

# Geographic Information System for Trade and Business Sector

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**Abstract:** Today's e-business along with modern technologies encourages business developments and enlargements. India with its inevitable presence in an evolving business, reporting and unveiling its gradual yet regular development progress throughout every day in the last two decades. This development in the trading and marketing sector is limited which can be seen from the swift proliferation of amount of shopping centres all over the states in India. However, in some places like Navi Mumbai, an independent planned city in Maharashtra, the usage of shopping centres is not promising as the purchasing behaviour of the consumers is shifting gradually to the phase of amenable interest to the offerings of the marketplace. This evolution of business expansion leads to the discovery of new technology with Geographical Information System (GIS). This paper focuses on the fundamental concepts of GIS technology in business. The primary motive of this study is to ignite awareness among the individuals and business communities and to discover the theoretical prospect of identifying competitive knowledge and bearable benefit unambiguously for marketing and trading professionals, administration officers, and academicians in the field of business management. Furthermore, this research article attempts to offer some simple solutions pertaining to the requirements of the business by identifying the limit of innovative technology such as GIS. It also suggests the method in which the GIS can be incorporated with traditional business methods using modern software tools precisely to adapt to the new business environment with expertise in managing the business resources and inventory, exploring location suitability, consumer reporting, discovering impending business prospective and the developing approach in the trade division.

**Index Terms:** GIS, Trade and Retail, Geographical Map, Spatial Information

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## I. Introduction

According to Mr Jack Dangermond, who is considered to be the father of Geographic Information System (GIS), it prolongs the thinking of trade professionals by conceptualizing their realm with simulations, maps and pictures based on which a structural context is constructed to make them clear about the expansion of their trades across geographical platforms.

In general, GIS is a specific class of information system that is ultimately deliberated to collect, store, operate, investigate, cope, explore and display various kinds of data collected over a wide geographical area. In a more naive form, GIS can be projected as the accumulation of digital information in the form of a map by performing the statistical evaluation on the data collected and stored in the database. Over the past two decades, the GIS professionals may eye-witnessed the evolution of the GIS technology from command-line based system to the batch system using various software tools and which is now utilizing the mobile device for its operation and also in the cloud environment.

GIS offers a structural context for the professionals to design the components in the system with higher efficiency and new designing competencies. The complete contextual framework of the GIS system is comprising of five major components such as hardware, software, techniques, data and people. These components are integrated in order to perform various operations such as collecting and managing data from different locations, exploring and evaluating the data as well as displaying the useful information obtained from the data in various forms concerning geographically mentioned data.

The visualization of data in GIS systems is impressive and intellectual as it permits the user to interpret, observe, infer, assess, cognize, deduce and envisage the information into various means of maps, graphs and charts, diagrams, reports to divulge the association, correlation, patterns or regularities that exist between the information collected across a geographical area.

Accordingly, GIS technology assists in finding the solutions to various issues that exist in the business by providing various options to analyse the spatial data effectively collected from a different location thereby

ensuring comprehensible output with appropriate visualization that can be shared among distributed systems which helps to make significant, feasible and applicable decisions.

GIS is still evolving day by day with new technologies and is convincing with its performance since the visualization of maps provides a better understanding of all types of users than words. Thus, spatial analytics support the user to cognize the current business in an extensive way covering the entire world and assists in making valuable verdicts that are still spreading through the use of cloud computing. GIS has become a communal framework by facilitating its service to various fields such as scientific research, strategic or operational management, and in various domains involving humans such as healthcare, archaeology, crime mapping, defence system, economic management, educational field as well as domains related to nature such as wildlife management, environmental study, ecological expansion and natural resource management and even more. The usage of GIS is beyond the scope of desktop systems.

In recent days, the shift in weather has become a major influence due to the excess global warming with which the GIS is the only medium that can assist the scientists and climatologists to overcome the effect for saving the earth.

The progressive nature of GIS helps in providing accurate results by adapting with various technology related to various fields in different means such as additional dimension, extra pervasive computer networks, exposed guidelines for data, improved topographical knowledge leading to combined environmental indulgent. GIS swiftness our confined thinking by congregating diverse fields to cohesive thinking. Thus, the article helps to understand the benefits of GIS technology, applications as well as implications.

