GIS Redefined for Tourism

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Geographical Information System (GIS) Redefined for Tourism

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Tourism is a one of the large income earner in the state of Kerala. Kerala is one of the favorable destinations for both the Indians and the foreigners. God's own country an illustrative book on Kerala by Vakkom Purshothaman describes the monsoon season is visually appealing journey as " When Heavens Touch the Earth". Kerala is an eternally fascinating land, its beaches, lagoons, forests, and the many hued green of the countryside with its emerald paddy fields and banana groves and coconut trees. In Kerala, the revenue generated by tourism is assessed as 6.29% of the GDP and the employment in tourism is estimated as 7 lakhs. Total investments worth over Rs.500 Cr. has come into Kerala on account of the State's prioritizing the creation of basic infrastructure to support tourism, and adopting a policy that is eco-friendly and environmentally sustainable says Kerala's Tourism Minister in 2003. It is evident from this that tourism has to adopt modern practices to sustain in the international market within the eco-friendly and environmentally sustainable framework. For an example, in 2002, the first year of peace in Sri Lanka, tourist arrivals increased by nearly 17%. This has also affected the tourism industry in Kerala. To cope up with such competition tourism industry has to adopt state of art technology. The importance of information technology is increasing in all the sectors. Tourism, one of the larger income-generating sectors should also take advantage of the modern technology. The technology is now freely available and easily accessible. This paper addresses the importance of IT with specific reference to Geographical Information System (GIS) in Tourism and the strategies of implementing such systems.

"If Kashmir is all about men and mountains", "then Kerala is all about women and nature"
– M.F.Hussain.

In India the foreign exchange earnings from tourism during the year 2000 were estimated at about Rs. 14,408 crores with an estimated direct employment of about 15 million, which is about 2.4% of the total labour force of the country. Tourism is the third largest foreign exchange earner for India. The International tourist traffic in the country is estimated to be 2.64 million during the year 2000. However, according to the World Tourism Organisation (WTO), India's share in world tourism arrivals is only 0.38%, accounting for 0.62% of the world tourist receipts. This indicates that much of the tourist potential is yet to be tapped. Tourism has emerged as an industry next in importance only to Information Technology industry in the Services sector. By 2005, the contribution of Tourism to the world economy will be doubled. The economic liberalisation in India and consequent foreign investment opportunities, development of tourist facilities including expansion in airline services, etc. provide an impetus for a spurt in tourist arrivals as in South Asian regions. Its contribution to generation of employment is very high. With the increase in income levels and emergence of a powerful middle class, the potential for domestic tourism has grown substantially during the last few years. It is evident that tourism has to adopt modern practices to sustain in the international market within the eco-friendly and environmentally sustainable framework.

1.1 Kerala

Kerala is one place in the riveting diversity of India where there is tangible beauty and a phenomenal thing like total literacy. It is one of the southern States of India with beautiful landscape and interesting customs. Kerala is spread from Kasargode in the north to Thiruvananthapuram in the south. Kerala is full of interesting places that attract tourists and travelers from all over the world. Located

between north latitudes 8 degree 18' and 12 degree 48' and east longitudes 74 degree 52' and 72 degree 22', this land of eternal beauty encompasses 1.18 per cent of the country. The Western Ghats, bordering the eastern boundary of the State, form an almost continuous mountain wall, except near Palakkad where there is a natural mountain pass known as the Palakkad Gap. The average elevation of the Ghats is about 1500 meters above sea level, occasionally soaring to peaks of 2000 to 2500 m. From the Ghats, the land slopes to west on to the plains, into an unbroken coastline. The nature of the terrain and its physical features, divides an east west cross section of the state into three district regions - hills and valleys, midland plains and coastal region.

In Kerala, the revenue generated by tourism is assessed as 6.29% of the GDP and the employment in tourism is estimated as 7 lakhs. Total investments worth over Rs.500 Cr. has come into Kerala on account of the State's prioritizing the creation of basic infrastructure to support tourism, and adopting a policy that is eco-friendly and environmentally sustainable says Kerala's Tourism Minister in 2003.

