GIS in Indian Retail Industry-A Strategic Tool

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Abstract

Geographic Information Systems (GIS) is increasingly becoming more important in the business world due to its applicability in various areas. In today's highly competitive retail environment, it is becoming ever more important for retailers to monitor their trade areas, assess the impact of competition, and choose new store locations strategically. GIS with its capability to manage, display, and analyze business information spatially, is emerging as a powerful location intelligence tool. The focus of this paper is on the use of GIS by retailers in their retail location decisions. Despite its numerous benefits, usage of GIS in retail in India is in nascent stage. There has been a slow diffusion of awareness and acceptance of its benefits. Therefore, in this paper attempt is made to outlines the benefits and difficulties to the effective use of GIS as a strategic tool in retail industry in India.

Keywords: GIS, Geographic information systems, Retail location, Strategic tool

1. Introduction

One of the most important constituent of effective decision making is relevant information. Management must recognize the value of information as a vital resource to the organization and, indeed, to some extent management has already become an information-processing function (Christopher et al., 1980). Hess et al. (2004) in their review of the potential of GIS as part of a marketing information system examined how the analytical and data integration strengths of GIS can be used in internal reports, marketing intelligence systems, marketing decision support analysis and marketing research, with the overall aim of further understanding customer behavior. In today's dynamic and highly competitive retail environment, the importance of pertinent information cannot be overemphasized.

Geographic information systems (GIS) constitute a powerful new technology that can address many of the information needs of decision makers. GIS are becoming more prevalent in both day-to-day and strategic decision-making by retailers (Nasirin, 2003). GIS is giving retail analysts the ability to quantify spatial attributes, and to add these into the analytical mix alongside more traditional measures such as sales area and turnover (Goodwyn, 1998). Today, Environmental System Research Institute (ESRI) has adapted GIS to show where projected growth can and can't occur. ESRI uses aerial photographs combined with GIS technology to map geographic features. Finally, retail real estate professionals have access to technology capable of modeling demographics into comparisons of sales potentials among different locations (Fickes, 2006). Geographic Information Systems (GIS) allows decision makers to leverage their spatial data more efficiently, by visually bringing together relationships between customers, suppliers, and competitors (Mennecke, 2007). GIS vary in terms of their scope and sophistication but GIS are a powerful technology in terms of data storage, analysis and visualization, with the ability to combine information and mapping systems as analytical and modeling tools (Goodchild, 1991). GIS can be applied to many aspects of business viz. facilities management, logistics, inventory control, target marketing, market analysis, and site location.

Today, retail has been one of the growth areas in the global economy. It has witnessed a high growth rate in the developed countries and is poised for an exponential growth, in the emerging economies. The Indian retail market is expected to grow to US$ 833 billion by 2013 and to $1.3 trillion by 2018, at a CAGR of 10 percent (A. T. Kearney Report, 2008). According to a survey produced by Euromonitor International (Aug 2007), Indian retailers are forcing their way into the Top 500 list of retailers in Asia Pacific. There is great confidence in India's potential to sustain a period of high growth. Retail location and real estate are one of foremost keys to the growth of organized retail in India. The value of location as a business measure is fast becoming an important consideration for organizations. Making better site location decisions for the retail sector is about staying ahead of the competition, entering a new market, or just familiarizing oneself with the advancements in methods and technology.

Though globally, GIS is emerging as a powerful location intelligence tool but retailers in India are still not using GIS much. Although, the usage of GIS-based technologies is currently nascent in India, it is picking up at a fast pace as more

and more users realize its benefits. In today's competitive markets, GIS-based applications can be of tremendous use in sectors like retail (Financial Express Report, 2004). In the US and Europe, retailers started using GIS in the late '90s. Robins (1993) revealed that early retail users of GIS have focused on marketing applications and on-site selection. Miracle Food Mart of Canada implemented a system to replace hand-drawn maps that were used to assess customer distribution and to look at market share on a store-by-store basis. Dayton Hudson's Target stores have used GIS as a strategic tool enabling it to determine which areas are not being properly served (Robins, 1993). Major national chains such as Best Buy used GIS technology to assist their advertising, merchandising, human resources, distribution and other departments. In the US, Starbucks, Blockbuster, Sears, and many other businesses used census data and GIS software to help them understand what types of people buy their products and services, and how to better market to these consumers (Madigan, 1997, Duffy, 1999, Taneja, 1999). McDonald's uses a GIS system to overlay demographic information on maps to help identify promising new store sites (Alan, 2004).

