

Geomarketing: Spatial consumer behavior and integration of the geographic dimension - Literature review.

Abstract

Faced with fierce international competition and ongoing technological innovations, companies are constantly looking for tools to help them make decisions and optimize costs, in order to ensure their commercial attractiveness. Geomarketing is emerging as a powerful tool in marketing analysis, enabling companies to take into account the demographic and socio-economic aspects of consumer behavior in space. The aim of this approach is to guarantee customer satisfaction, thereby strengthening the commercial appeal of companies.

Through the analysis of geospatial data, using tools such as geographic information systems (GIS) for the processing of geographic and behavioral data collected, geomarketing offers a better understanding of consumer behavior and geolocalizes potential markets, hence the interest of this research.

Using a systematic review methodology, this work highlights emerging trends in the literature. The theoretical results show that the successful integration of the geographical dimension into marketing analysis, thanks to new technologies of GIS, can influence consumer behavior and identify new business opportunities.

To carry out this analysis, we will explore the concept of geomarketing, its origins and evolution. We will also analyze the factors influencing consumer behavior and the role of the geographical dimension in the expansion of economic markets. Finally, we will examine the contribution of geomarketing in addressing the conative dimension.

Keywords: Geomarketing, consumer behavior, commercial attractiveness, geographic information system, customer satisfaction.

Introduction:

Fierce international competition and rapid technological progress force companies to constantly seek out effective techniques and implement modern tools to help them make strategic decisions, protect their commercial appeal and remain competitive in the marketplace. Geomarketing is emerging as a powerful tool in marketing analysis, enabling companies to take into account the demographic and socio-economic aspects of consumer behavior in space. This approach aims to guarantee customer satisfaction, thus strengthening the commercial appeal of companies.

According to Jean P. Douard: "*Geomarketing, through a broad approach to territories integrating numerous variables of different dimensions, offers a new solution to the search for business locations*". The territory is a source of information and opportunities for companies. It enables them to collect important data on their clientele, even their address and contact details, as well as their purchasing behavior. This data can then be processed through innovative technology and, above all, geographic information systems, i.e. collecting geospatial data, analyzing important commercial areas, and developing models that predict consumer behavior.

This enables companies to categorize their customer base, while analyzing potential markets and understanding consumer needs and requirements. Hence the central research question is:

What impact does the geographical dimension have on consumer behavior?

To answer this question, we will explore the concept of geomarketing, its origins and evolution. We will also analyze the factors influencing consumer behavior and the role of the geographical dimension in the expansion of economic markets. Finally, we will examine the contribution of geomarketing to the consideration of the conative dimension, as well as existing empirical work in geomarketing.

This theoretical work occupies a central place, as it provides a robust foundation for the two themes we are about to explore. By integrating this theoretical framework, we are able to approach these themes with a solid foundation, which will enable us to deepen our understanding of the impact of the geographical dimension on consumer behavior. What's more, this approach allows us to comprehensively examine the two crucial aspects of the problem: 'consumer behavior' and the 'geographical dimension'.

1. The concept of geomarketing

1.1. Definition and origins of geomarketing

Geomarketing is the branch of marketing used to analyze the behavior of economic individuals, taking into account notions of space.

- According to B. MERENNE-SCHOUMAKER (1989), *"geomarketing is first and foremost a technique for spatially segmenting a market, a technique closely linked to the existence of computerized data banks and enabling a "tailor-made" response to any problem encountered by a company in its search for relevant and reliable information on its actual or potential market"*.
- For Latour P., and Le Floch J. (2001), *"Geomarketing can be briefly defined as the combination of data, the computerized processing system and the methods applied by an analyst, all of which work together to produce decision-support information in the form of cartographic spatial representations, rather than graphs or tables"*.
- According to Jean-Pierre DOUARD and Michèle HEITZ (2004), *"geomarketing is defined as a method of federating and processing data based on their geographical dimensions. Geomarketing is technically situated at the junction of data with a geographical component, map backgrounds and data management software that has been more or less analyzed."*

Admittedly, the term geomarketing is more recent than its technical tools. Indeed, in the 50s, the first cartographic management tools were somewhat complex, requiring effort and large machines, as they were passed on from the simple orientation maps used in wartime to computerized tools. In the 80s, the arrival of computer tools and software enabled cartographic data to be processed in a simpler, clearer way, encouraging their use by other specialties for economic and commercial purposes.

