

GIS With DM: Just Tools, or a New Marketing Science?

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Abstract

Marketing is one of the fundamental sciences of the present day, especially because it makes use of its deductive character in the attempt to understand consumers and satisfy their needs. Consumers, however, have very subjective behaviour whose analysis is not always linear. Through its capacity of referencing entities in a geographic manner, GIS has enriched this analysis. However, the unpredictability of these phenomena was solved with the combination of Data Mining methods with GIS. By their characteristics, the newly emerged Location Based Services have become a laboratory through the conjoint use of these two techniques – GIS and Data Mining. This paper intends to answer the question of the title, by characterizing the benefits resulting from this new way of understanding Marketing, as well as, anticipating future scenarios of the evolution of this science with regard to the application of these concepts.

Key words: Marketing, Geo-Marketing, GIS, Data Mining, Spatial Data Mining, Location Based Services, and Spatial Analysis.

1. What is Marketing?

There are many definitions for Marketing, but as an example we can use three of them, from well-known authors:

- Marketing it's the process through which the economy is integrated in the society to serve the needs of human beings. (Peter Drucker)
- Marketing it's the process to attract and to keep the customer. (Levitt)
- Marketing it's an orientation of the management whom it aims at in the long run to provide to the satisfaction of the customer and well-being of the consumer, as form to satisfy the objectives and the responsibilities of the organization." (Kotler)

As we see, all of them are related to the customer satisfaction. We can say that Marketing it's the science that identifies, creates and satisfy customer needs.

The marketing departs from the concept that the demand and offer are heterogeneous, that is, that the demand departs from a set of consumers whose preferences are distinct between itself, and that the offer is composed by a set of manufacturers whose products present certain degree of dissimilarity. The marketing looks for the best possible coupling between segments, offer and the demand.

2. Marketing Evolution

During its recent history the organizations have passed by some evolutions in their way of satisfying customer needs.

2.1. Product Orientation

It is an orientation of the organization that estimates that consumers will answer favourably to their "good" products whose prices are reasonable and that a little of effort of marketing is

enough to obtain high level of sales with satisfactory profits. That's the traditional way of thinking of the industrial companies, building the best products without thinking in what customers really want. There is a joke that explain this concept very well, which is the company that produces pet food that has developed the best dog food in the world, with all desired proteins and vitamins for the dogs, they have built up a huge marketing campaign. Nevertheless, the results were a catastrophe because they have forgotten to give this food to be tasted by the dogs before they launch the product. Nowadays, only some non-profit organizations show, more frequently, an orientation for the product.

2.2. Sales Orientation

The sales orientation emphasizes the use of the promotional instruments with the only intention to generate sales in a short-term period, or in other words sale at any cost. In this orientation companies act as if without a big marketing effort customers didn't buy anything.

This kind of companies, guided only for sales, create unsatisfied customers in the long-term period, for considering secondary, comparing to the sales effort, the satisfaction of customer's needs.

2.3. Marketing Orientation

This kind of approach has introduced a new kind of vision in the organizations, a vision to reach the success. An orientation of the organization based on the agreement of that the primordial task of the organization is to determine the needs, desires and values of the market and to adapt the organization to promote the desired satisfaction more effective and efficient than its competitors. This kind of approach builds long-term relationships between organizations and their customers. Although it's a different approach from the sales orientations, sometimes there is a tendency to mix it, but they are quite different. Sales focuses the needs of the sales force, instead of marketing, that is focalised in the customer's needs. Sales orientations converts product in money; the marketing approach satisfy the customer needs not only with product, but with a whole package of concepts such as logistics, technical and after sales support, price and of course the product himself.

3. Marketing Mix

It's in the organizations with a Marketing orientation that appears the concept of Marketing Mix. The main Marketing management decisions can be classified in one of the following categories:

- Product
- Price
- Place
- Promotion

The perfect mix of this four variables dictates the success of any organization in the market where its involved.

The meaning for each P is:

P for Product – it is everything that is capable to satisfy a desire or a need. It can be physical or virtual (service). This element plans and manages the image of the given benefit. It is strongly connected with the concept of economical good, in other words everything that as utility for someone.