Despite its global use, there is little published work on GIS implementation as applied to retailing in India. As mention by SBL Geomatics (2008) GIS is not as popular in India as in the western countries, the term GIS and its applications has just started gaining importance in India. Therefore, this paper focuses on how retailers can use GIS in various decisions especially location, to gain competitive advantage. This is because retail location decisions are extremely capital-intensive and locations themselves, once chosen, are (in the short term at least) fixed. Due to current economic climate and increased competition, it is becoming ever more important for retailers to monitor their trade areas, assess the impact of competition, and choose new store locations strategically.

2. Understanding of GIS

A common definition of Geographical Information Systems (GIS) found in literature relates this technology with a tool that associates databases and digitalized maps. Geographic Information Systems is a computerized system that combines physical geography with cultural geography. Geography fundamentally influences and connects culture, business, society, and lifestyle. Geography answers many business and marketing queries. Therefore, the tools that leverage geography, such as GIS, are very useful for business and bring value to organization and improve their bottom line. A computer-based GIS provides an electronic process for managing, integrating, and analyzing massive amounts of geographic information by combining locational features with descriptive data in a relational database management system. According to Environmental System Research Institute (ESRI), A GIS is an organized collection of computer hardware, software, geographic data, and personnel designed to efficiently capture, store, update, manipulate, analyze, and display all forms of geographically referenced information.

Figure 1. Process of geographic information system

Roger Tomlinson, one of the pioneers of GIS defines it as a configuration of computer hardware and software specially designed for the acquisition, maintenance and use of cartographic data. Burrough (1985) sees a GIS as a powerful set of tools for collecting, storing and retrieving at will, transforming and displaying spatial data from the real world. A geographic information system (GIS) is an information system that is designed to work with data referenced by spatial or geographic coordinates. In other words, a GIS is both a database system with specific capabilities for spatially-reference data, as well as a set of operations for working with data (Star and Estes, 1990).

Thus, a complete GIS consists of at least five components: software, hardware, geographical data, people and the organization. If a system is implemented in a 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. It digitized mapping with key locational data to graphically depict trading-area characteristics such as population demographics, data on customer purchases, listings of current, proposed, and competitor locations.

GIS mapping has evolved out of a long tradition of map making. Earlier all spatial analysis were done by manual processing procedures but now with the development of GIS, efficient handling of voluminous data and effective spatial analysis is possible. GIS mapping have emerged as very powerful technology because it allows geographers to integrate their data and methods in ways that support traditional forms of geographical analysis, such as map overlay analysis as well as new types of analysis and modeling that are beyond the capability of manual methods.

3. Importance of GIS

GIS is an information integration vehicle with a tremendous range of uses. It becomes more powerful, and dramatically more cost effective, the more different types of information are available for integration. The main advantage of GIS, the possibility of integrating spatial and alphanumeric data, has made it widely applicable to a variety of fields (Trubint et al, 2006). Digital geographic information, once captured, can be used for many productive purposes. The key to effective GIS use is creating mechanisms to share that data. Recently, there has been a growing interest in the business community to use GIS to enhance decision making processes at both strategic and operational levels. According to Chris Garthwaite,

stores marketing manager for Woolworths, the GIS system "is a very effective tool in understanding our local market, enabling us to respond to opportunities within key areas. It has been especially useful in understanding and responding to competitors' activity" (Reed, 1996). Ginger (1999) mentioned retailers' use of the GIS technology for applications beyond mapping for store site selections. GIS also allows the retailer to track its competition in a region, as well as its customer base. Moloney (1992) emphasized that GIS allows retailers, and virtually any business organization, to go beyond data integration and map generation to explore relationships within a wide range of data. Smith and Webb (1997) demonstrated how the use of GIS can improve estimates of future retail space demand.

GIS mapping supports spatial decision making and strategic planning and it is a rapidly evolving area that continues to expand. Everybody wants information in useable formats and this has lead to continual increase in GIS as it is easier to use, more intuitive, more analytic and more embedded within a variety of technologies.

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. It can even be used for sales territory planning, meaning that a business will know how to deploy its sales staff so they don't overlap with each others' territories. GIS can also help optimize their "catchment" area. Understanding location is even more important when businesses go into new location.