Initially, the geographical variable was presented in the form of maps, which are now part of computerized applications. According to JACOB (1992): *"Any map selects its object and abstracts from what would distract from the essential. (...) The map schematizes reality, categorizing it"*. Hence the importance of spatial visualization in all fields.

Secondly, technology has developed sophisticated navigation systems such as the Global Positioning System (GPS), which can be used to define directions and reach the desired spatial destination. This obviously leads to a detailed study of the commercial zone, taking into account its strengths and weaknesses in terms of transport costs, proximity to customers and customization of products and/or services according to local preferences. According to BAAKIL Driss (2013), the dissemination of this cartographic information to the general public only accelerated in the early 2000s, thanks to websites offering store location services, distribution route calculations and, above all, the use of web mapping for a variety of purposes.

1.2. The evolution of geomarketing

The German school was a pioneer in laying the foundations of this field, with research by Von Thünen in 1826, A. Weber in 1909, W. Christaller in 1933 and Lösch in 1938 and 1954. This work was then transmitted to the USA after the Second World War, to complete the spatial and geographical reflection and enrich the Anglo-Saxon school during the 1950s and 1960s. The work was only translated to Europe in the 1970s, and to the rest of the world in 1980.

The works on the spatial organization of a market can be divided into three groups:

- Research that focuses on modeling the spatial behavior of the buyer, such as the "nearest center" model and gravity models.
- Point-of-sale selection models, to assess the potential of a location through location-allocation models.
- Models based on central place theory.

Among the spatial analysis models used to understand shopper behavior in space, we distinguish the "nearest center" model, and gravity models based on the retail gravity concepts proposed by Reilly and Converse.

Modeling spatial buyer behavior

Commercial location has historically been based on models, many of which are based on the study of commercial attraction. The latter is defined as "*the ability of a point of sale to move consumers around, as measured by the number of visits to the store*" Cliquet (2002). Like Newton's laws of universal attraction, these models of commercial attractiveness were established over seventy years before probabilistic or deterministic conceptions began to be extended.

- Nearest center model

This model is based on the idea of frequenting the nearest distribution unit to obtain the good or service they are looking for. Some authors have questioned the notion of absolute distance and introduced the notion of relative distance. If the difference in distance between two alternatives is not perceived by the buyer, the two outlets will be considered equivalent by him at the moment of choice. Devletoglou (1965), O'Sullivan and Ralston (1976).

- Gravity models

After the weak capacity of the nearest-center model, probabilistic spatial analysis models have just compensated for the disutility caused by the extra distance to be covered with the utility provided by the greater attractiveness. Reilly's (1931) gravity model was the precursor, setting the boundary between two distribution centers as a function of the distance between them and

their respective dimensions. Huff (1964, 1966) was the first to develop a gravity model based on probabilistic foundations. Attractiveness is perceived as a combination of several variables: the image of the outlet (Stanley and Sewall 1976), the presentation of items (Jahn and Mahajan 1979), proximity to other outlets (Hansen and Weinberg 1979). The subjective interactive model of spatial competition (MICS) proposed by Cliquet (1990), allows us to measure the attractiveness of a sales outlet by taking into account subjective data instead of the objective data usually used.

Location-allocation models

Location-allocation models aim to select different locations, so as to optimize performance criteria already set by the company. Von Thünen's (1826) location model relates to the agricultural allocation of land based on a market. The four determining factors in his theory are: market, distance to market, cost of production and soil type. According to Von Thünen (1966), profit is based on the optimal use of land and transport costs: "*The location of economic activities is determined by transport costs*".

Other location-allocation models include Weber's industrial model, which, unlike agricultural activity, is characterized by the optimal and precise location of the factory, in order to minimize transport or transfer costs. Alfred Weber (1909) attempted to systematize location data at the beginning of this century in the German context of the early 20th century, at a time when the basic industry was steel. The best location is the one that minimizes production costs.

Central place theory

The theory of central places, developed in the 1930s by Walter Christaller (1933) and August Lösch (1954), applies to the distribution of services, their hierarchy, spacing and catchment areas through the system of towns that act as central places for their environment. Christaller's theory was best suited to low-density rural areas such as southern Germany in the 1930s, and was followed by Lösch's theory, which took this work a step further and adapted it to more densely populated areas and more complex economies where industry and specialization were more advanced, such as the Iowa area in the USA in the 1940s.

