Chapter 6
TOURIST INFORMATION SYSTEM FOR KERALA

6.1 Introduction

In our day-to-day life, we directly or indirectly interact with a number of information systems dealing with various topics. Information systems help individuals and organisations, to take informed decisions. This enhances their output and efficiency and helps to bring in more satisfaction to the individuals as well as to the management, employees and customers of the organisation. Through centralised and decentralised processing of data and information, they also lead to knowledge, ideas and theories. Data and information are the foundation of every information system.

6.1.1 Data and Information

“Data is raw unprocessed facts and figures that have no context or purposeful meaning; information is the processed data that has a meaning and is presented in a context.”

“Data may be processed by performing arithmetic operations on them or reorganising them by applying methods like sorting, merging, selecting, matching, filtering, etc.”

Information is the finished product, which is used to trigger certain actions or to gain better understanding of what the data implies. In a system, information is used for planning, controlling and decision making.

6.1.1.1 Levels of Information

In an organisational structure, planning, control and decision making are carried out at various levels. Accordingly, there are four levels of abstraction for information.

1. **Strategic information:** This information is the most important for long term planning and direction of a business. Strategic information is less structured, in small volume and difficult to arrive at.

2. **Tactical information:** Information needed to take short term decisions to run a business. This information is obtained by specially designed, complex processing of routine data. The volume of tactical data is more than strategic data.

3. **Operational information:** Information generated or processed on daily basis for routine conduction of business. This is obtained by straightforward simple
clerical processing of available routine data. Usually this forms the bulk of the information generated or processed in an organisation.

4. *Statutory information:* Information and reports submitted to government authorities or filed for subsequent verification. It is obtained by straightforward processing of data.

6.1.1.2 **Qualities of Information**

Information has numerous desirable qualities like:

- **Accessibility:** Information should be easily reachable.

- **Accuracy:** Information should be accurate enough to serve the purpose intended. Wrong information is worse than no information.

- **Completeness:** Information should include all details required by the user.

- **Reliability:** Information should be reliable and should not hide any vital data.

- **Timeliness:** Information should be available on time, as and when needed. Information received later may not serve any purpose.

- **Up-to-date:** Information should include the latest data available at the time of processing.

- **Relevance:** Information should be useful for the purpose.

- **Understandable:** Information should be presented in a way that can be immediately perceived by the receiver.

- **Brevity:** Information should be available in a brief and summarised form for easy understanding and quick action.

6.1.2 **Tourism and Information**

Tourism is characterised by the need to provide prompt and accurate information to the consumers. For this reason, tourism industry is greatly benefitted by developments in information and communication technologies. With the advent of Internet and development of information and communication technologies, people have access to large amounts of information related to tourism. This has grown so rapidly as to create a phenomenon of information explosion. Even though there are too many sources, formats
and categories of information available online, tourist may face difficulty in finding the right information at the right time.

Information systems have played important roles in the development of tourism. The global distribution system (GDS) which evolved from the computer reservation systems is an example for this. It aggregates information from airlines and other itinerary service providers, which enables travel agents and tourists to “make reservations and order other services in a single marketplace”.  

Information technology is not only a critical factor for destination competitiveness, but it is transforming the tourism system worldwide with regard to structure and operations. “ICT use in tourism has not only defined methods of making existing processes more efficient but has provided new ways of performing these existing functions”. Table 6.1 demonstrates some of the ways that ICT has been used in tourism industry.

**Table 6.1**

<table>
<thead>
<tr>
<th>Tourism Activity</th>
<th>ICT Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site selection and tourism development</td>
<td>– Geospatial information technologies</td>
</tr>
<tr>
<td>Marketing</td>
<td>– Inbound market research</td>
</tr>
<tr>
<td></td>
<td>– Outbound advertising</td>
</tr>
<tr>
<td>Customer relationship management</td>
<td>– Turn prospects into customers</td>
</tr>
<tr>
<td></td>
<td>– Booking of travel, lodgings, tours, etc.</td>
</tr>
<tr>
<td></td>
<td>– Trip management- pre, during and post</td>
</tr>
<tr>
<td></td>
<td>– Home-destination-home</td>
</tr>
<tr>
<td>Operations</td>
<td>– Buying, managing services and supplies</td>
</tr>
<tr>
<td></td>
<td>– Managing value chains</td>
</tr>
<tr>
<td>Managing and monitoring tourism site</td>
<td>– Geographical information systems and global positioning systems</td>
</tr>
</tbody>
</table>

*Source: United States Agency for International Development 2006*
6.2 Information System

An information system is a work system devoted to processing of information. Processing includes a combination of capturing, storing, retrieving, manipulating, displaying and transmitting. Such a system is typically used for converting data into information required for forecasting, planning, control, coordination, decision making and operational activities in an organisation.\(^9\) It consists of people, hardware, software, communication networks and data resources.\(^10\)

In a broad sense, all the ways that people communicate with others form information channels, which together constitute an information system. These channels may be oral, written, or digital, formal, informal or semi-formal, personal or impersonal and public or private. Different people, businesses and communities use information channels in different ways and combinations.

6.2.1 Computer Based Information System

As long as a system or organisation is small and has limited operational goals, manual information systems are enough for processing data. But nowadays many of the business activities have become competitive and organisations are distributed with many branches across the world and demand more up to date and accurate information. For large size organisations and systems, the data may be in large volume and in a variety of forms. Manual systems cannot efficiently handle such big volume of data in diverse formats and hence computer based information systems are required. Computerised information systems can process large volumes of data in many ways and managers can look at the performance of an organisation from different angles.

6.3 Tourist Information System

A tourist information system is a specific type of information system. It can be defined as a combination of people, hardware, software, communication devices, networks and data resources that processes data and provide information for tourists. Unlike other users of information, tourists need accurate and up-to-date information on their fingertips, anywhere and anytime. Paper maps and guidebooks, which are so far popular, have many limitations such as limited amount of details, difficulty in locating one’s own position on the map and difficulty in searching for a place of interest. An ideal
tourist information system provides tourists all the information they need to know about travelling in a particular place. It also serves as worldwide advertisements for tourism services, agencies and tourism activities. Many times such a system is built to promote a tourist destination, community or business. It provides information to anybody connected to the global network. Complete online information about tourist services will promote tourism by helping to increase the number of visitors and helping them to access the resources that best suit them. Advances in computer hardware, software, and networking technologies have spurred an evolution in the structure, design and use of tourist information systems.