Kerala wins best state award for Tourism -2004
Kerala has won the best state award for tourism instituted by Government of India. It won seven of this year's awards. It received the best eco friendly project award for the Thenmala project, the best wildlife sanctuary award for Periyar wildlife sanctuary, for innovative use of IT in tourism.

1.2 Background

There are various applications of Information Technology (IT) in Tourism. IT is used in tourism for online transactions, networking the services, and Geographical Information Systems (GIS) applications. Now travel industry's services are widely available in the Internet, and there are Developments in travel-related services in the Internet (Markku, 2002). There are also context-aware tourist guides, designed to meet the particular needs of cultural tourists. This is called Accessing Cultural Tourist Information (Michael and Gregory, 2002). Further, the electronic pricing strategies through the online applications of IT regulate the rates in the major international hotel companies (Peter, 2002). GIS is used to browse tourist information using GIS Technology displaying interactive maps with information associated to the elements present in such maps (Miguel et al, 2003, and Giles) and the advantages it has to offer in a developing country (Dondo et al, 2002). Location Based Services (LBS) in the Tourist Industry is another application, which uses the mobile technology that utilizes the information about the location of their user (Stefan, Hans and Franz, 2003). There are four primary functions of LBS for the traveler. They are (a) localization of persons, objects and places, (b) routing between them, (c) search for objects in proximity such as restaurants, shops, hotels, or sights, (d) and information about traveling conditions, such as traffic related data. There are also systems, which are enabling the user to identify their own destination and to personalize the travel using travel planners using IT (Werthner and Ricci, 2002). There are online Airfare Reservation Services (Law and Leung, 2002), and other tools for travelers translating the services to overcome language barriers and so on using Personal Digital Assistants (PDA), laptops, cell phone, web TV etc. (Sushil et al. 2003).

1.3 Studies

There are studies, which are emphasizing some of the features an information system for tourism should contain. Werthner and Ricci (2002) on case base querying for travel planning recommendation described a system that enables the user to identify his own destination and to personalize the travel by aggregating elementary items. Case-Based Reasoning techniques enable the user to browse a repository of past travels and make possible the ranking of the elementary items included in a recommendation when these are selected from a catalogue. Sushil et al (2003) suggested a system to overcome language barriers with flexible services architecture. The system does translation on any operating system and on any hardware including PDAs, laptops, cell phone and web TV. Law and Leung (2002) suggested e-travel business framework based on A Study of Asian Based and North American Based Travel Web Sites on Online Airfare Reservation Services. They found that the North American based web sites outperform their Asian counterparts significantly in many selected variables. Nysveen, Leif and Pedersen (2003) study found that tourism businesses should provide more value-added services on their web sites in order to fill the gap between customers' preferences for such services and the companies' actual offerings.

From the above, it is clear that IT has a major role in Tourism. Many countries are implementing technologies like GIS, Online Pricing, electronic tourist guides etc.

It is also important to use GIS applications in Tourism. GIS has various features and all of them to be utilized to the fullest potential. There are not many GIS applications in tourism in India. There are only applications of IT and GIS in any of the elements of tourism industry i.e. either on Travel industry or on Hospitality industry. But there is no implementation integrating all the elements.

Efforts have been taken for implementation of IT in Tourism in Kerala. For example www.keralatourism.org implements a GIS map for Kerala, which gives the driving distances between various destinations in Kerala (Refer Fig.1).
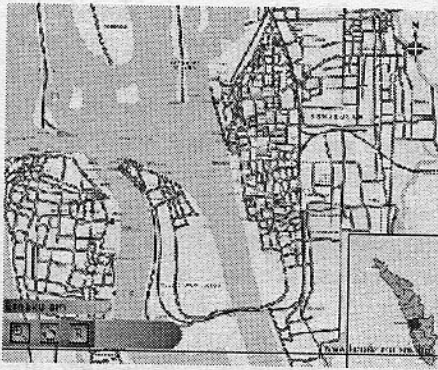
Fig. 1 GIS map of Ernakulam District
Source: http://www.keralatourism.org
www.cottageemporiumindia.com provides online purchase of many cottage industry products like paintings, jewelry, lamps, candles etc. They also provide services such as interior decoration, customer club etc.