To achieve a competitive edge, telecommunication companies such as Reliance Infocom Limited based in Mumbai, India, have embraced GIS as a technology that will enable them to survive, compete, and win market share. Reliance plans to leverage the data and applications developed as part of this GIS project in other their retail outlets too (ESRI news, 2002).

4. GIS – a Strategic Competitive tool for retailers

Advances in technology are rewriting the rules of the game in increasingly rapid cycles. ESRI considers that the future success of retail, real estate, and restaurants will be determined to a large degree by the competitive advantages of investing in and implementing smart technology. GIS is one of the smart technologies through which retailers can gain competitive advantage. In today's competitive marketplace geographical positioning of the retail business is a crucial issue with which the retailers must tackle with. All operating costs, except for lease rentals, are typically location neutral. Hence the retailer's profitability at a given location is directly dependent on the revenue potential vis a vis the occupancy cost. A poorly located store can impact dramatically on the retailers bottom-line (Sen, 2008). 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.

In today's fiercely competitive environment, retailers must use every advantage to acquire and retain customers, plan market expansion and contraction, locate profitable sites, stay abreast of changing consumer tastes, and act faster than the competition. Retail location analysis activity within the retail business deals with the collection, analysis and dissemination of spatially referenced information which is ideally handled by geographical information systems. GIS adds spatial intelligence, the one true source of sustainable competitive advantage, to retail organization. GIS can be applied to many aspects of retail business such as Demographic Analysis, Trade area analysis, competitive market analysis, site selection. Thus, GIS is a tool for managing business information of any kind according to where it's located. Retailers can keep track of where customers are, site businesses, target marketing campaigns, optimize sales territories, and model retail spending patterns. Fig 2 depicts integration of GIS with various retail decisions. A GIS gives retailers extra advantage to:

- Develop Intelligent-marketing strategies by combining census, street, and suburb information.

- Analyze target cities for roll-out, best suited locations for their formats.

- Investigate that whether the stores should be on the high street, in a shopping mall or part of an out-of town complex.

- Examining where exactly the high-income consumer group is located, which retail outlet has maximum customers traffic, which locality has maximum no of double income families

- Investigating whether retail outlets close to customer living places,

- Analyzing customer movement and whether customers moving from a particular location

- Change analysis by finding new trends created by changes in the city like new shopping malls, café strips or major roads.

- Analyze sales pattern and trends vis-à-vis geography and retail network

- Matching distribution network match with consumer location.

- Identification of a series of existing locations that resemble the proposed location.

- Compilation of maps and reports that highlight the crucial information about a potential site in a consistent and comparable manner, which shows changes in customer behavior through major censuses.

- Measure the impact of new store openings, relocations, remodels, closures, and competitive acquisitions.

- Analyzing competitors locations vis-à-vis yours and understanding the effects of competitive market moves.

- Gap analysis

- Links to CRMs

Figure 2. Integrating GIS with retail decisions

5. Reasons for slow adoption of GIS as tools in retail location planning

Trubent et al. (2006) mentioned that companies that have made large investments in GIS have achieved considerable cost savings. Robins (1993) indicated that due to decreasing costs and increasing PC power, more retailers are implementing geographic information systems (GIS). Despite numerous benefits of GIS, many retailers have been slow to investigate the possibilities of GISs (Simkin, 1985; Reynold, 1991). Goodchild (1991) mentioned that at a more immediate level GIS suffers from all of the problems of a rapidly expanding industry. It lacks a clear focus, a set of institutional structures around which it might be organized. Despite progress has been made, the lack of clear consensus on these issues remains a significant impediment to the use of GIS in market analysis. Clarke (1993) mentioned that there are a small but increasing number of individuals who feel that GISs are failing to deliver the much-promised business solutions about which there has been much publicity and even more hyperbole.

Clarke and Rowley (1995) emphasized that despite some significant success stories, there has been only a slow diffusion of awareness of the benefits and application of site evaluation techniques in general, and the application of geographical information systems (GISs) in particular. Consequently, the diffusion of the benefits and applications has been remarkably slow, with location planning still being, by and large, the preserve of the major grocery chains, joined more recently by DIY retailers, department and variety store operators, pubs, banks and building societies (Clarke and Rowley, 1995).