### **GIS Technology - A preview**

GIS is transforming our earth to a new form by servicing the human to appreciate the true dimension of the planet with the study of geographic and environmental science. It initiates this process by introducing scientific geography which is a combination of computer system networks, mappings as well as place and space science to identify and visualize the relations, patterns that exist between the spatial data collected over various places. The primary revolutionary research directed to the establishment of an environment that provisions image conception, exhibiting, and information organization concerning image data.



**Image of Earth (source from satellite)**

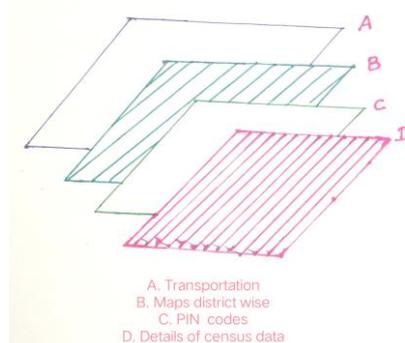
GIS systematizes terrestrial data and allows the user to identify the precise information across various locations through reading the map and collecting the required data pertaining to their underlying research work. Here the map contains the various contents that are arranged with a proper list and GIS permits the user to include additional information as a pile of layers to the fundamental map having the significant locations of the world. This can be agreed with the support of a simple example. Consider a trade analyst who can utilize the fundamental map pointing to the location of Mumbai, a city in Maharashtra, India to collect the dataset with which he can include additional layers stating age, educational background and employment status of the people in that location. GIS is considered to be a beneficial tool irrespective of the field specialization in extracting information related to the required knowledge due to the facility provided to accumulate different datasets in different fields in enormous ways.

The paper anticipates indicating untraditional methods for advancing the trade management in Indian marketing enterprises which were previously instigated in developed countries like the United States. To comprehend the contemporary business situation, commerce-related companies must obtain the factual existing data from their consumers regarding their interest in buying such as the preference towards the brand, type of product, capacity of purchasing, duration in which they purchase the product and so on from GIS system for improving their business by making strong decisions. Even the popular business corporations such as Digital

Globe, implement the infrastructure with appropriate hardware and software tools to obtain the data about their customers, which then process the data and visualize the results showing the veracity. Conspicuously, Google Earth, a computer program that renders the three-dimensional earth representation through satellite images, assists in stimulating business support.

The various accomplishments are to be completed over exhibiting procedures in an indicative way for capturing the spatial exemplification of the business features for managing the business resources and inventory, exploring location suitability, cannibalization, consumer reporting, discovering impending business prospective, managing space in the retail shops and the developing approach in the trade division and even more.

Thus, the novel framework or solution to be considered to accomplish the aforementioned actions is the computer-based information system termed Geographical Information Systems (GIS). It is previously employed in developed countries like the United States for business analytics and trade explorations which is impressively successful. A digital map has become the most prominent method for collecting spatial data, performing refined analysis and visualize the events which are then combined appropriately. This visual representation of information on a map is highly helpful in capturing real insight about the inclinations and behaviours of the business which are hard and challenging to divulge these details through formulated values and graph projection.



**Location and Business-GIS layers**

### GIS Solutions for Business

With the contemporary situation of globalization in financial deeds and the development of information system management, the organized data which a business possesses is a most promising resource of the company for upholding its place in the competitive business race. GIS comforts by terminating the obstacles that exist among the trades and businesses. The excellence and the prospect of data captured obviously stimulus the premeditated decision procedure and even creates a significant influence on the development of business to be held in future. Thus, the managers are responsible for using the dominant tools in various levels such as collecting data from various locations, processing appropriately, expressively displaying the reality and making proper decisions with the help of spatial exemplification and its features.

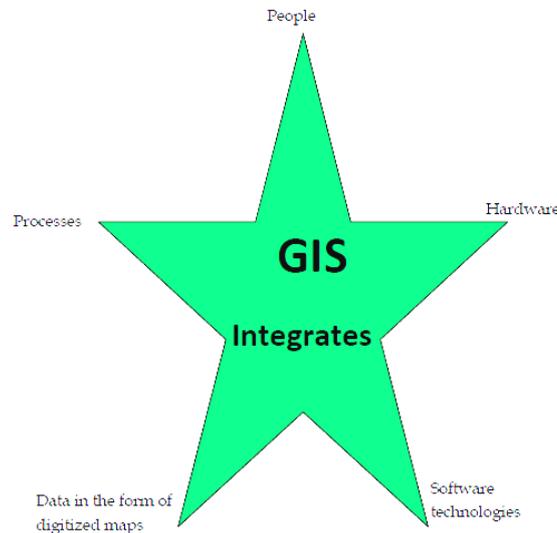
Thus, with the considerable knowledge obtained from the analysis, the paper wishes to pull the attention of the users towards the effect of using GIS for offering technical solutions in resolving or overcoming business-related issues. With the help of these dominant tools, consumer scan accomplish comprehensive and multifaceted business analytics based on the economic dataset collected across geographic locations. It clearly highlights that with the use of any intricate applications for business analysis along with GIS technology, a new height in business growth can be accomplished in real-time through the hints from geographical data of the market.