6.3.1 Characteristics of Tourist Information System

A tourist information system consists of many channels including advertisements, brochures, tour operators, government agencies, repeat visitors, etc. The system should provide tourists all the information they need to know about travelling in a particular place. Additionally, the following characteristics are essential for an effective tourist information system.

1. Each channel in the system has its own function: A traveller may depend on different channels to get particular information, at different instances. Each information channel has its own function in different contexts.

2. All the information channels used in the system relate to each other by a common theme. A tourist information system has many different parts, which are inter-connected by the theme. Even though different channels of the system serve different functions in providing information, they are all tied together by the projected theme.

3. All channels used in the system are interdependent: Hence, it is essential that all the channels should be providing correct information in a coherent manner. If some channels violate this, the effectiveness of the whole system is lost.

6.3.2 Objectives of Tourist Information System

To serve as an effective means for destination tourism marketing, a tourist information system should strive to meet the following objectives:
Provide tourists with information about the destination.

Collect relevant information from the point of generation and makes it available to the tourists.

Integrate and coordinate the existing tourist information sources and services into an organised and effective network.

Find out the existing gaps in tourism information services and fill them by avoiding duplications of efforts.

Facilitate more contacts among the users and information sources through exchange of information.

Coordinate and implement sales promotion measures.

Advertise tourism products.

Facilitate research and development activities in tourism.

Promote the usage of documentary sources of information for tourism development.

Update and standardise the library tools and indexing languages from time to time.

6.3.3 Users of Tourist Information System

Developing information systems in the field of tourism and making them available through Internet can change the information seeking and information retrieving behaviour of tourists. A tourist information system can help the user to visualise the tourist destination and its features interactively and analytically.

Mainly two types of clients use a tourist information system, namely, potential tourists and managerial users. Potential tourists, also referred to as clients, customers or general public elsewhere in this thesis, need information about a place before they visit there. They want to know where the place is located, what facilities and services are available there, what is the climate, how to reach there, what is the fare, etc. The user should be able to do specific searches to find out this information. A Tourist information system can help the visitors in finding out the relevant facts about a tourist destination.
The managerial usage of a TIS may be done by professionals in travel and tourism sectors, corporate organisations, individual operators, tour groups or local administration agencies. A management query to the information system may be for finding out the details about the customers, their socio-economic background, their routines and habits, suitable facilities for accommodating the visitors, restaurants suitable for the visitors, attractive tourist sites, specialties in an area, etc. A TIS must be sophisticated enough to handle the multi-sectoral nature of tourism industry with diverse enterprises, stakeholders and customers.12

<table>
<thead>
<tr>
<th>Customer Approach</th>
<th>Management Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Where is the destination? (Country, state, location, etc.)</td>
<td>What are the important tourist attractions in the destination?</td>
</tr>
<tr>
<td>What will be the climate in the destination?</td>
<td>What are the physical and geographical features of the area?</td>
</tr>
<tr>
<td>What is the tourist season in the destination?</td>
<td>What are the major events in the tourist season?</td>
</tr>
<tr>
<td>What is the language in the area?</td>
<td>Translators and translating facilities are available in the area?</td>
</tr>
<tr>
<td>Availability of different types of accommodations and their booking procedures</td>
<td>What are the socio-economic backgrounds of the tourists, their food habits, etc.</td>
</tr>
<tr>
<td>What kind of public transport facilities are available?</td>
<td>How efficient and tourist-friendly are these facilities?</td>
</tr>
<tr>
<td>What are the important tourist attractions of the area?</td>
<td>What is the tourist demand for the area? What are the demographic characteristics?</td>
</tr>
<tr>
<td>What are the important cultural/ festival events in that season?</td>
<td>What are the plans, programmes and projects that will help to stimulate tourist activities?</td>
</tr>
<tr>
<td>Where are the nearby public facilities like, banks, ATMs, money changers, etc.</td>
<td>Availability of general infrastructure facilities and quality of services.</td>
</tr>
<tr>
<td>Where are the shopping locations, famous trading centers, etc.</td>
<td>Category wise list of traders, important trade centres, famous streets, etc.</td>
</tr>
</tbody>
</table>
6.3.4 Components of Tourist Information System for Kerala

Basically the TIS consists of a database containing all the tourism data about Kerala, its market research data, various programme modules, administrative programmes, etc. In addition, it will also have different related and interdependent information channels like:

- Promotional messages for Kerala tourism
- Associations of tourism related organisations in the region
- Information centers for travellers
- Business promotions for private organisations
- Brochures, signs, etc.
- Images and videos depicting culture and heritage of the region
- Trade and commerce
- Hospitality
- Community awareness and pride
- Other travellers
- Repeat visitors

6.4. System Analysis

“System analysis is the process of studying a procedure or business in order to identify its goals and purposes and create systems and procedures that will achieve them in an efficient way”. One of the essential pre-requisites for the creation, development and management of a successful information system is the availability of an experienced system analyst. A system analyst is appointed for studying the information needs of the system users and various aspects and functions of the proposed information system. His primary responsibility is to create a logical design of an information system that will meet the user needs. For this, he should interact with managers and users to find out what information they search in the current system and how they use it. They are then asked what beneficial information they lack. He must assign priorities among different requirements, analyse and evaluate existing system and suggest methods to improve them. The system analyst coordinates the works of managers, users and computer programmers, to develop and operate the information system. A good system analyst must have some basic qualities like, knowledge about the subject area of the information
system, knowledge about computer hardware, software and networking, good interpersonal relations, ability to communicate and also must have an analytical mind.

6.4.1 Tools Used by a System Analyst

System analyst is the responsible person for the entire process of design and development of the tourist information system. For this, he uses different tools to work at various stages like choosing the components, building and testing the sub-systems, integrating the sub-systems and validating. The system analyst should know the use of the following tools.