According to Michèle HEITZ, Jean-Pierre DOUARD (2012), geomarketing is a conceptualization for studying the location of companies and services. It enables us to analyze the phenomena of commercial evasion, which could have a negative impact on companies in the commercial sphere, economic activity and the attractiveness of territories. In fact, consumer behavior analysis databases can help to better understand the conative dimension. This enables commercial companies to better target their offers and potential markets.

2. Consumer spatial behavior: a marketing perspective

2.1. Factors influencing consumer behavior

In this section, we will divide the set of variables influencing consumer behavior into two categories, which are the ultimate objectives of any marketer.

- Attractiveness

The consumer is now attracted by the store's surface area and location. However, this has only proved valid in certain cases, where the shopping area is sparsely populated or transport links are difficult to access (Huff and Batsell, 1975). These findings then suggest a notion of spatial

indifference, since the consumer chooses a point of sale located in a zone of spatial indifference in which the cost of reaching any other store is minimized (Nystuen, 1967). More precisely, and according to Craig et al, (1984); Ghosh, (1986), customer travel does not depend on absolute distance, but rather on the relative distance between several shops. For this reason, Christaller and Lösh have added the theory of central places to the deterministic conception, in which the optimization of spatial and temporal factors in customer movement is envisaged by a local in a central market.

Consumers tend to choose outlets or businesses located close by, since they can move around easily. According to Cliquet G (1997): "*Most food stores target resident population stocks as a priority, while others focus on capturing passing traffic, and still others play on both levels*". The same is true of other marketing targeting strategies, which aim to build customer loyalty by personalizing offers and taking proximity into account. As for m-commerce (mobile commerce), which focuses on the use of cell phones (smartphones), it is the focus of a great deal of attention among marketers, thanks to its ability to increase the flow of customers to a point of sale by means of geolocation; indeed, proximity offers can be sent to prospects depending on their location (DAHLBERG, T., MALLAT, N., ONDRUS, J., & ZMIJEWSKA, A. 2008).

- Visibility

Based on the deterministic concept, store location is based on the assumption that the consumer will visit the nearest store. Deterministic models assume that consumers are attracted by the distance and surface area of a given store. This postulate was validated by Reilly's (1931) law of retail gravitation, as well as by Christaller's (1933) and Lösh's (1954) central place theory.

With regard to the probabilistic conception, location theories propose that the attractiveness of a business for a customer is based on the probability of its patronage, Wong and Yang, (1999). Based on past experience and perceived consumer behavior, an individual's preferences are derived from spatial and temporal factors, Cliquet, (2002). In the history of these probabilistic models, store size and distance have been shown to be essential variables in estimating the probability of visiting a store. According to Huff (1964), store size is a better indicator of a store's attractiveness. This is because larger stores tend to have a wider range of products, and distance from the store can be measured by driving time (absolute distance) or transport cost. Subsequently, however, several environmental, situational and individual variables are taken into account, Granbois (1984). The Huff model was revised by Nakanishi and Cooper (1974), to which other parameters were added, giving rise to the so-called choice models or MCI (Multiplicative Competitive Interaction), Cliquet (2002). These methods integrate several qualitative and quantitative variables to explain a customer's choice of a particular outlet.

The current trend is towards the destructuring of catchment areas, due to the increasing mobility of consumers, who follow complex trajectories depending on their living space and the type of product sought (Viard, 1994). Commercial attraction is a subject addressed in the literature by several models, as already mentioned. The so-called gravity models are based on a store of a certain surface area automatically attracting a calculated number of customers (Reilly), or according to Huff, taking into account distance and mass variables. Next come Nevin and Houston, 1980, which give rise to more subjective variables linked to the outlet's communication efforts, sales policy and promotions (Cliquet 1995).

2.2. The role of the geographical dimension

The appeal of geographically-based research lies in the possibility of determining business location models for companies operating in the Business-to-business (B2B) or even Business-to-consumer (B2C) sector. All industries can benefit from the geomarketing approach, whether in sales, decision-making, marketing, business development or expansion planning. The geographic variable contributes to improved decision-making by taking into account population disparities within regions, changes in the urban economy with spatial interactions within market areas and catchment areas, while considering competition, merchandise flows and geographic barriers.