From the above it is clear that IT is not utilized it's full potential in the Tourism Sector. The present implementations have to include the integration of all sectors of Tourism industry. The present endeavor is an attempt to integrate the elements of tourism and suggest a system to eliminate the shortcomings of existing systems.

2. Tourism and its Elements

Tourism is defined as a "travel and stay of a non-resident". This definition suggests that the tourists are most of the times alien to the tourist destinations. This gives a clue that even though a tourist is physically located in a destination he is mentally far off. This gives a lot of scope for GIS. GIS handles this issue by taking a tourist around the places on a website along with the spatial dimension. Tourists are the main targets of tourism industry. Like any industry it is very important to target the customers first. The tourists are the customers in the tourism industry who brings foreign exchange to any economy. For an example, Nepal a country located in South Asia is depending on tourism for 75% of its GDP. This explains the importance of the contributions of tourism in an economy. Even in the developed economies namely, Switzerland, Singapore and Hawaii Islands and Los

Vegas in USA the tourists contributes significantly to their economy. In the above instances the tourism strategies were always focusing the needs of the tourists. Nysveen et al (2003) suggest tourism businesses should provide more value-added services on their web sites in order to fill the gap between customers` preferences for such services and the companies` actual offerings. This paper suggests an integrated tourism information system should be focusing on the tourists by integrating various service providers and the authorities. It also aims at providing services, which makes the visit comfortable without much of strain to the tourists.

Tourism has three major elements. They are, service providers, agencies of tourism and the Tourists.

2.1 Service Providers

Service providers include Hotel Industry, Travel Industry, Artisans and Cottage Industry. The common functions of all the service providers are advertisements, promotional activities, managing advance reservations, tariff details; details of services provided, value added services, announcing seasonal benefits, informing the tourists about important festivals and events and so on. The service providers like to advertise their services only to the potential customers rather than to all the tourists. This allows them to focus only to the appropriate segment. This further reduces the cost of advertising. This helps them to get good response from the Tourists. Other function of the service provider is managing the advance reservation. This is the main activity, which generates revenue for the service providers. This is the process which is generated by the rigorous advertisement and marketing efforts. In addition to the above, they also provide value added services to the Tourists.

2.1.1 Hotel Industry

Hotel industry is considered as the most important element of Tourism. A tourist will be concerned about the place of stay at his favorite destination. The tourists look for easy access to the accommodation service

providers. Tourist requires access information about the kind of hotels at the destination, their ranges of product, the price and other relevant information without leaving his/her office or home. He prefers the information to be obtained aided by still or moving pictures in order to give an exact feature of an accommodation, facilities and services of ones choice. At a destination also he will be comfortable if he gets the information about their business, family or other information back home.

The hotel industrialists are more interested in showing ads and promotional videos and pictures to potential customers. They also want a website for their hotel in which they can project their hotel and provide features such as advance reservation system, room availability list, tariff, food availability details, information about value added services provided, seasonal discounts, package tours etc.

2.1.2 Travel Industry

Travel Industry provides the essential link between tourism origin and destination areas and facilitates the movement of holiday makers, business travelers, people visiting friends and relatives and those undertaking educational and health tourism. Typically travel industry has a number of functions. They include advance reservation, rent details, modes of travel,

distances between places, time for travel, seasonal discounts, package tours, festivals and events and so on. For example, Thrissur Pooram being an important festival in Kerala the travel agents attracts more tourists during this period by providing information regarding the festival to the tourist. The agents offer discounted rates and attractive package tours, customized for the particular event.