6.4.1.1 Data Flow Diagram

It is a tool that specifies the origin of data and its flow through a system and spells out where the data is processed to form information. A data flow diagram models a system by showing the entities where the data originates, gets processed and terminates or gets stored. It can provide an overview of what data are processed, what transformations of data are done, what data are used and what data are stored. Being a graphical representation, it is a good communication tool between the user, the analyst and the system designer.

6.4.1.2 Decision Tables

It is a tool for defining a logical procedure by means of a set of conditions and related actions, for specifying complex processing rules in a concise and easily understandable form.

6.4.1.3 Database Management Systems and Associated Languages

These tools are used for specifying users’ requirements and for prototyping the information system based on it.

6.4.2. Information Gathering

The system analyst collects both quantitative and qualitative information using different methods for finding out how the current system works for meeting the users’ information needs. Emphasis is given to identify missing function in the current system, unsatisfactory performances, excessive cost of operations, expectations of users, etc. For gathering all relevant information, interviews will be conducted and questionnaires will
be distributed among the users at all levels. Observation of existing information seeking behavior, statistical reports, conference papers and subject journals will also provide more information for the system analyst.

6.5 Development of the Tourist Information System

Development of the tourist information system has three stages, and each stage can be divided into so many activities as shown in the figure 6.1.

![Figure 6.1 Stages in Developing a Tourist Information System](image)

6.5.1 Stage 1

This is an important phase in the development of a tourist information system, where the needs are analysed for knowing the relevance, feasibility and possible architecture of the system. It has two segments; 1) requirements collection and analysis and 2) feasibility study.

6.5.1.1 Requirements Collection and Analysis

An information system is intended to meet the information needs of a particular group or organisation. Therefore, the first step in the design is to collect the needs or requirements of the users to be met by the system. One major segment of system users is
the public users who use the information system for finding relevant information. The other segment of system users consist of operational staff of the organisation who work with the system daily for entering and updating the data and collecting processed information on routine basis for analysis or storage. Other than system users, two more groups of people are involved in developing a computerised information system; managers of the system and computer programmers. Managers are responsible for running the information system and they are the primary beneficiaries also. The computer programmers are professionals who are responsible for writing the programme to implement the system and for creating and maintaining databases.

6.5.1.2 Feasibility Study

After determining requirements to be met by the proposed tourist information system, the system analyst will decide areas where a computer based information system can be implemented effectively and will present a working model of the system with specifications.

Feasibility analysis is conducted for finding out whether the needs can be met with the working model, and if yes, at what cost. The analysis will help to set goals for removing deficiencies of the current system (if any) and give appropriate solution and its cost benefits, by examining different alternatives. The alternative methods are modelled using data flow diagrams. The feasibility report will contain specification of information to be made available by the new system and of data to be input, along with a description of what will be done manually and what will be done by the computer. It will also spell out the configuration of hardware and software for developing a new system or expanding the existing system.

The recommended alternatives are shortlisted for further evaluation to find out their technical, operational and economic feasibility. Cost benefit analysis is necessary to determine economic feasibility i.e. whether it is economically worth to invest in the project. Both direct and indirect cost are listed. Direct cost are incurred for buying hardware, peripherals, software, stationeries, consumables, employing people, rent, travel, Internet, telephone, training, etc. and indirect cost include time spent by users in discussing with system analyst, data collection, etc. Benefits can be divided into two types; tangible and intangible benefits, where tangible benefits are directly measurable.
like savings made due to reducing expenses. Intangible benefits are not directly measurable and not easily assignable with money value. These include better service, accurate, reliable and up to date information, etc. The sum of all the direct and indirect costs is compared with sum of all tangible and intangible savings to find out the cost benefits.

The feasibility report will summarise what the proposed system will achieve, who will be responsible for operating and maintaining the system and what organisational changes are required for its implementation. Along with feasibility study, a possible architecture of the system is drawn out. Details like hardware and software elements, their specifications, nature and extent of manpower required, etc. are worked out. The feasibility report is reviewed by the management and approved for implementation.

6.5.2 Stage 2

After approving the feasibility report, the next step is to develop a logical design, based on the objectives of the information system. During this phase, the database is designed, and programme test plans and implementation plan are drawn up. A detailed proposal for hardware, peripherals and software essential to execute the information system is prepared. The volume of data to be processed, frequency of reports, nature of queries expected, response time for online queries, etc. would be considered for selecting the configuration of hardware and software. After that, the requirements for information processing obtained through interviews and questionnaires are analysed and interpreted. The needs are unambiguously transformed to precise statements for computational procedures. For this structured English is used where the natural language along with the ideas of logic and block structuring is used. This makes the description precise and understandable. In some cases where complex decision procedures are to be communicated, decision tables are used. In contrast to structured English, decision tables are non-procedural in nature.

6.5.3 Stage 3

The third stage of development consists of prototyping, implementation, validation and operation of the tourist information system.
6.5.3.1 Prototyping

A prototype of the information system is created based on the logical design described in the second stage. The prototype demonstrates the potentials of the information system to the users, inviting their comments and criticism so that the final system can be properly implemented. Prototyping can be regarded as an extension of the systems development process. The philosophy behind the approach is that if users can see what the final version of the system will be like and are able to come to an understanding on its acceptability, then there is a much less possibility of the final system being rejected.

6.5.3.2 Implementation

In the system implementation phase, a database is created based on the conceptual model of data and incorporating the relationships between various data elements. This is used to group data into a number of tables. The tables will help to reduce duplication of data and simplify the functions like adding, deleting, updating and retrieval of data. The organisation of data into tables is known as normalisation and helps to reduce redundancy. The collection of tables of data is called database. The normalised database will be later converted to a physical database.

The organised data in a table will have relationships among them, which connects the data to represent meaningful dependencies and an attribute, which specifies the properties of entities and relationships. In the lifetime of a database, the relations between entities will alter many times, but it should not lose information or introduce inconsistencies in database. The type of alternations normally needed for relations are: 1) insertion of new data values to a relation without affecting other relations, 2) deletion of a relation, without losing vital information and 3) updating or changing a relation.