Companies' strategies for locating points of sale along geographical lines are constantly evolving, in line with consumers' spatial behavior. Geo-demographic data is a relatively new concept that stems from the combination of geographic and demographic information on the population. (RAMADANI, V., ZENDELI, D., Gerguri-Rashiti, S., & DANA, L. P., 2018) This data has data reports that enable quick and easy analysis, and a better understanding of important business factors regarding decision-making on certain issues. According to PETERSEN, J., GIBIN, M., LONGLEY, P., MATEOS, P., ATKINSON, P., & ASHBY, D. (2011): *"Location reports gather information around a specific point or location on a map, such as nearby intersections and traffic data for distances from that point."* *"Geo-demographics can also be used as a social marketing tool to create 'place' information and target the population."*

According to BERNARD C. (1996): *"The key point in the intelligent use of geographic data and analysis is the database, where, from a marketing management perspective, all the elements are intended to help the decision-maker understand localized markets"*. So, the way in which geographic data is used does make a difference. RAMADANI et al (2018) share a similar idea about the development of a geomarketing plan. Indeed, companies store geographic data concerning its clientele, from different sources, in mapped databases. This makes them easier to visualize and analyze. It's also a way for analysts and forecasters to detect trends and opportunities, and target their actions based on customer requirements and expectations.

Using geographical data, geomarketing enables companies to assess the economic potential of a new activity. It identifies areas that are likely to be more profitable for a company. By extrapolation, geomarketing can be used to study the market and measure a company's commercial performance.

3. The influence of geomarketing on the conative dimension

3.1. Use of technology in geomarketing

The conceptualization of geomarketing refers to a Geographic Information System (GIS) whose ultimate aim is to analyze consumer behavior in their living space, especially in terms of commercial travel. Geographic data processed by geomarketing tools, such as geographic information systems (GIS) and cartography, are used to facilitate corporate decision-making, spatial analysis and business location. (BODIN, F., & SALINAS Prado, P. A., 2006).

By using GIS databases, companies can improve their marketing strategies at the operational level, by monitoring their sales forces and facing up to the competition, through a variety of methods including prospectus distribution, optimizing poster campaigns, locating the shortest routes, etc. On a strategic level, companies analyze the development of their stores and formats in a given area, be it a region, city or neighborhood. Indeed, strategic marketing can prospect

the habits of existing or even potential customers. Over the years, several geomatic tools have been developed to help improve the commercial attractiveness of companies, combining GIS and GPS for geomarketing purposes (BODIN, F., & SALINAS Prado, P. A., 2006). A similar perspective has been put forward by HAGIN, et al (2004), showing the role of GPS system design, which lies in detecting the movements of a sample population whose journeys are then juxtaposed with the visibility perimeters of display media. Route reconstructions are performed in two different ways: either a warning message is sent when the measurements are imported if the distance between points exceeds a set threshold value, or the measurements are geolocalized on a vector map with well-defined road axes.

The emergence of smartphones and online social networks has spawned a billion-dollar industry that relies on geospatial data for advertising and marketing purposes. Geolocated messages on social networks, GPS records, data from cellular antennas and WiFi access points are amply implemented in direct access to people for advertising, recommendation, marketing and group purchasing purposes. The use of such vast quantities of geo-referenced data offers a gigantic capacity to materially improve existing recommendation services and to propose new ones, with a wide range of applications in various fields, such as social networking, marketing and tourism. (BOUROUS, P., Dasu, T., Kanza, Y., Renz, M., & Sacharidis, D., 2020)

Geographic information systems (GIS) are the tools needed to implement geomarketing technologies. The sheer volume of information to be stored and processed makes them indispensable. However, specialized GIS for marketing research is emerging (Maguire D, Batty M, Goodchild M F, 2005). ESRI offers a range of software tools that implement a number of geographic models and specialized functions. In particular, it is possible to apply the Huff model and calculate and visualize trade zones on the basis of various parameters (Rana, S Isovist Analyst, 2006). Currently, geomarketing work uses two types of GIS: commercial GIS and others that are free and available.