Before setting out on a journey of any kind, every traveler makes sure which travel company has a good safety record. To this effect, airplanes coaches and even taxis are equipped with good communication equipment. An Airplane flies with the help of modern information technology equipment, which provides information ranging from weather, altitude and other information to the pilot to communication made during emergency by the pilot with other airplanes and air traffic control stations. In-flight entertainment, video games, video films are some of the other features tourists look for.

Travel industry provides the features and facilities described above. For providing such facilities they require to tie-up or associate with hotels and tourism portals to advertise their services.

2.1.3 Handicrafts
The other service provider in the tourism is Handicrafts industry or the

heritage products. They are generally traditional industry depicting the local culture and practices. They are generally made of the available raw materials. The artisans run their business either at their home or in the outlets of organized market places. In India most of the artisans are still in unorganized sector. Some NGOs are trying to formalize them. They help in preserving and promoting traditional culture and national heritage. It is estimated that about 50 million people are employed in such industries in India (Hrishabh, 2001). Tourists are the main targets of the artisans. They earn their livelihood from selling the products to tourists. Their major activities include producing the handicrafts, selling in the stores, advertising the stalls, participating in the tourism events, tie up with other service providers.

2.2 Agencies of Tourism
Second element of Tourism is the agencies of tourism. Following are the major agencies involved in the development of tourism in the state.

Department of Tourism acts as the coordinator and facilitator between various agencies involved in activities like planning, publicity and promotion,

infrastructure development, destination development, human resources development, investment promotion and enacting legislative measures. Kerala Tourism Development Corporation (KTDC) is activity participating in building up and running basic infrastructure needed such as star hotels, budget hotels, motel Araams, Yatri Niwases, restaurants and beer parlors, central reservation systems and conducted tours. Tourist Resorts (Kerala) Ltd., a subsidiary company of KTDC, is engaged in implementing the projects such as investment in joint venture companies, land bank projects etc. District Tourism Promo-

tion Council with District Collector as Chairman and selected peoples representatives and officials as members, coordinate the development of less known tourist centres within the districts. Kerala Institute of Travel and Tourism Studies (KITTS) and Kerala Institute of Hospitality Management Studies (KIHMS) institutes are playing a pioneering role in providing necessary manpower training in the field of tourism.

2.3 Tourists
The third elements of tourism are the tourists themselves. There are two types of tourists. They are Native and Foreign. The tourists are unaware of the geography of the places that they are visiting. Some tourist have language barrier. Most of them who face this problem are the foreign tourists. Generally tourists look for information on various service providers, the events and festivals, attractions in a destination, the regulations that are applicable, and so on.

3. The framework
Based on the findings of the studies mentioned above there are technical issues, which needs to be addressed by the future systems. The system also should integrate the elements of tourism namely service providers, regulatory authorities and tourists. The framework proposed is an integrated one with the available resources in addition to the GIS implementation.

4. Integrated Tourism Information System (ITIS)
ITIS model is designed to facilitate most of the functions of all the elements of tourism discussed above. Three systems connected to tourism are discussed below. They are systems for service providers, authorities and the integrated system.

4.1 Service Provider's System
The service providers in Tourism include the hotel industry, travel industry and the handicraft industry. In spite of all the service providers follow the same framework, they are independent. Each of the above is discussed in detail below.

4.1.1 Hotel Industry Module:

This module of the integrated tourism information system has the following features.