To serve as the backbone of a tourist information system, the database should

- be expandable with the growth and changes in the organisation and be modifiable according to changes in user requirements
- be adaptable to changes in hardware and software environments
- validate data before storage
- allow only authorised persons to have access to the data stored in the database
The tourist information system requires a huge amount of data to be collected and entered. Data is entered using forms for which the operators are to be trained. The system is tested with operational data to develop a data dictionary. The dictionary will list only data used and will not say anything about the relationship among the individual data items. It is also required to develop software programs to aid in the entry, validation and storage of the data. A set of queries for accessing the data from the database are designed. These queries will explore the database using the previously defined relations and also will do arithmetic and statistical operations as and when required. A user friendly graphical user interface is to be designed for enabling easy and efficient access to the data.

6.5.3.3 Validation and Testing

After the system has been in operation for a reasonable period, its performance is evaluated and tested to make sure that during operation the system performs as per the specifications and meets users’ requirements. This requires evaluation of the programmes and manual procedures for finding errors and for correcting them. Controls incorporated in the system are verified for functioning as intended. The shortcomings of the system are understood at this stage. Based on the evaluation, plan for its improvement is drawn up and suitable modifications are made in the software. The strength of a good information system is its amenability to change as per the changing requirements of the users.

6.5.3.4 Operation

This is the final phase, where the initial data is loaded, and the information system starts working.

6.6 Architecture of the Tourist Information System for Kerala

The block diagram of the TIS for Kerala is shown in figure 6.2. The heart of the system is a Geographic Information System (GIS) server. This server is connected to a GIS database which stores data about objects such as roads, railways, hill stations, backwaters, hotels, etc. In addition to discrete objects, attributes like rainfall, temperature, and elevations can also be stored. Data is stored as raster images or as vectors. GIS makes use of spatial location as the key variable to index the records and to relate among tables.
In addition to the GIS server and database, a separate database containing data on offered services, packages, accommodation, reservations, client details, etc. is part of the system. This database is called Tourism Products and Services (TPS) database.
A web application server is provided so that clients can connect from anywhere in the world to access the information content. The web application server connects to the GIS server and TPS server over a local area network (LAN). The tourist information system can be registered in Internet search engines such as Google, Yahoo, etc. to make it visible to the users of World Wide Web. The different blocks of the Tourist Information System are explained below.

6.6.1 Geographic Information System Database and Server

Geographic Information System is a computer based information system used to digitally represent and analyse the geographic features and the events taking place in Kerala (non-spatial attributes linked to the Kerala). It consists of hardware, software, and data for capturing, managing, analysing and displaying all forms of geographically referenced information about Kerala. GIS allows us to view, understand, question, interpret and visualise data in many ways that reveal relationships, patterns and trends in the form of maps, globes, reports and charts. GIS can be thought of as a system that provides spatial data entry, management, retrieval, analysis and visualisation functions. GIS helps in answering questions or solving problems by looking at data in a way that is quickly understood and easily shared.

6.6.2 Tourism Products and Services Database and Server

There is lot more information expected from the tourist information system than that handled by the GIS. Examples are events in tourist season, entertainment facilities, translator facilities, tourist statistics, room availability, reservation information, details of trains and other public transport vehicles, etc. Data pertaining to this will be stored in a separate database called tourism products and services database with an associated server.

6.6.3 Server and Client Machines

Servers are providers of resources or services, which the clients can request and access. Client can be on a different machine connected to the server through a network or it can be on the same machine as the server. The client initiates a communication in the form of a service request and the server fulfills the request. In the tourist information system the server component is responsible for providing tourist information according to the client’s request and returning the data and images back to the client application,
suitable for the visualisation. The client component provides the user with a graphical user interface (GUI). Its main tasks are collecting the user input data and communicating with the server in order to retrieve the information as well as to provide interactive mechanisms for representing and analysing the results.

The server must have robust hardware configurations to handle large volumes of client service requests. Hence, the server should have a multi-core processor, high clock speed, large cache size, as much RAM as possible and multiple hard drives combined to a large logical storage using a RAID (Redundant Array of Independent Disks) controller. This will ensure that the system will work with any size or physical layout of network and will not slow down with heavy use.

The recommended configuration (state of the art as on August 2014) of a server machine for Tourist Information System for Kerala is as follows.

Microprocessor: 2 numbers of Intel Xeon Processor E5-2690 (8 core, 2.9GHz)
Cache: 20MB L3 Cache per processor
Chipset: Intel C504 chipset with OEM motherboard
Memory: 4 numbers of 16GB ECC DDR3, 1600MHz
Memory expandability: 12 slots
Hard disk drives: 4 numbers of 900GB 10K RPM SAS or above
Optical drive: DVD Writer
Ethernet: 4 numbers
Interfaces: 6 numbers of USB 3.0/2.0 RS485 port, 2 numbers of RJ45
PCI Slots: 4 numbers
RAID controller: RAID controller card with 512MB battery backed cache

The client machines connected on the local area network are high end personnel computers with attached scanners, printers and DVD read-write drives. The recommended configuration of such a machine suitable for the present application is as follows.

Microprocessor: Intel Core i7-3770 processor (3.4 GHz)
Cache: 8MB L3 Cache
Chipset: Intel Q77 chipset with OEM motherboard
Memory: 8GB ECC DDR3, 1600MHz
Memory expandability: 3 slots
Hard disk drives: 1TB SATA-II
Optical drive: DVD Writer
Interfaces: 4 numbers of USB 3.0/2.0 RS485 port, Ethernet port, RJ45
PCI Slots: 4 numbers.

6.6.4 Local Area Network

In the proposed tourist information system, the computers and servers used to build the system are physically connected with one another though a local area network. The machines in the network are connected to each other using unshielded twisted pair (UTP) cables using 16 port switches. Bridging the 16 port switches, larger networks can be made. This network can communicate at the rate of 100 megabytes per second. In the place of UTP cables optical fibre cables and wireless connections can be used for higher speed LAN. The physical network is comprised of the computers (with network cards), routers and cables.

6.6.5 Internet and World Wide Web

Internet, the network of networks, can be used to access the tourist information systems from any part of the world. A Public Switched Telephone Network (PSTN) will rout the messages originating from a computer to the destination. In each participating computer, there must be appropriate software to format the messages using Internet Protocol, which is a set of commonly agreed rules so that it can be properly interpreted. Each participating computer in the Internet has a unique IP address.