As discussed earlier, worldwide GIS is considered to be a powerful tool. Regardless of benefits which can be gained from investment in such systems retailers in India are still not using GIS to a great extent. This paper attempts to outline the barriers to the effective use of geographical information systems (GISs) as a strategic tool in retail organizations in India. Some of the apparent reasons are:

(1) Comparative balance between the costs and benefits of GISs- Reynold (1991) mentioned the various benefits of GIS in terms of productivity, speed, coordination, quality and continuity. GIS can act as both a valuable tool in initial location planning and also as a mechanism for monitoring and developing the marketing strategy of a specific store. The capabilities of most GIS allow data to be compared temporally as well as geographically, facilitating identification of trends and patterns. As a result, one would expect their widespread utilization as an input into both strategic and tactical decision making (O'Malley et al., 1997). It was disclosed by Andy Wood, managing director of Total DM, that GIS is rife among retailers. A survey of more than 100 UK retailers conducted at the 2003 GeoBusiness conference revealed that 33 percent of participants felt that their boards did not understand the impact of GIS. Only 28 percent fully understand its operational and marketing benefits (Michele,2004).

All managers are reluctant to incur the costs associated with the implementation of information systems, unless convinced of the benefits. Costs of implementing GISs, both in terms of initial capital investment for hardware and software and also in terms of its influence on organizational structures and approaches to management decision making can be high. Over and above the costs of the systems themselves, additional staff in technical and managerial roles to manage them is also required. Another significant element is the cost of datasets which can be generated either internally or externally.

(2) There is an increasing recognition that, for information systems to be effective in supporting decision making, it is necessary that the manager has a better understanding of the data and models used by the information systems and an input into the design of these information systems. Therefore, an effective spatial decision support system (SDSS) needs to be developed and used jointly by managers and specialist location planners.

(3) Geographical information systems can be developed successfully only with today's database management systems. Database management is described as linking topology data and attributes to geographical elements. In India, precise statistical data on population density may not be available. Data available from the census relate to territorial units of such size as is not adequate enough for locating retail service users.

(4) Location problems arising in practice are, often, not a representative of single theoretical models but of their combination. There are, of course, many other factors we have to take simultaneously into consideration.

(5) Last but not the least, encouraged by flexible rentals and relatively low real estate costs in India, many retailers does not employ sophisticated location research methods.

6. Conclusion

Retail location decisions are said to be the most fundamental decisions because it facilitates getting the merchandise to the ultimate consumer at the right place, at the right time, in the right quantities, and at the right price. In addition, location decisions are strategically important for the retailer because they help in developing sustainable competitive advantage over the competitors that cannot be copied at any cost. Given a bright growth picture of Indian retail sector, retailers need to use information technology more intelligently to manage their retail businesses. As mentioned in this paper, retailers in US and Europe widely use census data and GIS software to understand their customers, analyze their competitors, evaluate current market position, identify optimal expansion and for innumerable other benefits. It can be concluded that GIS helps retailers to make strategic business plans with an exclusive set of planning services which helps them to make decisions in various competitive retail business segments. GIS is by no means a system that will give a final solution to a user, but it will provide the possibilities for a better and more organized analysis of information, which is a prerequisite for making quality decisions. Thus, retailers can go beyond standard data analysis by using GIS tools to integrate, view, and analyze data using geography.