1. Advertisement
2. Tariff details
3. Room services
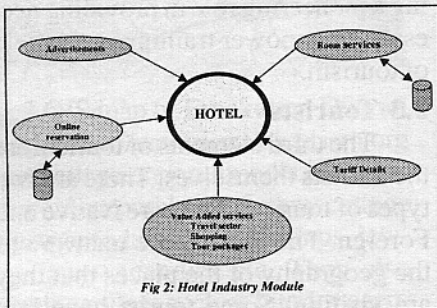4. Online reservation
5. Value added services

Fig 2: Hotel Industry Module

While features 1 and 2 are static pages, 3 and 4 are dynamic pages linked to database (Refer Fig.2). Advertisement feature helps the advertisement function of the hotel industry. It helps in marketing and promotion for hotel industry. It is suggested that this should contain pictures and videos of the place of accommodation, rooms etc. Tariff feature includes the room rents and other related tariffs updated from time to time. This also takes into consideration of the seasonal factors. Room service is a dynamic feature, which helps the hotel to communicate the availability of the rooms. This directly communicates with the reservation records and updates the availability. Online reservation is another dynamic feature, which does the reservation online. This feature provides a reservation form, which includes the personal details, duration of stay, mode of payment etc. Once a registration form is accepted it automatically makes entries in the database. In case the payment is not made within seven days from the date of reservation, it stands cancelled. Value added services include tie up with travel sector, package tours, foreign exchange rates etc.

4.1.2 Travel Industry Module

This module of the integrated travel information system has the following features.

1. Advertisement
2. Tariff details
3. Online reservation
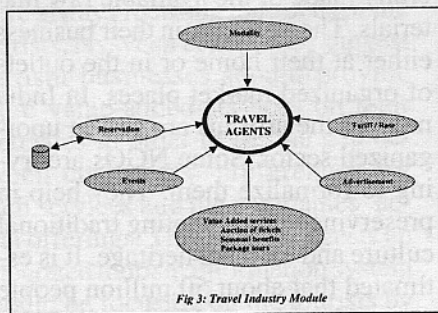4. Value added services

Fig 3: Travel Industry Module

While features 1 and 2 are static pages and 3 is a dynamic page linked to database (Refer Fig.3). As mentioned above the advertisement feature helps the advertisement function of the travel industry. Tariff feature includes the details about the ticket fares, taxi services and other related tariffs updated from time to time. Online reservation is a dynamic feature, which does the reservation online. This works similar to the one previously explained. The value added services include auction of tickets at lower prices, seasonal benefits for online users, package tours, tie up with hotels etc.

4.1.3 Handicraft Industry Module

This module of the handicraft has the following features.

1. Advertisement
2. List of items with price details
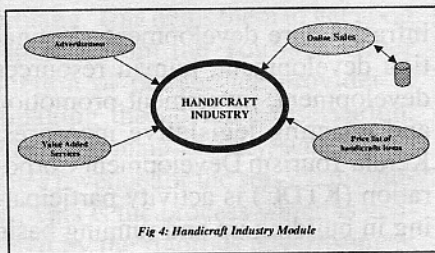3. Online sales
4. Value added services

Fig 4: Handicraft Industry Module

While features 1, 2 and 3 are static pages and 4 is a dynamic page linked to database (Refer Fig.4). As mentioned above the advertisement feature helps the advertising the products. List of handicraft items with price details feature includes the details about the details of the products and its price updated from time to time.

Online sales is a dynamic feature, which sells the handicrafts online which facilitates either online payment or payment through demand drafts. The value added services include auction of tickets at lower prices, seasonal benefits for online users, package tours, tie up with hotels etc.

4.2 Govt. and Regulating Authorities

There cannot be any external system allowed within the regulatory bodies. Hence a link for the appropriate authorities will be provided in a page.

4.3 Integrated Tourism Information System (ITIS)

All the above systems are integrated and provided as an interface to the tourists. Like the above two elements of tourism, the tourists also will have their own functions. ITIS will have some additional features such as tour planner/scheduler, email, financial module and so on. As this model focuses on the customers, the ITIS is the interface used by the tourists (Refer Fig.5).
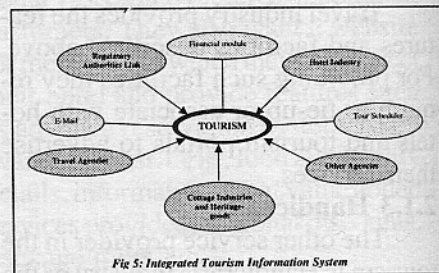