Contemporary studies specify that among the total data analysed by the business analysts in a wide range including private and public sector, more than 80% has the data connected to the location or geographical factor. The spatial data plays a vital role in retail trade as the business owners first always think about customers' location and on the other hand, the consumers always initially search for the nearest retail store. Thus, the GIS technology tools always provide the solution for both customers and business owners through a compact map along with a piece of spatial information that is updated regularly from time to time and comforts with existent results for discriminating trade as well individual demands.

To help the people with direct access, a GIS application along with the national database was implemented in the United States. Perceptibly, the required constraint in utilizing these dominant tools is to perform analyses and assess the data from these sources. These tools along with the spatial based data sets highly influence the identifying the schemes for business development and in accomplishing the business intentions.

### Application of GIS in Trading with Business Intelligence

GIS is becoming more quantifiable and analytical technology since it is varying promptly and progressing itself with due fields such as computing methodologies, scientific research, reckonable technologies, fresh heights in data capacities, cloud platform and distributed networks as well as statistical and data analytics. GIS is not only evolving with the increase in the size of the real-time datasets but also with increased dimensions but often with its own merits such as easy to implement, simple to use, higher usability with better management of data as well as adaptability towards mobile devices.



Environmental Scientific Research Institute (ESRI) is an international provider of GIS software as well as geodatabase applications, with its headquarters in California, offers GIS software through powerful technologies such as ArcGIS, ArcView, ArcInfo that mainly focuses on the modules pertaining to trade analysis. As a prominent location intelligence platform supplier, ESRI established a new version of customized GIS with the amendment of the separate component called Business Analyst that is specifically designed for performing business analytics. To utilize the tool properly, in the United States, the amended component is often implemented with a database containing business and domestic data along with demographic information. Thus, viewing the data with all the information on a map often creates a strong insight that helps in making appropriate decisions. Additionally, the queries associated with the consumer are also processed and analysed using the ArcInfo software platform which helps to appreciate the users' behaviours.

These software tools are being utilized effectively in many developed countries as a part of studies related to the economy that mainly focuses on customer profiling, multifarious promoting exploration and tactical dissection. This often assists in identifying new market trends, and analysing existing business patterns, and studying the summaries of the customers. Additionally, it creates a simple way of identifying targets in trades, analysing various locations related to the market, performing site analysis and identifying new suitable locations and so on. Thus, GIS is obviously utilized in all the fields related to the economy in which new modern management strategies can extremely make use of these geographically related modules.

### GIS Support towards Trades Management

Applications of GIS have widely spread towards all trade events. The main reason for its rapid evolution is that it does not provide information upon viewing data, instead, it performs various analyses to provide clarification to its users.

Thus, GIS is considered to be suitable for various levels of the business including lower operational level for processing transactions, middle tactical level for managing information and higher strategic levels for making decisions. Here, retail is a simple form of business that aims at selling products in small quantities. Practically, retails are the primary trade that gets complete assistance from GIS technology. It completely focuses on mapping the trading with the outcome of sales by performing various computational and systematic procedures. This helps in identifying the trade areas and suitable locations for trading quickly and also in reviewing the opponents and predicting future patterns and trends in business trades. Various simulations are established to work in line with the GIS system in order to assist the trading through instituting the two main modules responsible for creating an association between mandate and supply, customers and dealers.

Undoubtedly, these modules can be easily incorporated with the appropriate geographical locations into the map display which will be very simple and easy to explore the trade using the GIS system.