Information is communicated on the Internet in the form of packets containing a header, which is used to route the packet and the payload- the actual information. The header consists of the source and destination addresses, the serial number of the packet, error detection bits and other control bits. The packets find their way to the destination through a number of routers which store the packet till a communication channel becomes available. This is called packet switching. The packets are finally assembled at the destination, based on the serial number.

The World Wide Web is a global multimedia information service available on the Internet. It consists of linked web pages created using Hyper Text Markup Language
(HTML). This language has the feature to embed links within web pages, which points to other web pages, files or databases. Web pages are stored in web servers and a scheme known as Uniform Resource Locator (URL) is used to locate a web page in World Wide Web.

6.7 Functionalities of the Tourist Information System

The usefulness of the tourist information system can be enhanced by enabling it to do a range of functions, which complement and supplement its basic objective of providing information. These functions are described below.

6.7.1 Personalisation

This quality provides the users with the opportunity to customise their search results based on their choice and preferences.

*Personal profile:* Customers can create profiles containing personal details like native address, demography, preferences, interests, etc. Information from this profile can be combined with the customers’ query about destination and other services for offering suggestions.

*Context aware:* Date, time and current weather are the context aware information. This information combined with personal information and location information can be used to recommend places of interest, food and accommodation facilities and travel routes between two points.

*Location aware:* During travel, Global Positioning System is used to obtain the details of present location of the tourist and recommend the places nearby.

6.7.2 Aids to Information Retrieval

An open direct search function can be used to search all the information available in the system. The following add on features enhance the utility of information search.

*Presentation of information:* The system can present information in a context aware method. For e.g. if a customer searches for information about a location, a list of nearby places based on the interest of the customer and season will be displayed.
Practical tips: The system will automatically notify the user when there is a point of interest at a nearby place or if there is an upcoming event.

Dynamic information: The system can provide the customers with dynamic information like daily attractions, current events, special menu in restaurants, working hours, timing of transportation, etc.

6.7.3 Maps

Different map functions such as displaying current location and displaying points of interest on a map are categorised as map functions.

Current location: The system will show the current position and orientation on a map.

Nearby places of interest: The system will assist the users by pointing out in a map, the places of interest nearby to a location.

Thematic presentation: For making easy access to information, points of interest on the map can be categorised based on themes like, restaurants, museums, accommodation facilities, etc.

Navigation: The system can plot a route between two places on a map, for making easy transportation.

6.7.4 Social Networking

Functions such as instant messaging, showing friends locations or leaving comments about places visited are categorised as social networking functions.

Community development: People can register as friends in the system to see locations of each other on a map.

Messaging: The registered members can send messages to each other in the community. In addition, the members can send and receive messages from the tour guides or tourism information centres.
**Guest book/bulletin board:** All registered services in the system have a guest book, where users can rate the service or leave their comments. These can be browsed by all users for getting an idea about the services.

### 6.7.5 Planning

Functions related to planning tours or making reservations and bookings are categorised as planning functions.

*Preparing:* The user can browse the system for choosing the interested locations for creating a tour and finalising the services.

*Reservations:* The system will help the users in making reservations for events, attractions, food and accommodation directly by avoiding intermediaries.

### 6.7.6 Transportation

Functionality that supports and encourages use of public transport, such as showing railway timetable, schedule of transport busses, ferry services, etc. included here. The user can browse the system to plan his travel using multiple modes of transport like air, rail, road and water. Wherever possible, reservation facilities for these services are also to be provided.

### 6.7.7 System Outputs

The information obtained as the result of processing of a query is called the output. It may be a report in text format, graph, multimedia file like audio clip, video clip, etc. A request for an output notifies the information system to sort out the results, generate additional queries to notify other systems, update reports, adding attributed data and presents result in a convenient form. This involves reporting, analysis and decision making.

Presenting the processed data by an information system in an attractive and usable format is extremely important. Very often the success and acceptance of a system depend on the format of presentation. The most important output devices are printers and video display units. Printers are used when the output is to be distributed to many persons or is to be filed for future reference.
Video display units use cathode ray tubes or liquid crystal display or light emitting diodes for displaying results and answers to queries online. The information displayed on a video display unit is interactive and the user has to be instructed how to get appropriate information.

With the advent of inexpensive speech synthesisers and sound cards, the output and results from the tourist information system can also be delivered through audio output devices for immediate or delayed usage.

6.7.7.1 Print Outputs

The proposed tourist information system will have different types of print outputs for delivering information to the users. The designs of various print outputs will be based on the type of tourists, their educational qualification, purpose of visit, frequency of visit to Kerala, travel experience, etc. Normally every print outputs will have a report heading which appears on the first page of the report, a page heading, page footer and report footer. Except for very simple reports, they also contain sub headings and field headings.

The general principles used in designing the print outputs are:

- The key field will be the easiest to find;
- Page heading and page number will be provided;
- Date of printing the report will be indicated;
- All columns will be labeled with meaningful headings;
- Too many details will be avoided and
- Page footings and report footings will give summaries.

6.7.7.2 Screen Outputs

Most of the guidelines for print outputs are valid for displaying outputs on video display terminals also. Output in video display units requires active participation from the users because it displays results online. The user must be given clear instructions on how to retrieve the information, how to get to the next screen, how to exit, etc. The system should be able to recover a wrong key pressed by the user and should present alternative options before the user.
6.7.7.3 Graphical Outputs

Computer based information systems have the facility to present outputs in pictures and graphs showing trends, bar charts, pie charts, maps, etc. Graphs have the advantages of condensing and presenting the information in a form where it can be comprehended easily. Bar charts can show the distribution of the number of items having specified characteristics within a specified range. Pie charts can show the percent or part of a total used by different entities. Maps have the ability to present information on a geographical background.

6.7.8 E-Commerce

The tourist information system will permit business through e-commerce. E-commerce is transactions carried out between two organisations or individuals online using their computers which are connected by a telecommunication system or Internet. The transactions include ordering a service or product to a supplier, invoicing by the supplier, making of payments, etc. Many types of tourism products and services can be sold using the World Wide Web. The major advantages of e-commerce are; a) one can buy or sell items from anywhere; b) E-commerce is generally available at 24 hours in a day and 365 days in a year; c) All types of services and goods are available for e-commerce; d) Can save time and money of physically visiting and searching many shops; e) Business is carried faster as all documents are exchanged electronically; and f) Real time inventory and less transaction time.