P for Price: it is the aggregate value that justifies the exchange. The moment of product ownership it's defined by this factor. It is not only connected with the price list but also includes discount policies and financing solutions.

P for Place: the local or the chain for which we will offer the product. This element plans and manages where, as, when and under what conditions the product will be placed in the market.

P for Promotion: it is the system of communication and relationship that interacts with the internal and external market of the organization. This variable has several such as: Merchandizing, Franchising, Telemarketing, and many others that must be worked by the marketer in order to reach the customers.

There are many theories around Marketing Mix, adding new P's or any other letters related with other concepts, but the theory of the 4 P's it is still actual and could be the basis for any successful marketing plan.

4. GIS Definition

A common definition of Geographical Information Systems (GIS) found in literature relates this technology with a tool that associates databases and digitalized maps. Concepts ampler than this are presented nowadays. A complete GIS consists of at least five components: software, hardware, geographical data, people and the organization. If a system is implemented in an company, only the software is not enough to work with the database and the digitalized map, is important that exists: qualified personal, an objective in the use of the system and the interaction with other areas inside of the organization. Therefore, GIS is a collection of software, hardware, geographical data and people to facilitate the process of decision taking into consideration that involves the use of geo-referencing information in the organization.

5. GIS History

The initial idea of GIS was born in Sweden. However, the first GIS was developed in Canada in 1962, being called CGIS (Canada Geographic Information Systems). It objectified the accomplishment of land inventories in national scope, involving different partner-economic and environment aspects. It has became total applicable only in 1971. Commercial packages of GIS had started to be developed in years 70, in U.S.A. and had mainly tried fast growth in years 80. Initially, the public administrations were the main customers of these products. The market in years 90 was characterized by the large application in

the private sector. In the U.S.A. the propagation was sufficiently intense, since the American government was already worried about the development of the digital representation of the roads networks and census data since 1972, which is one of the basis for the growth of this technology.

6. Geo-marketing

Organizations face today two great challenges: increase sales and optimize their processes and resources. Gurus of the strategically planning, and of the customer relationship, suggests that the creativity and the innovation are the solutions for a highly competitive market, where the changes of products and services happens in an extremely quick form. Following this advises, the areas of marketing and planning are starting to use a new technological tool: geo-marketing or geographic marketing. Basically, it's the junction of the two words, geography and market, in order to measure the demand and it offers of one region, from a single quarter, to a city or a country. The geographical characteristics of this region combined with the parameters of the products, or services, offered are primordial to calculate the size of the geographical coverage for each type of product, or service, also called influence area. The main attribute for the success of a retail enterprise is to know which is the best localization to get the best exploitation on target consumers.

Geo-marketing is today a basic part for the decision taking process. With the use of a system based on digital maps, GIS software and diverse databases, the information are graphically distributed, being able itself, for example, to analyze the market trends, to monitor the competition, to visualize opportunities and to launch marketing campaigns.

Location it's one of the main problems in Marketing. An incorrect decision of localization promotes a series of sequential errors in the concept of the marketing mix. This means that the 4 P's - place, price, product and promotion – are deeply related and depend one on the other. If a store is opened in the wrong place, all the others P's (price, product and promotion) will also have to be reviewed.

7. Data Mining

Date Mining consists on an analytical process to explore great amounts of data (typically related to business, market or scientific research), in the search of consistent patterns and/or systematic relationships between variables and to validate the application of the detected patterns to the new subgroups of data. The process consists basically of 3 stages: exploration; construction of model or definition of the pattern; and the validation of the model.

Currently, the organizations have shown extremely efficiency in capturing, organizing and storing great amounts of data, from their daily operations or scientific research. However, they still not use adequately this huge amount of data to transform it into knowledge that can be used in its proper activities, commercial or scientific one.

The Data Mining concept is becoming more popular as a tool of information management, which must reveal knowledge structures that can guide us to better decisions. Recently, it has had an increasing interest with the use of new analytical techniques; however Data Mining is still based on conceptual principles of Exploratory Data Analysis and Modelling.