Essentially, huge administrations distribute substantial possessions for various tools such as trade-fair which are dedicated to identifying the customer's behaviours based on their summary. However, it is very evident that only the personal details about the customers such as age, sex, occupation, income may not help in expanding the business or elevating the current business outcome. Apart from demographic information about the customers, the location data is also vital to assist in determining the suitable site for expansion as well as to improve location-based trading. Thus, identifying the clients' geographic along with the processed information will create a huge knowledge in improving trades.

The commercial business and trades should control and utilize this huge interrelated information for its improvements. The data to be collected can include a terrestrial location, a place where the customer lives, a precise location covered by the service, a deal zone, a transportation path and so on which can be viewed on the map. Also, the increase in the profits can be made by analysing the location intelligence tools that help in identifying the finest location, describing the purchaser's details, the trade-fair along the delivery of facilities through prime locations.

In order to provide appropriate link components with the various layers of information, much finest information such as an address, a zip code, geographic positions on the earth in the form of coordinates as (x,y) in which x specifies the latitude direction and y represents the longitude direction.

GIS incorporates an ability to integrate bulk datasets containing interesting material which are then analysed effectively and the results can be displayed on the map. All the trade and commerce companies that involve location-based information can be projected on the map which is then allowed to access by different professionals at various levels of business. More specifically, high-level strategic professionals can take the advantage of GIS which are appropriate for making critical decisions in expanding the market or identifying the trade in which they are to be entered and sort of entity to be promoted and so on.

In the research related to business management, GIS technology assists in identifying the customers and their interests, collecting their details in the form of a profile, identifying the opponents along with their strengths and weakness, determining their strengths for expanding their business, and knowing the ways for advertising events to influence their consumers and so on.

### **GIS Support for Retailers**

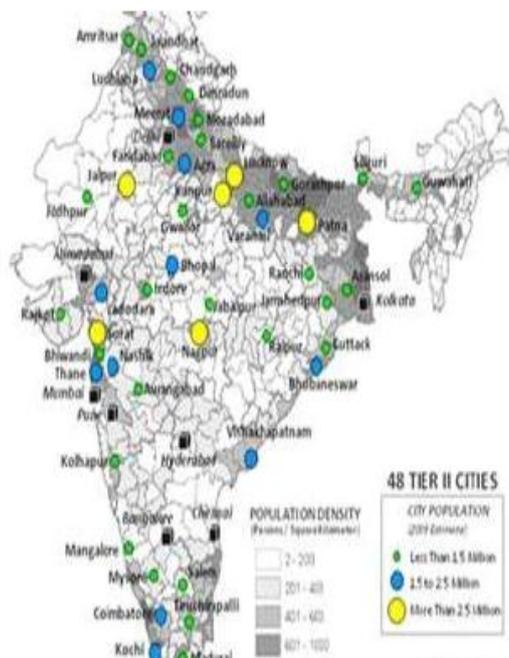
GIS technology with its potential tools allows the business and trade to drive above an ordinary data analysis through various events such as data assimilation, visualizing and performing various operations on the data based on location information which can be utilized in the entire retail industry consisting of many departments. Most business analysts utilize one or more of the GIS software such as ArcGIS, ArcView, ArcInfo and so on.

Most of the processes in marketing and trading related business such as trade exploration, location identification, retailing, sales and dissemination, distribution of sales, and others makes use of location-based associations. GIS facilitates the dealers to recognize as well as to view these locations based associations for increasing the sales and to acquire effective profits.

Extrapolative inquiries including trade analytics and customer exploration in a business can be improved with the use of GIS technology. Various types of data related to real-time events can be used utilized for understanding various factors related to the business including personal information of customers, details about the opponents, a collaboration between the dealers and customers, and other data distributed in different locations. The final results of GIS let the organizations know its potentials and perform investment analysis as well as be aware of the shifting trends in the business.

Though GIS is apparently employed in diverse trade activities in various industries, only fewer business firms including Reliance Industries Ltd deliberates the use of GIS technology. With the increase in the usage and awareness of GIS, many companies understand the possibility of using GIS in information management. Utilizing location-based intellectual systems in business creates a huge impact on the economy.

The support of GIS toward traders and merchants commences with determining the appropriate location based on various investigations, analysing the market potentials, entering into the business trades, identifying customers and their behaviours, predicting the business trends and customer interests and assimilating the offline stores with the online business.