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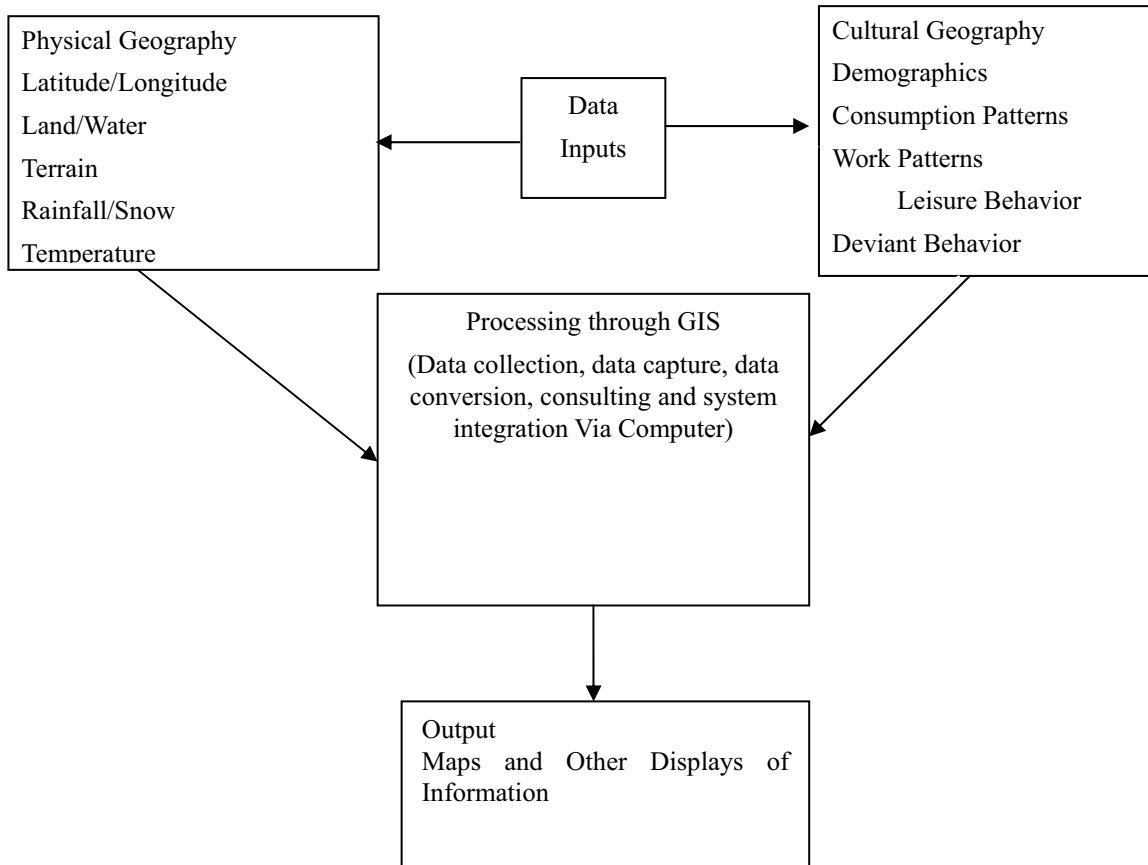
Physical Geography Latitude/Longitude Land/Water Terrain Rainfall/Snow Temperature	← Data Inputs →	Cultural Geography Demographics Consumption Patterns Work Patterns Leisure Behavior Deviant Behavior

Processing through GIS

(Data collection, data capture, data conversion, consulting and system integration Via Computer)

Output
Maps and Other Displays of Information

Figure 1. Process of geographic information system

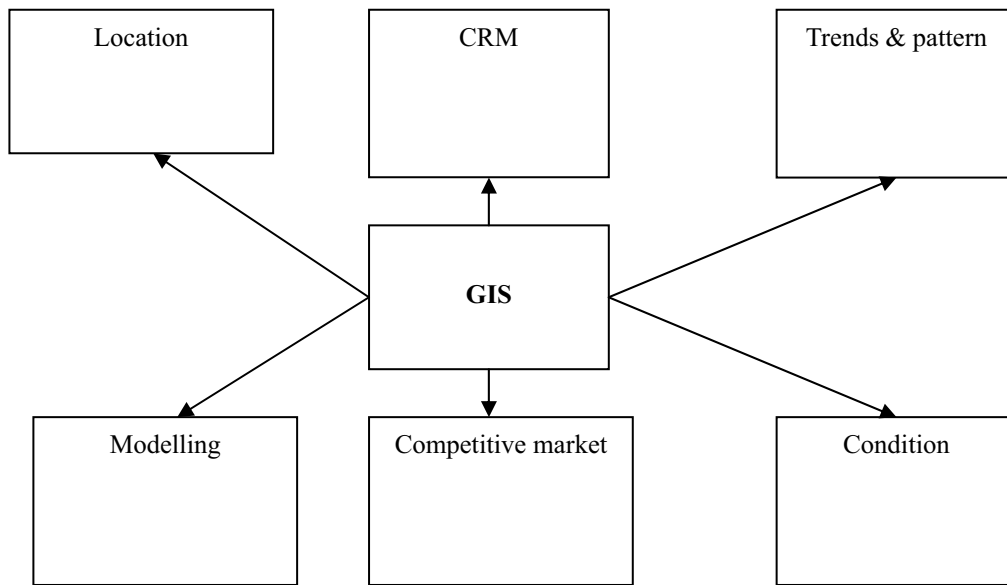| Location	CRM	Trends & pattern
GIS		
Modelling	Competitive market	Condition

Figure 2. Integrating GIS with retail decisions