retailing or manufacturing), should be able to manage cross-channel strategies in order to respond at anytime and anywhere to this behavior. Spatial databases, or spatial big data, are built with data stemming from loyalty cards, browsing data on websites, or data about shopping trips recovered from smartphones. All these data can then be used by GIS. But we see at this point how much legal limits could be overpassed: this is the problem of privacy violation insofar as consumers refuse more and more often to be tracked by location-aware marketing techniques even though they like to get relevant promotions whenever they are on mobility (Xu et al. 2011).

The relationship between Internet and franchising can be difficult to manage in its spatial dimension in retail and service networks. The problem of encroachment is well known when a franchisee advertises for sale and really sells products or services to consumers located in a trade area of another franchisee of the same network (Vincent 1998). With Internet it is easier for either the franchisor or other franchisees to advertise everywhere and then to attract customers located outside of one's own trade area; then encroachment can be more frequent and

more difficult to deal with. Retailers have implemented several solutions to cope with that because franchisors have never interest in seeing their franchisees suffering from these bad practices (Cliquet and Voropanova 2016). "Click and collect" systems help to stay in touch with customers through Internet and to better know their favorite products to propose relevant promotions. But these customers often do not enter the store anymore. Hence, retailers should know more about the place they live and the time they come in order to suggest visits and geo-positioning can play a role for that purpose: sending promotions through smartphones can change the way consumers shop. M-marketing is then partially spatial even though GIS should use new devices which are much smaller than usual computers. Practitioners talk about location marketing and location-aware marketing when using geo-positioning is accepted by consumers. Retailers then use location-based advertising when a potential customer walks or drives within the geofencing limits of a given store and offer location-based services and even context-aware services (Schilit and Theimer 1994).

However, smartphones come up against the problem of accurate geo-positioning. First of all, GPS is unable to position somebody or something within a building as it works from satellites: technology based on magnetic fields has been proposed to cope with that flaw, and it could help to better understand in-store consumers' shopping trips. Two other errors have been found in Danish justice system. An error was found in the conversion by an I.T. system phone companies' raw data entailing a wrong position of a person at the scene of a crime. And finally, "some cellphone tracking data linked phones to the wrong cellphone towers, potentially connecting innocent people to crime scenes" (Selsoe Sorensen 2019). Beyond the fact that it calls into question the Danish justice system which should now review more than 10,000 verdicts, retailers or any other firms are now also able to consider consumers' geo-positioning questionable: Who can trust such a system? A European geo-positioning system, Galileo, which is supposed to be more accurate, is still in progress.

10.7 Conclusion

Spatial marketing can be defined as a set of domains as follows:

- A geomarketing relying on GIS techniques;
- A localized marketing to adapt commercial offers to various market areas;
- A spatial strategic marketing reinforcing marketing mix elements (geo-merchandising, geo-pricing, geo-advertising, etc.) and devoted to better manage local markets with a "glocal" strategy;
- A geo-retailing to deal with store location problems, in-store management, and spatial strategies within retail and service networks;
- A location-based marketing concerned by spatial behavior of consumers connected with mobile devices involved in omni-channel strategies.

Geomarketing has been the main pillar for spatial marketing for years, useful to locate commercial units or factories and to adapt marketing strategies to local markets with maps and models. Now location-based marketing enables to also develop a better knowledge of spatial consumer behavior and an efficient mobile marketing. But this evolution based on both technology and consumers' desire of customized offers should take care of privacy concerns.

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