Contemporary inclinations create an impression and gather attention from the industries to emphasise solutions pertaining to sales by implementing applications that combine various factors of information including customers' personal information, economical as well location information from a wide range of datasets. The reports originated through the datasets assist the professionals to analyse their customers purchasing behaviours and strategies to be developed for the improvement of the business. However, with GIS technology, all the output and valuable results are displayed on the maps which can be viewed by the experts. It also allows the practical stimulation to validate the efficiency of application in utilizing supply chain management, customer management, trade sector separation, resource management and other trade activities for enhanced sales management.

Many of the retail industries like supermarkets can make the database available to the public with the help of GIS technology. This allows the experts to understand the location of clients, purchasing trends on daily basis and the mean time taken for purchasing. This helps to choose the appropriate marketing strategies, as well as advertising events to impress and expand the customer circle. The recent technological developments help to identify the useful knowledge related to their customers from the enormous volume of data. Conversely, it also has numerous obstacles to makes the collection of information about the customers challenging with unrelated datasets, data fields with different formats, and more.

Infinite retail industries and trades, the difficulty of one retail shop or store will be the prospect for another retails store. In order to find the solution for these difficulties, personalized marketing applications can be implemented using ArcView. In general, the desktop GIS is responsible for various ways in assimilating registered datasets and permitting the trade experts or individuals to investigate the existing trade patterns even without any familiarity with GIS. The GIS transforms the given raw data into information that is valuable for its users. However, the results can be achieved by executing a variety of processing on the set of datasets stored in various departments such as retailer details, sales detail, and from public datasets such as government as well as registered datasets in the field of study.

India initiated the usage of the GIS system at the end of the 1990s for accomplishing modest investigation, however, the expertise developed for assimilation of datasets was not indeed made viable by the administration.

With the wide knowledge of the GIS system, the individual retailers must understand the benefits of utilizing geographic-based information for their business improvement by making some appropriate decisions with reduced cost by incorporating the complete potential of the system for financial benefits.

The administration assistances from the Indian government such as National Remote sensing Agency (NRSA) and other state-owned hubs allows viewing the results of GIS as map images.

The demographic data about the retail and trade events can be acquired from National Informatics Centre (NIC) specifically for performing statistical exploration on the data in offering resolutions to various business issues.

## II. Conclusions

The growth and development of the GIS system is a foremost breakthrough in the retail and trading industries. Owing to its advantages, GIS has extensively acknowledged the United States as well as in India. More specifically, Reliance Industries Limited, a conglomerate company has majorly profited through the database in the arrangement of digitized maps for the whole nation which are then used in a variety of businesses for identifying the optimized routes, and pipeline management for digital communication. The advantages of using spatial information through GIS will be purely useful for many trades and retail industries. With the increase in technological development, the competition is also increasing day by day. Thus any business organization can make use of the advantages offered by the GIS technology which can be extended completely in future as in the United States by creating a nationwide database with commercial access. Therefore, GIS systems can provide substantial developments in increasing the sales, decreasing the expenses as well as wastes through proper planning and guaranteeing appropriate decisions.

GIS as a software tool or information system is essentially powerful, however, there indeed exists some breach between the resource availability and interpretation of resources identification. However, it is mainly due to the lack of experience and familiarity in operating the data. Furthermore, the users or the scholars usually may not have the same level of expertise in operating computers and many of them only depend on academic experience. Thus, apart from software expertise, considerable knowledge about the technology is essential for employing GIS as its usage varies from one condition to another based on the requirements and business site.

### Future Scope of Research in GIS

GIS is becoming a more quantifiable technology since it is varying promptly and progressing itself with its due fields such as computing methodologies, scientific research, reckonable technologies, fresh heights in data capacities, cloud platform and distributed networks as well as statistical and data analytics.

The GIS technology is broadly acknowledged and successful in western countries like the United States, and thus evolving as indispensable all over the world. Currently, India is rapidly adapting the notion of GIS and its technology. More precisely, the company such as Reliance is completely taking the benefit of GIS for its trade enlargements and to cope up with consumer fulfilment. Thus, with this initiative, many industries and business organizations in India accept the use of GIS tools in their business. With the realization and involvement, it is now included in the GDP of the organization as well as the country. However, the gap exists in the need and the training due to the lack of knowledge related to geographical location, technological expertise. Thus, future investigation in the field of study is related to the training in location-based knowledge and system tools necessary for trade enlargements and consumer gratifications with GIS systems.

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