There are many disadvantages also for e-commerce like; a) Sometime the transactions are not reliable; b) Payments by credit card requires faith in the system security; c) Virus attack and other electronic vandalism d) Lacking of personalisation, social contacts, touch and feel before buying items, etc. and e) Small business groups may find it difficult to establish and maintain the required infrastructure for e-commerce.

6.7.9 Payments

In the tourist information system, payments can be made as credit card and debit card payments, cheque payments or cash payments. Credit card and debit card payments are made using a protocol called Secure Electronic Transaction (SET). For cheque payments, organisations use digitally signed cheques and public key certificates issued by
a certifying authority. Cash payments can be made through e-coins issued by banks to customers after debiting the amount from their account. Another system called National Electronic Funds Transfer (NEFT) can also be used to enable bank customers to transfer funds easily and securely through electronic messages.

6.8 Building up of the Tourist Information System

A comprehensive information system for the development of tourism in Kerala should contain all the necessary data for both users and administrators of the system. Building up of a perfect tourist information system will take time to collect and load all the required information. Collection of information and data entry are the two important sections of building up of an information system.

6.8.1 Collection of Information

The Primary step to be taken for building a tourist information system is gathering of all types of data related to tourism in Kerala. It includes historical, natural, cultural and socio-economic information about important tourist destinations in Kerala, images of the major historical and important cultural centres, information about amenities like accommodation and travel facilities, reservation facilities, details of major hotels with facilities available, rates of rent and charges of different services, etc. The data may be in different formats like text, photographs, video clippings, statistics, etc. This data can be categorised as:

6.8.1.1 Spatial Data

Data relating to places, which may be in the form of pictures, video clipping or text, which is giving basic information about Kerala. In the tourist information system, these are given in different layers.

6.8.1.2 Attribute Data

Attribute data are the supporting information in the form of text and numbers that provide the factual information about the spatial data. Attribute data also defines the spatial data by providing additional information.
Table 6.3
Layers of the Tourist Information System for Kerala

<table>
<thead>
<tr>
<th>Layer Name</th>
<th>Spatial Data</th>
<th>Attribute data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourist Spots</td>
<td>Places with tourist value are identified and listed.</td>
<td>Location, historical and other relevant information about the tourist spots.</td>
</tr>
<tr>
<td>Travel Hubs</td>
<td>Airports, railway stations and bus stations are listed in the layer.</td>
<td>Location and distance from major tourist spots are given as the attributes.</td>
</tr>
<tr>
<td>Hotels</td>
<td>Details of all the standard hotels and restaurants collected and categorised based on standard criteria are given in this layer.</td>
<td>Supplementary information like number of rooms, rates, availability of dormitories, star ratings and other facilities.</td>
</tr>
<tr>
<td>Backwaters</td>
<td>Particulars of backwaters of Kerala, which are lagoons and lakes, some of them interconnected and most of them lying close and parallel to the Arabian Sea and are famous tourist attractions.</td>
<td>Details of all the backwaters, lakes, canals (both manmade and natural) and rivers are added as attributes. Photographs and video clippings are given as additional information.</td>
</tr>
<tr>
<td>Hill Stations</td>
<td>Kerala’s hill stations are attractive with its high mountains, gorges, deep valleys, dense forests, tea and coffee plantations, spice cultivations, etc.</td>
<td>Details including transport facility to the locations, accommodation facilities, photographs, video clipping, etc. are given in the attribute table</td>
</tr>
<tr>
<td>Wildlife</td>
<td>The evergreen rainforests of Kerala are rich with peculiar flora and fauna. The wildlife sanctuaries are rich sources of world's rarest and most threatened animals. The biodiversity of Kerala will be the theme of this layer.</td>
<td>Flora and fauna of Kerala is listed with sufficient details and photographs. Much coverage is given to rare and medicinal plants. Birds and animals facing extinction are profoundly covered.</td>
</tr>
<tr>
<td>Ayurveda</td>
<td>Kerala’s famous traditional systems of medicine like Ayurveda and Siddha draw increasing numbers of tourists.</td>
<td>Details of important hospitals practicing traditional systems of medicine, including their name, location, facilities available and contact details are the attributes.</td>
</tr>
</tbody>
</table>
Kerala has a unique culture, which is mainly Dravidian in origin. Native performing arts like koodiyattom, kathakali, Kerala natanam, koothu, thullal, mohiniyattam, padayani, theyyam and the famous martial art Kalaripayattu, etc., forms the components of culture layer.

Brief description about each of the performing arts along with photographs and video clipping are given as attribute data.

Availability of hospitals ambulance services, fire and police stations near each tourist spot are given in this layer.

Contact numbers and addresses of the emergency services are given.

The main roads and sub-roads are mentioned in this layer.

Name of the roads and the places they connect have been given as attributes.

National and state highways passing through Kerala are shown in this layer.

Name of the highways, places they connect, end to end distance and other details have been mentioned.

All the districts of Kerala are accessible by train except Idukki and Wayanad. A rail map for Kerala showing the rail routes and stations will be available.

Railway timetable, route of trains, distance to tourist spots from railway stations, etc. are given. Facilities attached with each railway station are also detailed.

Kerala’s famous centres of trading for native products, prominent shops and shopping malls are shown in this layer.

Details of markets for Kerala’s well known agricultural products like pepper, tea, cardamom, rubber, vanilla, ginger, etc. and handicraft products and hand woven clothes are given as the attributes. Contact details of important shops and shopping malls are also given.

6.8.2 Data Entry

After collecting data, the next step is inputting of the collected data into a well defined database. A data entry operator enters the records into the database. The text matters are keyed in and the multimedia data like images, clippings, sound files, etc. are transferred into the database after digitising using scanners and digitisers.
Existing data printed on paper or PET film maps can be digitised or scanned to produce digital data. With regard to the GIS, digitisation is the process of converting paper or scanned maps into digital files in order to encode geographic features in digital form as coordinates. A digitiser produces vector data as an operator traces points, lines, and polygon boundaries from a map. Scanning a map results in raster data that could be further processed to produce vector data. The online digitisation procedure using ArcView GIS 3.1 enables the road and rail network to be digitised as line features, lakes and rivers as polygon features and bus stations, railway stations, hospitals, places of tourist interest, offices, educational institutions and stadiums as point features.