Fig 5: Integrated Tourism Information System

The tourist will be provided a customizable desktop. The tourists customize their desktops to have variety of features as per their interests. This includes the latest development in the places of interests, filtered list of the kind of places one would like to visit etc. There is a provision for setting alerts for major festivals or events in the places of their interest. Other features of the portal will be a tour scheduler, calendar, finance module etc. The tourists will be provided with an interface in which they actually get a geographic view of India as a whole. Using GIS technology one can select the place of interest, by clicking on the map. Then they will get a map with the details on features and attractions

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of the place. Tourist destinations near to the chosen place, distance between places etc. will be made available. When the tourists clicks on the road linking two places they will get details on duration of travel, modes of travel and so on. Links to the pages containing the festivals and events of the place and their schedule will be provided.

Tourists after finalizing their destination will be given an option for booking his travel and accommodation. This feature will communicate to the travel and hotel modules of the ITIS. The other feature of the ITIS is providing links to government and tourism authorities. In case there is a migration related issue ITIS automatically forwards the request to the external affairs ministry. When a tourist selects a destination where a special permission is required, the ITIS provides downloadable forms issued by the authority.

3.3.1 Revenue Model

The revenue model suggested for the ITIS is from charging fee for registering in the site, advertising in the site and charging the service providers for facilitating their services.

5. GIS Implementation

The ITIS implementation explains the process of implementing GIS in tourism. To prepare a GIS map for tourism, a survey to be conducted on the facilities available, the importance of the destinations, any regulatory procedures applicable and so on. This data will be incorporated in the two dimensional map. Further the time and linking to the dynamic databases of respective service providers will enable other data on handicrafts, accommodation and travel. This will give two more dimensions to the map. Here the user interface of ITIS with GIS is ready to access.

As mentioned in the above paragraphs, the GIS is applied in tourism for the effective utilization of the modern technology in tourism. Like any technology, GIS also has its advantages and disadvantages. As mentioned above, GIS is a multidimensional source for any user with dynamic applications. This implementation may be tried with further more advanced technologies such as WAP, GPS, mobile applications and so on.

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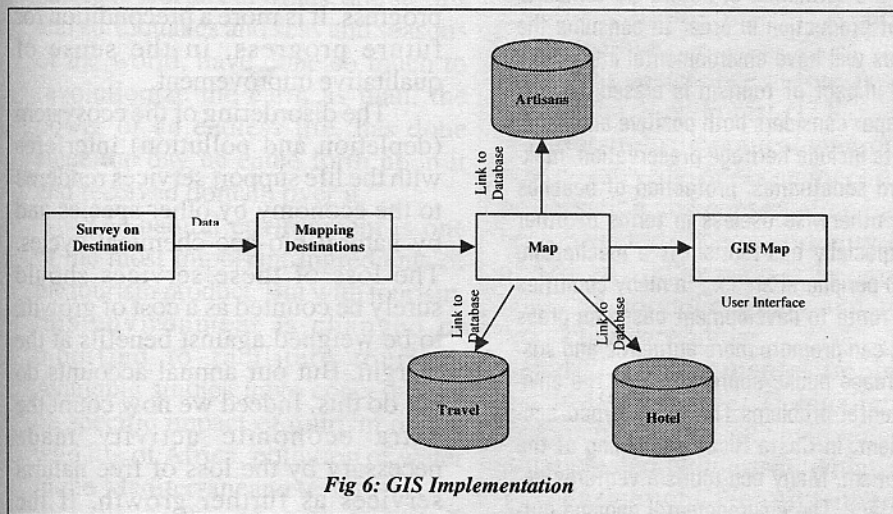15. Nath, Anand V., and Menon, Deepa, 2003.

Fig 6: GIS Implementation

plained above provides a GIS interface. For implementation of GIS one needs to follow the basics of mapping. Implementation of GIS is a mapping technique, which links to database for its dynamic interface. Figure 6 explains