8. Using Data Mining in GIS

Although GIS and DM are two powerful techniques, they are normally used independently in Marketing which is recognized, nowadays, as an incorrect attitude because all data in business can be located and due to the very big amount of data that organizations have, can also be analysed by DM techniques under the umbrella of geographical location.

The advantage of using Data Mining techniques in GIS it's the possibility of analysing and condensing a large number of variables into a single forecast or score. This is the strength of predictive data mining technology and the reason why there is such perfect fit between GIS and DM.

Depending upon the specific application, GIS can combine customer history or retail store sales data series with business, traffic, demographic, and market research data. This dataset is then ideal for building predictive models to score new locations or even customers for sales potential, customer churn analysis, cross-selling strategies, and other marketing applications.

Data Mining has been developed very quickly in the last years in business applications, specially due to the big amounts of data that organizations were collecting with the new IT technologies, but all this data, usually, its connected with a specific geographical location, so we can improve and enrich our analysis including this new parameter in Data Mining.

Another important factor that is improving this kind of analysis it's the Location Based Services (LBS), that after being developed to answer on emergency situations have been applied in the last years to business issues, and will be one of the competitive key factors for the companies that want to survive and to be successful in the future. LBS will have boom in the next years with the development of the UMTS mobile technology, where anyone can be geographical located. The new UMTS terminals will be, due to their technology capacity, the new data input tool for organizations as well for consumers. For instance we can easily locate and trace the movement of a customer inside a shopping centre, as also his payments done with mobile payment applications, analysing all this data we can have better knowledge of the customer behaviour, and better focalise our marketing campaigns and advertising, maximizing this way the success of our actions.

The rate of error in Marketing will decrease radically with these new-combined tools, and we will have better perception and knowledge of our customers, optimising resources in development, adapting the prices, focalising the advertising, choosing the right retail partners. In other words we will control more efficiently the marketing mix in order to take the best decisions.

With all this improvements, we can make a question: "Will the Marketing science be the same? Or we are speaking about a new Marketing era". The levels of knowledge and accuracy about the marketing mix will be improved dramatically, and marketing will be more focalised in building up predictive scenarios and be used in simulation strategies. The orientations that we have seen in the beginning of this chapter will be mixed and companies can have now a product, sales and marketing orientation all together in the some route of success, levelling the weights of each other according to competitive environment where they are competing.

We will assist to a knowledge revolution where only the organizations that adopt this way will survive, the number of companies will decrease and results will increase at the same time that customer satisfaction will reach its maximum level.

But to reach this “paradise” we still have a lot to do, we must introduce new analysis tools inside the actual GIS, we must educate new specialists in this field of knowledge and we must open the minds of managers to the potential of this new applications. It’s one of the first times in our history that we have the tools and the technology available waiting for the applications.

Conclusions

The competitive environment where organizations are involved as increase is competitiveness in last two decades, especially due to the development of the Information Technologies. Marketing was one of the tools that organizations have adopted to fight in this environment, trying to get more knowledge of their customers. In the last decade GIS has also increase presence in business fields, allowing better analysis of the sales evolutions, logistics, customer location and other business issues. Due to the very big amounts of data that companies were collecting its analysis has become difficult and Data Mining was the solution to analyse it in an intelligent way, allowing building up predictive models. We can say that most of the data that is inside organizations has an important parameter that is normally forgotten that is the geographical location; marketers have seen that and began to use the GIS tools to focalise better their Marketing actions. As a natural evolution of this last action, Data Mining as GIS have began to be integrated in one unique analysis of the organizations databases, enriching the customers knowledge. Location Based Services was the final step to the popularity of the Geographical Data Mining, allowing the maximization of results and the best performance in the optimisation of resources in the interactions between organizations and customers. With the increase of accuracy of Marketing actions and with the perfect knowledge of the customer, resulting from the correct Marketing mix adopted, are we really speaking about the some science? I believe that we are reaching a new Marketing science, more connected with scenarios simulation of customers and competitors reactions to variations of Marketing mix. It is just the beginning, but is the beginning of a new era in human history, the knowledge revolution, that we can be happy to live and participate in it, and is not restricted to business but can be applied to any field of knowledge were databases are involved.

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