Survey data can be directly entered into a GIS from digital survey instruments using coordinate geometry. Positions from a global navigation satellite system like GPS (Global Positioning System) can also be collected and then imported into the GIS directly using computers with wireless Internet connectivity. Coordinates of points where tourist attractions, hotels, clubs, museums, art galleries, parks, etc. are situated can be entered like this. The data captured are grouped into different categories like Facilities, Services, and Tourists Destinations and assigned with unique identifiers.

The combination of several spatial datasets (points, lines, or polygons) creates a new output vector dataset, visually similar to stacking several maps of the same region. These overlays are similar to mathematical Venn diagram overlays and can perform similar operations. A union overlay combines the geographic features and attribute tables of both inputs into a single new output. An intersect overlay defines the area where both inputs overlap. A symmetric difference overlay defines an output area that includes the total area of both inputs except for the overlapping area.

Each record in the database is assigned with a unique record number for identification. Record number is also useful for easy cross referencing, efficient storage and retrieval. A record will contain so many fields for defining an item. The fields are determined based on the outputs needed. Before the data is stored, it must be ensured that any error made during data entry is detected and corrected for ensuring the validity of data. The accepted records will be stored in the database.

The input of data to a database can be either online or offline. In online data entry, the operator enters data interactively into the computer’s secondary storage. The
computer will display on the screen a form to be filled in or ask questions to be answered or present a pre-designed menu giving fixed alternatives. Any error in data entry is checked immediately and the operator is prompted to correct it. This method will reduce key strokes and the use of mouse and pointer will be helpful to simplify the data entry processes.

In offline data entry, the data is written manually in pre-printed stationeries, at the point where the transaction originates. Many forms are collected to develop a batch and a data entry operator enters a batch of forms into a computer. Considerable time elapses between the entry of data in computer and actual transaction. Errors in data entry are thus found much later than when they occur. The forms are to be designed in such a way as to minimise errors during data entry in the place of transaction.

There are mainly two types of data entry errors; 1) single transcription error where a single digit is incorrectly entered and 2) transposition error where any two digits in the code are interchanged. Good form designs and careful data entry will help to reduce inputting of incorrect data into the database. Great attention should be given for input preparations. Data validation programmes should be written to check for possible errors in data entry processes.

6.8.3 Integrating the System

This is the process of positioning tourist entities like hotels, restaurants, tourist spots, etc. on to a map of a tourist destination. Each object integrated on the map will be represented by a symbol and linked with the corresponding homepage through a hyperlink to enable navigation. Georeferencing is the process of registering a geographical data set to an established coordinate system. Scanned maps do not usually contain information as to where the area represented on the map fits on the surface of the earth. The location information delivered with aerial photos and satellite imagery is often inadequate to perform analysis or display in proper alignment with other data. To establish the relationship between an image (row, column) coordinate system and a map coordinate system, we need to align or georeference the raster data (image). The image-to-map rectification approach is used for georeferencing. This approach involves the measurement of the image coordinates of the reference cell and their corresponding ground control points.
6.8.4 Database Management

Database management aims to allow writing application programmes to access and process the data, independent of the physical organisation of files in secondary storage. It effectively ensures that necessary data in the desired form is available for diverse applications of different subsystems. A database management system minimise storage of redundant data, maintain consistency of data values, ensures validity of stored data, protect data, prevent unauthorised access, control insertion, deletion and alteration of data and ensures fast access of data required by application programmes.

A database management system will contain

- Data definition languages and compilers implementing them
- Data manipulation languages and query languages known as Structured Query Languages (SQL)
- Procedures that can be invoked at execution time to generate the database and access it subsequently.

A database administrator is a controller, whose responsibility is to ensure the integrity, security and privacy of data. He coordinates the data collecting works, obtaining organisation’s conceptual view including future needs, designing logical database, implementing the database and maintaining it. The database administrator maintains a data dictionary, which is a central repository of information about entities, their relationships, data elements corresponding to entities, their relationships, etc.

For managing the GIS database, standard software like ESRI ArcGIS 9.3 desktop Geodatabase can be used. Another option is to use new technology like The OpenGIS Geography Markup Language Encoding Standard (GML), which is similar to XML encoding, for storage and transport of geographic information. It can handle spatial as well as non-spatial properties. GML can distinguish between geographic data and graphic interpretation of the data as it appears on a map. GML data are coded into XML graphical format using formats like Scalable Graphics Format, Vector Markup Language, etc. GML is for distributing the data where as Scalable Vector Graphics is for processing and presenting it.
6.9 Queries

Tourism is an information based activity and tourists demand specific information about their travel destination, conveyance and accommodation facilities and many other indispensable requirements in different stages of the travel. The tourist information system for Kerala will provide all the required information to the tourists anywhere and anytime for making their trip an enjoyable one.

6.9.1 Geographical Queries

A geographical query is used to locate a specific type of object (attractions, hotel, bus stop, etc.) in the geographic space covered. Geographic criteria like nearness, distance and region are the spatial analysis options used for providing easy search. A geographical query can be categorised into three types:

6.9.1.1 Object Based Search

1. Location specific: Asks for a specific location in a region. *e.g.* Where is the Napier museum?
2. Nearest or a specific object: Seeking a nearby object, facility or service to a location. *e.g.* Find hotels near Napier museum?
3. Objects in a region: Try to find all objects within a definite area. *e.g.* Show all the tourist spots near Napier museum.

6.9.1.2 Area Based Search

1. Entities in a city or region: *e.g.* List of important tourist locations in Thiruvananthapuram city.
2. Entities in a specific area: *e.g.* Tourist spots near Kovalam beach in Thiruvananthapuram.
3. Search for entities within a distance from a location: *e.g.* List of hotels within one kilometer of Kovalam beach.