GIS software includes:

- ArcGIS; a web mapping software developed by the American company ESRI, which uses intelligent mapping styles, based on spatial data and intuitive analysis tools to obtain information about places, and share it with specific people. (<https://www.arcgis.com>)
- QGIS; the free, open-source geographic information system, which lets you visualize and analyze georeferenced data, as well as create and publish geographic maps. (<https://www.qgis.org>)
- MapInfo; geo-decision intelligence, a complete mapping solution that enables GIS analysts to manage, analyze, visualize and publish maps and geo-referenced data. (<https://www.infosig.net/>)
- Google Maps; a Google application that displays maps and offers a multitude of ways to search for information on these maps. Google has also launched Google Earth, which provides access to maps from all over the world (Ingensand, J., 2005).

3.2. Geographic information systems in operational marketing

The use of Geographic Information Systems (GIS) can improve marketing strategies, market segmentation and site selection, while involving the location dimension in 4P analysis (Price,

Product, Promotion and Place). This section is dedicated to defining the relationship between geomarketing and the traditional marketing mix.

The "product" component of the marketing mix is used to adapt products to consumers' characteristics, especially those related to their spatial location. Ronald L. Hess et al, 2003, see this adaptation as very important in meeting the requirements of consumers in different regions. Geographic Information Systems (GIS) are heavily involved in this adaptation, analyzing where products are successful and defining the consumer characteristics that influence demand. They play a key role in determining what makes a product less attractive in regions where sales are low, and in decision-making to improve product performance.

From the recurring questions we ask ourselves all the time about the variation in product prices between hypermarkets and express supermarkets or between regions, it is quite clear that the geographical dimension plays a role in defining prices. According to Ronald L. Hess et al, 2003, there are two aspects to this concept of geolocation and prices.

Firstly, the influence of geographic information systems (GIS) on location-based pricing, taking into account the relevant models, contexts and factors. Secondly, what are the potential benefits in terms of turnover and market share, as well as the technologies applicable to various markets, products and industries.

In addition, whether products whose pricing does not currently incorporate geolocation elements could potentially do so. In both cases, it was found that a lack of data and analytical tools hampered the effectiveness of pricing models. According to Ronald L. Hess et al, 2003, GIS techniques and technologies can improve the decision-making process when spatial aspects are involved.

Promotion has long been an important part of the literature, but a rigorous understanding of how theory, technology and practice integrate is lacking. Ronald L. Hess et al, 2003, shed light on the question of the effectiveness of integrating internal and external data with the use of geographic information systems (GIS). They argue that GIS should have a crucial role in integration, a view supported by concrete examples, but it is not yet clear whether these assumptions stand up to more formal analysis.

Like localization, distribution is among the first areas where GIS has been widely used in the marketing mix. Certainly, the use of GIS has already been mentioned in the distribution of deliveries and the appropriate choice of points of sale. However, this is not practical enough in the field, as it is just an illustration of the successful use of GIS without formulating its contribution to successful decision making. Ronald L. Hess et al, 2003, emphasise the formal relationship between the type of decision, data availability, other situational factors and the successful use of GIS to enhance distribution decisions. These studies can address issues such as retail site location, distribution management, delivery routes, as well as elements integrated into the overall distribution strategy.

Research summary

Based on the research carried out, geomarketing is a concept that relies on the analysis of geographical data to understand the conative dimension of the consumer. Thanks to technical and technological progress, geographic information systems are having an effective impact on

the choice of location, the optimization of distribution routes and the customization of products according to customer preferences.

The use of Geographic Information Systems is a basic necessity for geomarketing, in order to go through spatial marketing, which consists of taking strategic decisions taking into account space with/without GIS, to the exploitation of specific mapping software to better understand potential markets and the personalization of customer needs.

If this theoretical study had not been carried out, it would be difficult to visualize the importance of the geographical dimension and to discover that a number of variables obviously need to be taken into account when analyzing the spatial behavior of consumers and identifying potential regional markets.

Conclusion

By way of conclusion, the aim of this study can be summed up as defining the research problem and exploring the theory in order to make real progress in the field with empirical studies. The interest of this research project remains the understanding of the spatial behaviour of the consumer through the integration of the geographical dimension. The aim is to make a success of marketing analyses aimed at geolocating potential markets and customer satisfaction.

It is also important to note that this study was carried out as part of the preparation of a doctoral thesis entitled: "*Geomarketing: spatial consumer behaviour and integration of the geographical dimension*". Consequently, the next article will focus on the development of empirical studies - quantitative and qualitative - to fully explore and confirm the variables that play an important part in the geolocation of commercial markets and the influence of the consumer's conative dimension.

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