6.9.1.3 Object and Area Based Search

A search made by combining object based and area based searches. *e.g.* Give a map with all the three star hotels within a distance of one Kilometer of Kovalam beach.
6.9.2 Geographic Query Work Flow

In the tourist information system, each tourism object will have a geographic representation and will be stored in a geographical information system database. The query made by a tourist about a tourism product or service will be transmitted to the integrated geographical information system with appropriate transformations through the World Wide Web. The map data obtained from the GIS will be augmented by the TPS by attaching other attributes related to the object like events, availability of the service, etc. The transformation and integration module converts this data into the required presentation media.18

Figure 6.3
Flow of a Geographic Query

6.10 Reliability of the Information System

Suitable techniques will be developed and incorporated in the design of the tourist information system for checking its reliability. Control, audit and security methods, which are normally used for checking the reliability of an information system will used in the TIS also.

6.10.1 Control in the Information System

Control is required at various phases of data processing to ensure the accuracy and reliability of outputs. The information system handles massive volumes of data. Methods
should be devised to control the flow of data in and out of the processing system, and to ensure that all data entering the system are correct and included for processing and no duplicate data enter in the system. If some records are omitted by mistake, the control function should find the location of such errors without having to search the entire system. A good control is a pre-requisite for the tourist information system, to guard its worthiness and reputation.

6.10.2 Auditing of the Information System

Auditing is a process done by an auditor who checks the system to make sure that it is built as per specifications and the processed results are correct. Auditing has also to ensure that there are no errors in the procedures for entering and processing of data. In a computerised information system, the intermediate records are not available for inspection, and an expert auditor who is also a computer expert can only check the system for errors. Three types of auditing methods can be used for the tourist information system for Kerala 1) auditing around the computer -by checking only the inputs and outputs 2) auditing through the computer –computer programme itself is checked and 3) auditing with the computer –writing special programmes to check the system.

6.10.3 Security of the Information System

Security is concerned with the protection of the data resources and the programmes against accidental or intentional destruction or modification or disclosure to unauthorised persons. It is the responsibility of the system analyst and database administrator to ensure the security of both data and programmes by protecting them from theft, corruption and other types of destructions. Backup copies of master files and transaction files are to be made daily and should be kept in a safe place. Every access to the system should be logged and only authorised person should be allowed to change data.

Sufficient preventive measures should be taken to guard against attacks of viruses, malware, worms, Trojan horses, spyware, adware and other malicious programmes. Updated antivirus programmes and firewalls can protect the information system from data corruption and data loss.
6.11 Management of the Tourist Information system

Management of the tourist information system helps at various levels in making, carrying out and controlling decisions. It is a means of communication where data are collected, processed, stored and retrieved later for making decisions of planning, operation and control. The important means for management of a tourist information system are:

- Establish a committee or organisation to manage the tourist information system. It should control what information is used and how it is distributed throughout the system. The committee/organisation should also be responsible for evaluating the system's effectiveness.

- Establish a set of standards, or guidelines, for deciding what, how and through what channels the tourist information will be presented. This will help to ensure that information used is accurately reflecting the theme and that it reaches the right target market.

- Develop community co-operation in the system. Explain the benefits of being involved in the system to local business persons and to community residents and develop community awareness and pride.

- Identify special areas and locations where tourism could be an appropriate strategy i.e. zoning. A community's appearance plays a significant role in its tourist information system. Appearance of a community is significantly influencing the tourist's image about it. Zoning can be used to make sure that a community's appearance will have a positive influence on its image in tourist’s mind.

6.12 Importance of the Tourist Information System

- Tourists need organised information so that it becomes easier to acquire and make decisions. They do not want to, nor have time to, sort through information that is confusing and disorganised. The easier it is to get information, the more comfortable travellers feel and the more enjoyable the trip will be for them. Travellers who are satisfied with their trip will be more likely to return and to tell others about the good time they had, which will boost up the popularity of Kerala tourism.
A tourist information system can present the theme to the tourists in a clear, concise, and consistent manner. There will be administrative control over information received by travellers through different channels, for making sure that all the delivered information relates to the theme and according to the demands of the tourists.

A tourist information system plays an important role in community development, because travellers see the community as a whole, rather than as individual parts. Community's image is important because tourists often become future investors and residents in communities that they find attractive.

6.13 Conclusion

Information is the most essential element for a tourist and it is important to be provided at the right time, place and format. Real time information is greatly needed to reduce travel uncertainty, minimise costs and improve quality of travel. Tourists wish to obtain information directly without any type of mediations and the content, quality and presentation must meet their exact demands. As information is the lifeblood of tourism, information technologies provide both opportunities and challenges for the industry. A tourist information system can act as the bridge anchored between the tourist and tourism industry. As an information based industry, tourism is traditionally exploiting intensively the information technology for its advancements. At the same time, the rapid developments of information and communication technologies have opened the doors to entirely new perspectives in the tourism business and services to the tourists.

A well organised tourist information system will benefit local businesses, the community and local residents as well as the travellers. It helps the local residents and travellers to locate recreation activities, sites and service outlets. It helps to build community pride and establish long term ties with satisfied visitors. It will also avoid confusion and other problems that happen with poorly oriented, directed and managed travellers. By enabling the present tourism industry to improve its competitiveness by utilising the emerging information and communication technologies and innovative management methods, the industry can go further to maintain the status as the leading industry in the service sector as well as the major provider of jobs and significant generator of foreign exchange.
This chapter has presented the design and development of a tourist information system for Kerala making use of the latest developments in information and communication technologies. The system is architected to provide the tourist with all information necessary to plan, execute and enjoy a tour to any location in Kerala. If the system is well implemented and managed, it will provide potential tourists a virtual, dream-like voyage through ‘God’s own country’ at the leisure of his home anywhere in the world. It will also enable him to translate his dream to a reality by detailed and meticulous planning, which best utilises his time and budget. Additionally it will enable him to reserve and pay for travel, accommodation and entertainments in advance for a tension free experience. During the journey it will provide the tourist with up-to-date and location aware information in real time through mobile devices to enhance this experience. By enabling the tourists to have an enjoyable and hassle free experience in visiting Kerala as well as by promoting stakeholders of local tourism industry, the tourist information system will contribute in a big way to the growth of tourism in the state.

References:


